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TRAINING AND LEARNING IN THE INFORMAL SECTOR IN THE GAMBIA

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**A thesis submitted to The University of Huddersfield
in partial fulfilment of the requirements for the degree of
Doctor of Philosophy.**

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The University of Huddersfield

Abstract

Over the last 30 years or so, there has been growing international interest in the “informal sector” of the economy in developing countries, and there is now the recognition that to operate successfully as artisans in the informal sector, “apprentices” require a range of knowledge and skills.

The general aim of the present, qualitative study, was to investigate how apprentices in informal sector enterprises in two trades (the Motor Vehicle trade and the Tie-dye trade) in The Gambia learn at the workplace and how such learning was facilitated. Twenty enterprises were selected for the study, ten in each trade.

A variety of data collection methods were employed, namely, (a) individual, semi-structured interviews of the entrepreneurs (who owned these enterprises), and of the apprentices, (b) observations of the tradespersons and apprentices at the workplace, (c) accounts of “critical events”, and (d) documentary studies.

The study has shown that (a) the tradespersons did not demonstrate to the apprentices the procedures for the tasks that they were undertaking, (b) the apprentices were not allowed to practise on the tasks that the tradespersons were contracted to undertake; (c) the apprentices practised their skills privately in their leisure time. (d) the tradespersons did not explain to the apprentices the theories underpinning the technical procedures; and for the apprentices, the term “theory” referred to the technical procedures, as such, rather than to the scientific and technological concepts and principles underpinning the procedures, (e) although the apprentices were often outwardly passive they did observe closely the tradespersons at work and made associative links with their own previous knowledge and experience.

What has also emerged from the study is that apprentices’ learning at the workplace in the informal sector is: (a) a multi-dimensional process, largely self-motivated and conditioned by the rigid hierarchical structure of the workplace. (b) (i) productivity-driven, (ii) atheoretical, (iii) unplanned, (iv) unstructured, (v) facilitated through role modelling.

The study compared the concepts of learning which emerged from the study with the traditional concepts of learning and teaching in Vocational Training Institutions.

This study has also shown that the tradespersons failed to assess formally competent performance at the workplace. There was no end-of-apprenticeship assessment for the apprentices in the Tie-dye trade; and in the Motor Vehicle trade, the assessment was *ad-hoc*. Importantly too, from the entrepreneurs’ perspective, the workplace was about production and not about apprentice learning. The tradespersons were expected to concentrate on their jobs and not on training, in sharp contrast to the apprentices’ expectation that the tradespersons should concentrate on skills training.

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CONTENTS		PAGE NO.
Abstract		i
Acknowledgements		ii
Table of Contents		iv
List of Tables and Figures		ix
Acronyms		xi
	Overview of the Structure of the Study	1
CHAPTER 1 :	INTRODUCTION	2
1.1	The Gambian Economy	4
1.2	The Informal Sector	8
1.3	Vocational Training	13
1.4	The Apprenticeship System	14
1.5	Statement of the Problem	18
1.6	The Research Questions	19
1.7	Aim of the Study	20
1.8	Terminology	20
CHAPTER 2 :	REVIEW OF THE RELEVANT LITERATURE	23
2.1	Learning Theory in General	23
	2.1.1 Learning and memorising	31
2.2	The Learning Process at the Workplace	32
	2.2.1 Theory <i>versus</i> practice	33
	2.2.2 Problem solving	42
	2.2.3 Understanding at the workplace	45
2.3	The Motivation to Learn	48
2.4	Training	51
	2.4.1 Formal, on-the-job training	52
	2.4.2 Formal, off-the-job training	53
2.5	Summary of the Literature Review	55
CHAPTER 3 :	METHODS AND PROCEDURES	58
3.1	The Research Design	58
	3.1.1 Documentary studies	62
	3.1.2 Case studies	64
	3.1.2.1 Interviews	64
	3.1.2.2 Accounts of critical events	65
	3.1.2.3 On-site observations at the workplace	66
3.2	The Pilot Study	67
3.3	The Main Study	68

3.3.1	Data collection procedures for the main study in the motor vehicle garages	68
3.3.1.1	The sample of motor vehicle garages	68
3.3.1.2	The sample of respondents in the motor vehicle garages	71
3.3.1.3	The interviews of the motor vehicle entrepreneurs'	77
3.3.1.4	The observations of the tradesmen's activities	78
3.3.1.5	The interviews of the motor vehicle apprentices	78
3.3.1.6	The observations of the motor vehicle apprentices and their accounts of critical events	79
3.3.2	Data collection procedures for the main study in the Tie-dye trade	80
3.3.2.1	The sample of tie-dye businesses	81
3.3.2.2	The sample of respondents in the tie-dye businesses	84
3.3.2.3	The interviews of the tie-dye entrepreneurs	89
3.3.2.4	The observations of the tradeswomen's activities	89
3.3.2.5	The interviews of the tie-dye apprentices	89
3.3.2.6	The observations of the tie-dye apprentices and their accounts of critical events	90
3.3.3	The analytical procedures	91
3.3.3.1	Content analysis	91
3.3.3.2	Comparisons	92
3.3.4	Constraints and limitations	92
3.3.4.1	The constraints on data collection	92
3.3.4.2	The limitations of the study	94
CHAPTER 4	: RESULTS FOR THE MOTOR VEHICLE TRADE	96
4.1	The Apprenticeship System in the Motor Vehicle Trade	96
4.2	A day in a motor vehicle garage	102
4.2.1	The particular day	103
4.3	Two Apprentices' Accounts of Critical Events	115
4.3.1	First account of a critical event (an event in connection with starting a motor vehicle engine)	115
4.3.2	A second account of a critical event (in connection with an overheating engine)	118

4.4	Individual Interviews of an Apprentice and of an Entrepreneur, respectively	120
4.4.1	Record of an interview with an apprentice	120
4.4.2	Record of an interview with an entrepreneur	132
4.5	The analysis of results for the Motor Vehicle trade	142
4.5.1	The learning of practical skills	142
4.5.1.1	Learning by observing	142
4.5.1.2	Learning through problem-solving	152
4.5.1.3	Trial and error learning	154
4.5.1.4	Monitoring of learning	155
4.5.2	The learning of theory	156
4.5.3	Learning through understanding	160
4.5.3.1	Recall in learning	168
4.5.4	The motivation to learn	173
CHAPTER 5	THE RESULTS FOR THE TIE-DYE TRADE	180
5.1	The apprenticeship system in the tie-dye trade	180
5.2	A day in a tie-dye business – “Under a Mango Tree”	183
5.2.1	The account of the particular day	185
5.3	Two apprentices’ accounts of critical events	199
5.3.1	The account of a critical event in tying : learning the ‘folding’ technique	199
5.3.2	The account of a critical event in dyeing : learning to prepare the dye-bath solution	200
5.4	Records of individual interviews	202
5.4.1	Record of an interview with an apprentice	202
5.4.2	Record of an interview with an entrepreneur	211
5.5	The analysis of Results for the Tie-Dye Trade	218
5.5.1	The learning of practical skills	219
5.5.1.1	Learning by observing	219
5.5.1.2	Learning through problem solving	227
5.5.1.3	Trial and error learning	229
5.5.1.4	Monitoring of learning	230
5.5.2	The learning of “theory”	233
5.5.3	Learning through understanding	235
5.5.3.1	Recall in learning	238
5.5.4	The motivation to learn	241
5.6	Summary of Research Findings from Both Trades	245
CHAPTER 6	DISCUSSION AND IMPLICATIONS	249
6.1	Discussion	249
6.1.1	Learning from the apprentices’ perspective	249
6.1.2	Learning from the tradespersons’ perspective	257
6.1.3	Learning from the perspective of the selected trades	265

6.2	The Key Emerging Concepts	267
6.3	Implications	271
References		274
Appendices		
Appendix 1 :	Interview Schedule for Motor Vehicle Entrepreneurs	287
Appendix 2 :	Interview Schedule for The Motor Vehicle Apprentices	289
Appendix 3 :	Interview Schedule for Tie-dye Entrepreneurs	292
Appendix 4 :	Interview Schedule for Tie-dye Apprentices	294
Appendix 5 :	Observation Schedule	297
Appendix 6 :	Tie-Dye Crash Course Notes	298
Appendix 7 :	Record of an observation of an apprentice at work	299
Appendix 8 :	Observation of an apprentice during the dyeing of a Bedspread cotton material	301
Appendix 9 :	Record of an observation of an apprentice at work – During the tieing of a bedspread cotton material	303
Appendix 10:	A record of another motor vehicle apprentice’s interview	306
Appendix 11:	Record of yet another motor vehicle apprentice’s interview	312
Appendix 12:	A record of another tie-dye apprentice interview	315
Appendix 13:	Record of yet another tie-dye apprentice interview	318
Appendix 14:	A record of another interview with a motor vehicle Entrepreneur	322
Appendix 15:	A record of another interview with a tie-dye entrepreneur	326
Appendix 16:	The backgrounds of the garage apprentices : their age, Level of formal education, number of years of apprenticeship and place of birth	330
Appendix 17:	The backgrounds of the tradesmen : their age, level of Formal education, training and place of birth	331

Appendix 18: The backgrounds of the tie-dye apprentice : their age, Level of formal education, Number of years of Apprenticeship and place of birth	332
Appendix 19: The backgrounds of the entrepreneurs and tradeswomen : Their age, level of formal education, training and place Of birth	333

Tables:

Table 1 :	The types of apprenticeship available in the different Apprenticeship systems by sector	16
Table 2 :	The data collection methods used for the different categories of informants	70
Table 3 :	The targeted garages : some descriptive statistics	71
Table 4a:	The sampled tradesmen : their age, level of formal Education and birth place	73
Table 4b:	The sampled entrepreneurs : their age, level of formal education and birth place	74
Table 5 :	The sample of apprentices : their age, level of formal education, number of years of apprenticeship and birth place	76
Table 6 :	The data collection methods used for the different categories of informants	83
Table 7 :	The targeted Tie-dye businesses : some descriptive statistics	84
Table 8a:	The sampled tradeswomen : their age, level of formal education and birth place	85
Table 8b :	The sampled entrepreneurs : their age, level of formal education and birth place	86
Table 9 :	The sample of apprentices : their age, level of formal education, number of months of apprenticeship and birth place	88
Table 10:	The summary data for various aspects of learning at the workplace in the two trades	247
Table 11:	Diagrammatic Representation of the Inter-relationships Underlying the Conceptualization of Learning in the Informal Sector	269

Table 12:	Comparison of The Concepts of Learning	270
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Figures:

Figure 1 :	Layout of a Tie-dye business	187
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Acronyms

IBAS	-	Indigenous Business Advisory Service
MOE	-	Ministry of Education
DoSE	-	Department of State for Education
CSD	-	Central Statistics Department
ILO	-	International Labour Organisation
JASPA	-	Job and Skills Programme for Africa
IMF	-	International Monetary Fund
HAC	-	Hendrikson Associates Consultants
UNDP	-	United Nations Development Programme
UNESCO	-	United Nations Education, Scientific and Cultural Organisation
GG	-	Gambia Government
MOF	-	Ministry of Finance

OVERVIEW OF THE STRUCTURE OF THE STUDY

The study adopted the conventional structure for educational research studies. Hence, Chapter 1 gives the background to the study by reviewing briefly, and in general terms, relevant aspects of the Gambian economy, the informal sector, vocational training and the apprenticeship system. This is followed by Chapter 2 which in turn reviews the literature about theories of learning in general, with a view of developing an appropriate conceptual framework for the study, planning the methods and procedures for collecting and analysing the empirical data that were collected, as described in Chapter 3 on “Methodology”. The study used different methods including ethnography. Chapters 4 and 5 report the research findings in the Motor Vehicle Trade and in the Tie-dye Trade, respectively. The study concludes with Chapter 6 which summarises and discusses the research findings and attempts to provide a basis for the development of a theory of learning in the informal sector, albeit provisionally. Furthermore, this chapter points out the implications of the findings.

CHAPTER 1: INTRODUCTION

The world summit on “Education for All”, at Jomtien, Thailand, in 1990, underscored the fact that the condition of over one billion people who were in absolute poverty was characterised by an absence of basic education and training opportunities (UNESCO, 1991). One of the goals of the Jomtein Conference was to provide universal basic education to all. This measure was seen as an essential ingredient in the effort to eradicate poverty, promote productive employment and foster social integration (DoSE, 1996).

Soon after the conference, national governments paid more attention to the entitlement of all children and adults to basic education. However, as a result, there was more interest in training policies too (ILO, 1993) and, since then, policy makers in developing countries have been looking at policies for more productive employment and self-employment (Awashti *et al*, 1990). As McGrath (1995) put it, although there had not been a world conference on Employment or one on Training for All, undoubtedly, these three issues – Education, Training and Self-employment – had converged more closely than ever before in the thinking and writing of policy-makers in the 1990’s.

Substantial concerns about employment and the world of work have also contributed to some convergence of thought amongst those planning the improvement of education, training and the labour market (World Bank, 1990). This was especially so in developing countries where (a) Structural Adjustment Programmes have been affecting the security of employment in the once favoured formal sector of the economy, and (b) education and training analysts (such as King, 1993) have had to recognise that far from expanding, the formal sector was actually contracting. Indeed, in some states, such as Ghana (Boeh-Ocansey, 1993) and The Gambia (CSD, 1994), it was precisely from the formal sector that many thousands of employees were laid off as a result of structural adjustment constraints (King, 1993).

Thus, whilst on the one hand there was the pressure on developing countries to expand their basic education (UNESCO, 1993) with the associated knock-on effect of ever larger number of school leavers, on the other hand, employment in the formal sector of the economy was shrinking; it is not difficult, in these circumstances, to explain the “re-emergence” on the political agenda of the importance of self-employment and of the informal sector (ILO, 1993).

Arguably, this is because many of the developing countries were further removed from the global economy of the major industrialised centres in the 1990s than they were in the early 1960s (ILO, 1993; King, 1990; Hoppers, 1992). The combination of a low knowledge base in science and technology, a continuing reliance upon traditional export commodities, and restricted opportunities for growth (due to debt burdens and structural adjustment) meant that many such countries have had to recognise that their formal sector was no longer the engine of growth for their ever expanding populations (McGrath *et al*, 1995). As a result, policy makers in these countries had to acknowledge that the bulk of their population had always generated their own employment, and would continue to do so.

1.1 The Gambian Economy

The Gambia is one such developing country having experienced Structural Adjustment in the 1980s (MOF, 1993). The main features of The Gambia economy are its small size – a total area of just over 10,400 square kilometres, its narrow economic base, a low level of literacy (30%), and the influence of trade and of the re-export trade from and to some other West African countries, in particular, Senegal, which almost completely surrounds the country (Stage *et al*, 1992).

The Gambian economy is dominated by Agriculture, the Distribution Trade and Tourism. The re-export trade has been a result of the higher prices for consumer commodities in neighbouring countries (such as Senegal and Mali). The re-export trade contributes about 40% of the GNP (CSD, 1994) to the Gambian economy, though recent moves to devalue the CFA Franc and to restrict cross-border trade (between The Gambia and Senegal), and trans-Senegal trade have made this sector of the economy appear vulnerable (CSD, 1994).

In the mid-1980s, The Gambia engaged in a “dialogue” with the International Monetary Fund (IMF) and with the World Bank with the aim of arresting the decline of the economy which had begun then; consequently, the Government of The Gambia embarked on an Economic Recovery Programme (ERP) in the mid-1985 with two basic objectives (MOF, 1993):

- i) To institute structural changes in order to reverse the over extension of Government Administration and parastatal activity, so as to match the size of the public sector with the productive base of the economy.
- ii) To stabilise the economy in order to create conducive incentives for private, productive activity.

The implementation of the ERP was generally successful, and resulted in economic stabilisation and steady, significant growth (MOF, 1993; Stage *et al*, 1992). During the five years following the inception of the ERP, the economy improved significantly with inflation falling to about 7% and the account deficit to about 20% of GDP, while the GNP per capita remained stable (Stage *et al*, 1992; MOF, 1993).

To consolidate the achievements of the ERP on a sustainable basis, in 1990 the Government of The Gambia launched another economic reform measure, known as the Programme for Sustained Development (PSD), as a continuation of the ERP. The PSD called for economic development based on a free market economy; the hope was that, if the PSD continued on course, the expected output would be an expansion in agriculture and in industry, and in the development of the informal sector (Ahmed *et al*, 1992).

The Programme for Sustained Development (PSD) initiated a process of national reflection (on poverty issues) and participatory approaches which eventually led to the formulation of a Strategy for Poverty Alleviation (SPA) under the Ministry of Finance (MOF, 1994). In 1992, following the completion of the ILO (1993) study “*Poverty in The Gambia*”, a new strategy was adopted; it aimed to build a consensus among the people of

the country through dialogue with participants at the grass roots level . The strategy was based on (i) a review of the economic and social developments in The Gambia, and (ii) a qualitative analysis of poor people's perceptions of poverty and of the ways in which the Development process in The Gambia had impacted on their lives. Underpinning the strategy was a growing recognition (by all Development actors, including both Central Government and Local Government) of the need to unleash the creativity of individuals and of communities for initiating and managing their own development.

There was also a recognition that The Government of The Gambia could not continue to be the largest employer in the country. Traditionally, Government Departments and Parastals had been the main source of employment in The Gambia. The Central Statistics Department (1990) estimated that for the economically active population during the period 1990-2000, out of a likely total increase in the workforce of 40,000 about 17,000 workers could be without paid employment. This surplus labour could be absorbed by the urban artisan enterprises that were engaged in the production of handicrafts, and by small traders and services. Attention was thus turning to the potential of the informal sector as a means of solving the problem of unemployment, and of developing indigenous entrepreneurs. The national philosophy of "TESITO" (self-reliance) in The Gambia made

nation building the responsibility of all Gambians (The Gambia Government, 1981).

Another consideration was that The Gambia, like many other developing countries, had primarily sought to expand the formal sector of their economies and consequently, their education and training programmes were designed to meet the skills requirements of formal sector employers (Fluitman, 1989; Brinks, 1988). However, as King (1977 and 1989) has noted, stagnant economies, high rates of unemployment and underemployment, and the inability to provide for the basic needs of large numbers of grossly deprived citizens had raised serious questions about past development and training policies. Developing countries were therefore turning to the “informal sector” as a source of economic growth, and now-a-days much hope is placed in the capacity of this neglected sector to help meet future employment needs.

1.2 The Informal Sector

Employing over 60 percent of the labour force in sub-Saharan Africa (Tendler, 1989; ILO, 1994), and producing nearly 20 percent of its gross domestic product (Novicki, 1996), the informal sector, by virtue of its status as the “hidden” or “underground” economy (Harper, 1987) or “ordinary economy” (Grierson, 1997) had been omitted from national

planning and support. Its operators had been victimised by laws and regulations, and their productivity held back by lack of access to credit, training and technology (Robinson, 1991). The informal sector was regarded as a transient, unorganised phenomenon, to be supplanted by a burgeoning formal sector, as Development takes root (Turnham *et al*, 1990).

However, the informal sector, in particular the urban informal sector long neglected by governments and international agencies, is now beginning to command the attention of Development experts and planners (King, 1990). As the main stay of urban employment and an important component of private sector growth, this sector is being seen as making a viable contribution not only to poverty alleviation, but potentially to the long-term economic development of the developing countries (ILO, 1993; McLaughlin, 1989).

In point of fact, the informal sector has now taken on a new role; in the words of Novicki (1996), the role is “that of a safety net and of an increasingly critical source of alternative income for many households”. However, its impact on economic growth is limited by low productivity, capitalisation and technology (Assuncao, 1993). According to the ILO (1993), poor access to resources and markets, and stringent regulations,

explain why the sector continues to operate outside the mainstream economy, and is thereby denied the opportunity to participate to its full potential in the national economy (Turnham *et al*, 1990).

Yet, the ILO (1990) report on the promotion of self-employment, suggests that those involved on the margins of the formal economy in trading and other enterprises ought to be recognised for their positive contribution. The report implies that such activities ought to be encouraged since they have the potential for absorbing a large pool of labour.

But what is the informal sector? The term has been and is still used to designate a wide variety of different activities and of people engaged in such activities. Thus, included in the informal sector are small entrepreneurs and street hawkers, many of them thought to be involved in illegal economic activities and/or in tax evasion. Importantly, although as yet no universally accepted theories and concepts about the informal sector have emerged (Desoto, 1990; Peattie, 1987), the term “informal sector” continues to be used, albeit with different connotations.

A host of criteria have been put forward to identify and define those businesses that are neither formal in structure nor traditional in their business activities. The definitions can be grouped into three categories

which focus respectively on: a) the legal status of enterprises; b) the structure of enterprises; c) the technical attributes of enterprises (Neizert and Horton, 1992).

Definitions based on legal status consider the informal sector to be made up of all those establishments that are either unregulated, or untaxed, or not enumerated in official statistics. However, there is always some degree of regulation, and also, some taxes – like customs duties and municipal duties – are paid by businesses in the informal sector, while at times, according to Livingstone (1991), organisations in the formal sector are either exempted from paying taxes or pay their taxes at reduced rates.

If structure is used as the identifying feature of enterprises in the informal sector, then ownership and market share are the distinguishing characteristics of the sector; for, enterprises in the informal sector are often family-owned, and are thought to be quick at seizing commercial opportunities in terms of both what they produce and how they market their products (Strassman, 1987).

Definitions based on the technical attributes of enterprises consider the lack of advanced technology to be the most important characteristic of the informal sector (Parker and Dondo, 1991). These technical attributes refer

to the complexity of the capital equipment used, the possession of managerial skills, the availability of an appropriate infrastructure, the marketing techniques used and the ratio of labour to capital.

For the purpose of the present study, the informal sector refers to the “Shadow Economy” (McLaughlin, 1989), a term usually reserved for those small enterprises which utilise the most rudimentary, traditional technology and business practices. These enterprises are usually unlicensed, unregulated and therefore virtually unknown to the Government; this fact allows their owners to evade all tax obligations as well as other labour regulations (Bose, 1990). Also, these enterprises make heavy use of unpaid family labour. The operators in the sector are highly flexible in both entering and exiting particular economic activities, in response to market demand.

In contrast to such enterprises in the informal sector, enterprises in the formal sector employ sophisticated, modern technologies and business practices, interact directly with formal institutions and may receive financial and/or technical support from the Government (Fields, 1989). In addition, the operators in the formal sector meet the Government’s licensing, financial and regulatory requirements, make more use of waged labour and move less flexibly in and out of the market.

1.3 Vocational Training

Increasing attention has been given to technical and vocational education and training (TVET) in the last several years. Some of this interest has certainly been due to both popular and political convictions that TVET should be able to assist in the transition from school to work. In developing countries, policy makers and analysts have been aware that there is no single, most obvious modality for TVET, and hence there has been very considerable debate about what forms of TVET might be most appropriate in different settings (Grierson, 1997).

The vexing question is, can training really help those hoping to become self-employed? In virtually all quarters, the current view of training is a well justified mix of scepticism and enthusiasm (Grierson, 1997). The simple answer though, and the answer that is the basis for most common practice and much of what follows, is that the possession of some kind of skill or technical knowledge will make self-employment easier to enter and more productive (King, 1984). Increasingly, it is being recognised that market linkages through mechanisms such as apprenticeships in small enterprises, can help training programmes impart marketable skills while creating access to market opportunities (Caillods, 1994). However, the limits of researchers' current knowledge are such that little is known and documented about how apprentices learn during such training. The

primary purpose of this study is therefore to investigate how apprentices learn during such training.

1.4 The Apprenticeship System

The term apprenticeship is notoriously difficult to define consistently worldwide. Nevertheless, an apprenticeship is conceived as having three broad and interrelated dimensions. There is firstly, the contractual framework within which an apprenticeship operates and which concerns the “reciprocal rights and obligations between an employer and an apprentice” (Gospel and Fuller, 1998). The second dimension refers to the cultural and social aspects of going to, and being at work which help socialise apprentices into workplace roles. The third dimension encompasses the informal, on-the-job learning experiences which are characteristic of apprenticeships (Gospel, 1995). A further complication is that the term “apprenticeship” is applied to a wide range of training modes, from informal, purely work-based, learning-by-doing programmes, to formal, structured programmes of general education and vocational preparation which are sponsored by large industrial firms in some advanced economies (Fluitman, 1989; Green et al, 1997).

The apprenticeship system in West African cities came to the attention of educationists when it was revealed to be the entry point to a large and

growing informal sector in Nigeria (Callaway, 1964; Grierson, 1997). The system is well established although it is not necessarily very well known (Fluitman and Oudin, 1991); it serves as a breeding ground for future indigenous industrialists, in particular, for the medium-level technical manpower. Indeed, the small enterprises in the informal sector may be said to serve as a school for entrepreneurship training, that is, for on-the-job training through which entrepreneurs too acquire their skills.

There are four types of apprenticeship systems, operating at operative, and craft levels in The Gambia and in Britain; the systems are as follows:

- a) In The Gambia
 - i) The African Traditional Apprenticeship system
 - ii) The Western Traditional Apprenticeship system
- b) In Britain
 - i) The Modern Apprenticeship system
 - ii) The Accelerated Modern Apprenticeship system

Table 1 indicates the availability (in the two sectors of industry) of the two forms of apprenticeships available under the four systems.

Table 1: The types of apprenticeship available in the different apprenticeship systems by sector.

	In The Gambia				In Britain			
	African Apprenticeship System		Western Apprenticeship System		Modern Apprenticeship System		Accelerated Apprenticeship System	
	Formal Sector	Informal Sector	Formal Sector	Informal Sector	Formal Sector	Informal Sector	Formal Sector	Informal Sector
Formal Apprenticeship	-	-	*	-	*	-	*	-
Informal Apprenticeship	-	* ✓	-	-	-	-	-	-

Key: ✓ = The available form of apprenticeship which is the focus of the study.
* = Form of apprenticeship available.
- = Apprenticeship not available

The term “Traditional Apprenticeship” does not mean that the form of apprenticeship is not changing. The term “traditional” here is taken to mean that there is a local variant of skills learning as opposed to the various Western versions of apprenticeships that were imported during the 1950s in many developing countries (Mason, 1994; King, 1977).

The size of the traditional apprenticeship system in many developing countries is one factor which makes it so worthy of closer attention. Even in Kenya, with its well developed training system, there are more apprentices enrolled in the informal sector than trainees in the formal sector (Ferej, 1993; Oketch, 1993). In Egypt, 83.5% of craftsmen acquire their skills through traditional apprenticeships (Assaad, 1993).

In West Africa (for example, in Côte d'Ivoire, Ghana, Nigeria and Togo), under the traditional apprenticeship system, elaborate contracts are agreed between masters and the families of prospective apprentices. The amount to be paid in fees and the allowances provided by the master are agreed upon. When the apprenticeship period is completed a large and costly graduation ritual is enacted (King, 1990).

The traditional apprenticeship system is characterised by the relative ease of entry into the system (Fuller and Unwin, 1998); in this regard, the system is far more accessible to the more marginal groups in society (such as illiterates and school drop-outs). One key advantage enjoyed by the traditional apprenticeships system over the other forms of apprenticeships is that apprentices in the former have far greater opportunities to observe activities going on at the workplace between the 'master' and the clients. Furthermore, apprentices' contacts with their masters' clients increase as their learning continues and can help greatly with the establishment of the apprentices' own clientèle when they in turn go into business on their own (Fluitman, 1994). In fact, according to Assaad (1993), one of the most important advantages of the traditional apprenticeship system is the access it provides apprentices to the well-established networks of their masters. Such access can be further enhanced by the existence of some very vibrant trade associations, such as, the Association of Motor Vehicle Mechanics in

Ghana (Abbou and Quarshie, 1993; Boeh Ocansey, 1993). The traditional apprenticeship system therefore, provides two essential requirements for self-employment: marketable skills and technical networks (Adam, 1993; Fluitman and Sangara, 1989).

However, a disadvantage of the traditional apprenticeship system is that in certain trades (such as the Tie-dye trade in The Gambia) the system is restrictive, in the sense that the “masters” have tended to recruit apprentices from their own castes or tribes, and through what Macharia (1988) terms traditional social networks such as family groups.

1.5 Statement of the Problem

To summarise the background to the present study,

- a) “Education for all” was seen by Government planners in The Gambia (and in developing countries generally) as an essential ingredient in the effort to promote productive employment, eradicate poverty and foster social integration.
- b) However, the advent of the Structural Adjustment Programmes in The Gambia had affected adversely the security of employment in the formal sector of the economy resulting in:
 - i) the retrenchment of thousands of workers in the formal sector.

- ii) the re-emergence in the political agenda of the importance of self-employment and of the informal sector to help eradicate poverty.
- c) The apprenticeship system in the informal sector serves as a breeding ground for enterprising indigenous industrialists, for the training of low-to medium-level manpower.

In view of (c) above, there is a growing realisation in The Gambia that there is an important inconsistency between, on the one hand, the fact that the informal sector is to a large extent providing the manpower needed in the country (at operative and craft levels), and on the other hand, the almost complete absence of any investigation into how apprentices in the informal sector in The Gambia (and indeed in developing countries generally) learn at the workplace.

1.6 The Research Questions

Given therefore the above inconsistency (and the economic importance of the informal sector), the present study focused on the following research questions:

- a) How do apprentices in the informal sector in The Gambia acquire their technical knowledge and practical skills at the workplace?

- b) How is their learning facilitated at the workplace, in the informal sector?
- c) To what extent are the methods of training and learning used in formal Vocational Training institutions adopted by the apprenticeship system in the informal sector?

1.7 Aim of the Study

In broad terms the aim of the present study was to investigate:

- a) how apprentices in the informal sector learn at the workplace.
- b) how learning at the workplace is facilitated.

Furthermore, the general rationale underlying the study was that if the conditions of learning and the learning process at the workplace were identified, described, analysed and documented, the pattern of learning at the workplace in the informal sector (in The Gambia) would become clear, thereby making it possible to formulate an appropriate policy for the apprenticeship system and to plan relevant training programmes for apprentices and tradespersons.

1.8 Terminology

As indicated above, the focus of this study was on apprentices' learning at the workplace; the focus was not on their education. Studies of the

informal sector (for example, Otero, 1988; Turnham *et al*, 1990) have not addressed systematically the issue of learning at the workplace whilst studies of the apprenticeship system within the informal sector, have viewed apprenticeship as a process of socialisation in the workplace culture and have not explicitly looked into how apprentices approach learning.

For the purposes of the present study, it was assumed that although learning, training and education are interrelated processes, it was possible at the workplace to focus on the learning process as such. Learning was conceptualised as the process by which individuals or groups, acquire, interpret, reorganise, change or assimilate a cluster of related knowledge, skills and attitudes (Marsick, 1987). On the other hand, training at the workplace was taken to refer usually to the formal, on-the-job, activities that have as their aim the acquisition of practical skills that can be immediately applied in the job (Ireland, 1996). Furthermore, education was taken to refer to the acquisition of generic knowledge, skills and attitudes, rather than to the development of specific, job-related competencies (Smyth, 1996).

Another difficulty with terminology in studying the learning process at the workplace (in the informal sector) was to find an appropriate term for referring to the role of the tradespersons who are associated with the

apprentices during the learning process at the workplace. Thus, one possibility was to refer to them as “mentors” (Lunt *et al*, 1992; Pedler *et al* 1992) given that researchers have described the role of helping people learn without formally teaching them as “mentoring”. However, the word “mentor” comes with much conceptual baggage (Fuller and Unwin, 1998); the term usually implies a one-to-one, formal relationship with an individual. The alternatives were also problematic; thus, terms like “teacher”, “tutor”, “trainer”, “coach” and “instructor” emphasise the presentational and explanatory roles in the context of learning, whilst the term “supervisor” emphasises the role of authority.

In the present study the person whose responsibility included facilitating learning for the apprentices was referred to as a “facilitator”; and normally this responsibility fell to the “tradespersons” at the workplace. The term “Tradesperson” referred to someone who is technically qualified (by his/her work experience) in a specific trade and to whom apprentices are attached at the workplace for working purposes. The term “Entrepreneur”, on the other hand, referred to the owner of a business enterprise who is himself/herself a qualified Tradesperson (by work experience).

CHAPTER 2 – REVIEW OF THE RELEVANT LITERATURE

Introduction

The aim in this chapter was to make explicit the theoretical position which was taken in the present study and which formed the basis for the various aspects of the fieldwork undertaken subsequently. The chapter summarises the literature review which was undertaken throughout the present study and which was relevant to the subject of the study, namely learning in the informal sector, in The Gambia. Hence, the review focuses on issues in connection with ways of learning and of knowing in the context of apprentices' learning in the informal sector.

2.1 Learning Theory in General

The view of learning implicit in the traditional concept of the apprenticeship system involves three elements – the apprentice as learner, the tradesperson as trainer, and the workplace as a site for learning. The traditional form of apprenticeship is portrayed as one which is lacking an explicit theory of instruction and which is not dependent on formal teaching (Collins *et al*, 1989). Learning is seen as a “natural process” that occurs through the observation and emulation of tradespersons at the workplace and over time.

The goal of the apprenticeship system as an approach to learning a trade is to help learners acquire and integrate the knowledge and attributes necessary for skilled vocational practice (Collins *et al*, 1989). This approach to learning is based on the assumption that the acquisition and use of knowledge and skills is dependent on the interactions between a learner's current knowledge and beliefs, and the social and physical environment in which the learner is situated.

Two fundamental questions hang over any debate about learning at the workplace. These are:

- a) What is understood by the term learning?
- b) What is the learning process at the workplace?

In dealing with the first question, arguably, any change in behaviour implies that learning has taken place (Skinner, 1974). This notion, however, fails to capture some of the complex issues associated with learning, such as, whether learning can only be inferred from behaviour and whether all human behaviour is learned. Hence, although this notion of behavioural change still underlies most definitions of learning, a modified definition is that, "learning is a relatively permanent change in behaviour or in behavioural potentiality that results from experience and that cannot be

attributed to temporary bodily states, such as those induced by illness, fatigue or drugs” (Merriam and Caffarella, 1991).

Michelson (1996) distinguished between learning as a product (the emphasis being on the outcome of the learning experience), learning as a process (the emphasis being on what happens during the course of a learning experience which aims at attaining a given outcome), and learning as a function (the emphasis being on the critical aspects of the learning activity, such as retention and the transfer of learning, which make behavioural changes in human learning possible).

Social learning theory (Bandura, 1986) posits that people learn from observing other people in social settings. Just how the learning occurs during observation has been the subject of various investigations. Drawing from stimulus – response and reinforcement theory, Merriam and Caffarella (1991) have argued that people do not learn from observation alone; rather, what has been observed must be imitated and reinforced. If imitative responses were not made and reinforced, no learning would take place. With the work of Bandura (1986), social learning theory broke away from a purely behaviourist orientation. Bandura focused more on the cognitive processes involved in observing than on the subsequent behaviour. Central to his theory is the separation of observation from imitation; one can learn

from observation, he maintains, without having to imitate what was observed.

It has been traditionally assumed that formal academic education and apprenticeship training involve quite different modes of learning and quite different teaching strategies and that these result in different capacities to transfer knowledge and skill from one context to another (Schubner and Cole, 1973). According to Billet,

“the goal of apprenticeship as an approach to learning is to help learners acquire and integrate the knowledge and attributes for skilled vocational practice. This approach to learning is based on assumption that the acquisition and use of knowledge and skills is dependent on interactions between individuals’ current knowledge and beliefs, and the social and physical environment in which the learner is situated”. (Billet, 1993; p5).

Vygotsky’s concept of a “zone of proximal development” as espoused by Billett (1993; p15) has provided a useful way of questioning this assumption. The term “zone of proximal development” is defined as:

“The distance between the actual development level, as determined by independent problem solving, and the level of potential development as determined through problem solving under adult guidance or in collaboration with more experienced person”.

This concept was central to Vygotsky’s programme of trying to identify the pedagogic structures needed to assist learners to move beyond the stage of mastery that they were capable of on their own; and one consequence of the

various reconstructions of Vygotsky's original ideas has been the development of a series of pedagogic strategies such as "scaffolding", "modelling", "fading" and "coaching" which have been designed to assist trainers to help students to participate in activities slightly beyond their current competence (Brown *et al*, 1989).

The "guided learning" method of instruction involves the four phases of Modelling, Coaching, Scaffolding and Fading (Billett, 1993). "Modelling" involves an expert executing a task so that learners can observe and build a conceptual model of the processes required to accomplish the task successfully. Such modelling requires the externalisation of internal, cognitive, procedures that experts deploy when utilising their procedural and conceptual knowledge. "Coaching" refers to the process during which experts observe learners carry out their activities and monitor their progress. The experts provide hints, feedback, clues and tricks of the trade to assist the learners achieve the desired outcomes. "Scaffolding" refers to the support that experts provide for learners, albeit at a distance. This support can take the form of providing the learners with opportunities to acquire knowledge and skills that are within the scope of the learner's ability. Scaffolding requires a co-operative, problem-solving effort by the expert and the learner in which the expressed intention is for the learner to take as much responsibility for the task as possible "Fading" consists of the

gradual removal of the experts' support until learners are able to conduct the task autonomously.

Under the apprenticeship system learning is experiential, in the sense that; the learner is directly in touch with the realities being studied. It (the task) involves direct encounter with the phenomenon being studied rather than merely thinking about the encounter or only considering the possibility of doing something with it. (Keeton and Tate, 1978).

This perspective on learning is called “experiential” for two reasons. The first is to tie it clearly to its intellectual origins in the works of Dewey (1959), Lewin (1951), and Piaget (1971) and in the self-actualisation psychology of Maslow (1970). The second reason is to emphasise the central role that experience plays in the learning process. This differentiates Experiential Learning theory from the rationalist and other cognitive theories of learning (that tend to give primary emphasis to the acquisition, manipulation, and recall of abstract symbols), and from the behaviourist theory of learning (Skinner, 1974) that denies any role to consciousness and subjective experience in the learning process. However, the aim of the present study is not to pose experiential learning theory as a third alternative to behavioural and cognitive learning theories, but rather to suggest, through Experiential Learning theory, a holistic perspective on

learning that combines experiences, perceptions, cognition and behaviour (Kolb, 1984). People come to realise the value of their own experiences, they take a critical perspective on these, and they learn how to use this reflection to help them deal with whatever problems they face. In Boud's words (1993; p8).

“To draw out of people their experience, it was essential that people learn to make decisions on the basis of analysing and trusting their own experience, and learning from what was good and what was bad. I believe that you learn from your experience of doing something and from your analysis of that experience”.

In this context, experience is taken to be the totality of the ways in which individuals see the world and make sense of what they perceive (Weil and McGill, 1989). Learning itself is an act of becoming aware of experience, building upon it, extending it and, in the process, creating new experiences which become part of what one knows (Boud *et al*, 1993). Every experience is potentially an opportunity for learning, but it is necessary to frame the experience as an event from which something can be learned; and so, while experience is a basis for learning, unless reflection takes place, the learning is incomplete (Boud *et al*, 1993). Indeed, the individual's experience may be what Jarvis (1984) categorises as “non-learning”,

that is, the individual does not respond to a potential learning experience, or he/she rejects the possibility of learning from it. Jarvis (1984) proposes two other potential categories of individual responses to experience, which he terms “non-reflective learning” (which includes simple skills learning and memorising) and “reflective learning” (which includes contemplation). Boud *et al* (1985) define reflection as a generic term for those intellectual and affective activities in which individuals engage and explore their experiences, in order to get new understandings and appreciations.

How adults learn was of particular interest in the present study given that apprentices are young adults. And indeed, it emerged that there is now a coherent and comprehensive body of theory about how adults learn; and “andragogy” (the art of teaching adults) draws on it (Knowles, 1973). The assumption is that as individuals mature their capacity (to be self-directing, to utilise their experiences in learning, to identify their own readiness to learn, and to organise their learning around life problems) increases steadily from infancy to pre-adolescence, and rapidly during adolescence. Consequently, in andragogy there is a decreasing emphasis on the transmittal methods of traditional teaching and an increasing emphasis on experiential learning which taps the experiences of learners and involves them in analysing their own experiences. However, it is not clear as to approximately when or why adult ways of learning begin, and as to how

these differ from children's obvious exploratory orientation to learning. It may be that the fundamental principles of teaching are common to both adults and children (a point Knowles seems at times to accept), and that any differences are a matter of degree rather than of kind.

2.1.1 Learning and Memorising

In physiological terms, learning occurs when information is transferred from the "working memory" to the "long-term memory". "Elaboration" (Roger, 1993) is important in this transfer as it is the process of using information stored in the long-term memory to "enlarge" on the new information which is to be learned (McGilly, 1996). Thus, elaboration provides the learner with multiple routes for accessing information in long-term memory; it is the key process in building interconnected knowledge networks.

However, the process of memorising information is complicated by the fact that there are three aspects to memorising, namely, registration, retention and recall (Gagne, 1965). Once information is registered (by being encoded in the brain), the ability to retain and recall the information depends on the strength of the original information, on whether the information is meaningful, and on whether the recall conditions are very similar to those under which the original registration of the information

occurred (Moely, *et al*, 1986). Importantly too, audio-visual information is better remembered than text-only versions of the same information. According to the “dual-coding hypothesis”, audio-visual information is stored in memory in two separate but associated codes: a verbal code and a visual code (Gunter, 1987; Grimes, 1991). During the process of recalling information the visual memory code serves as an extra cue for retrieving information.

2.2 The Learning Process at the Workplace

According to Billett (1996), the acquisition of knowledge in a particular situation (“situated learning”) is dependent on the context in which such knowledge is constructed and on the activity in which the learner is engaged during such construction; and in explaining “situated learning”, Brown *et al*, (1989) compared concepts to practical tools. As with practical tools, concepts can be fully understood only through use. As it is possible to acquire a new tool and yet be unable to use it, so it is possible that an individual can learn a rule, or a routine, or the verbal definition of a concept and yet be unable to apply such learning in concrete “situations”. The “situated-cognition” theorists (Tripp, 1993; Farnham-Diggory, 1992) describe this acquired but unusable knowledge as “inert”, and useful knowledge as “robust”. To facilitate the development of “robust knowledge”, these theorists have proposed a type of instruction called

“cognitive apprenticeship” (Collins *et al*, 1989; Resnick, 1957) for acquiring many skills in real-life contexts (such as the workplace). When learners are engaged in “cognitive apprenticeship”, they necessarily undergo a process of enculturation (Brown *et al*, 1989); in other words, they adopt the behaviours and belief systems of members of the culture with whom they interact. “Situated learning” theorists have proposed that “cognitive apprenticeship” must involve authentic activities, that is, those coherent, meaningful and purposeful activities that define the ordinary practices of a culture. It is through such authentic activities that learners become familiar with a body of knowledge as it is used within a particular culture. The notion of “cognitive apprenticeship” is thus relevant to the present study, for apprentices in the informal sector are deemed to be in an authentic environment at the workplace; they undertake real tasks which allow them to interact with the people and activities involved in their chosen trades.

2.2.1 Theory *versus* Practice

According to the received “grand narrative” of education derived from Plato and Aristotle, theoretical knowledge is superior to both practical and productive knowledge (Hickman, 1990). For Aristotle, theoretical knowledge was linked “to certainty, because its object was said to be what is always or for most part the case”. He held that practical knowledge was

inferior to theoretical knowledge because it involved “choice among relative goods”, and productive knowledge was even more inferior because it involved “the making of things out of contingent matter” (Hickman, 1990). For the Greeks this hierarchy of theory, practice, production was not only epistemological, but also social in that a person’s place in society reflected the kind of knowledge that was their his/her concern.

However, various writers, most notably Schon (1983), have drawn attention to the inadequacy of an account of workplace practice based on “technical rationality”, that is, on the view that practitioners need to have the command of a body of knowledge, within a discipline (mostly scientific), which they then draw upon to analyse and solve the various problems that they encounter in their every day practice.

Although one sometimes thinks before acting, it is also true that in much of the spontaneous behaviour of skillful practice one reveals a kind of knowing which does not stem from prior intellectual operation. As Ryle, (1949; p32) has put it;

“What distinguishes sensible from silly operations is not their parentage but their procedure, and this holds no less for intellectual than for practical performances. “Intelligence” cannot be defined in terms of intellectual or “knowing how” in terms of knowing that; thinking what I am doing does not connote both thinking what to do and

doing it. When I do something intelligently I am doing one thing and not two. My performance has a special procedure or manner, not special antecedents”.

Schon, (1987; p.51) has recently put the same thought in this Pithy

Phrase: “when some one acts intelligently, She/he “acts his/ her mind”.

Thus, according to Schon, separating theory from practice has created the problem of how to account for practitioners’ action in the workplace. Nevertheless, there has been a host of attempts more recently to produce such an account. These range from Elliott’s (1991) notion of “practitioners’ wisdom” to Schon’s (1983) notion of “reflective practitioners”.

There is also a recognition of the need to de-emphasise the spurious connotations about theory and practice that surround the distinctions between declarative (or propositional) knowledge and procedural knowledge, because these different ways of knowing do not necessarily represent independent modes of cognitive functioning (Yates and Chandler, 1991). The key points on which alternative epistemologies of professional practice centre are those of “knowing-in-action” and “reflecting-in-action”. Interestingly, knowing-in-action is “tacit knowledge” in that although practitioners may have the necessary knowledge, they cannot articulate it.

Thus, “knowing-in-action” is akin to Polanyi’s (1958) “personal knowledge” and refers to the type of know-how that is displayed in skilful performance which can be seen to follow a set of rules; and yet the set is not known, as such, to the performer.

There is nowadays an attempt to concentrate on what is said to be a central activity of people learning at the workplace, which is that of making judgements; and an account of workplace learning through judgements has been developed by Hager (1996). This account is broadly congruent with Dewey’s (1959) logic of action which repudiates the theory/practice dichotomy and cognate dichotomies, such as discursive versus practical activity. In a logic of action, vocational knowledge is no longer placed at the periphery of knowledge. Such a logic does not privilege the theoretical over the practical, and the practical over the productive. Thus, the Greek hierarchy of “theoretical knowledge-practical knowledge-productive knowledge” is rejected.

An important consideration is that practice is not simply a matter of technique; if practice is seen as such, the possibility of practice having its own realm of knowledge, that is, of there being knowledge in practice rather than simply acquiring knowledge for practice is difficult to envisage

(Usher *et al*, 1997). And if the possibility of knowledge in practice is dismissed, then there is always a tendency for practice to become a matter of routine and to be predictable (Elkan and Robinson, 1993). But according to Schon (1987), practice situations are characterised by a complexity and an uncertainty which resist routinisation.

And indeed, there is evidence of practitioners' "practical wisdom" (Elliott, 1991), that is, of a capacity to discern the right course of action when confronted with particular, complex and problematic states of affairs. However, such practitioners' knowledge is not stored in the mind as sets of theoretical propositions but as a reflectively processed repertoire of cases. Within this repertoire there is a theoretical knowledge base, but understanding and acting in practice "situations" do not depend exclusively on this theoretical knowledge base; for this base does not provide the practitioner with a prior knowledge of the right means to realise particular ends in particular contexts. The possession of "practical wisdom" (or "practical knowledge"), therefore means knowing how to act appropriately in relation to the circumstances of a particular "situation" or context (Elliott, 1991).

Indeed, for Usher *et al* (1997) practical knowledge cannot be universal because it cannot "look away" from its context. Furthermore, practical

knowledge is not knowledge of what is right in “principle” or in “theory”, since it is not “contemplative knowledge” but “performative knowledge”, that is, it is the enacted answer to the question, “how ought one to act”. These characteristics of practical knowledge show why it is inappropriate to see it as a matter of practical skills only (Wellington, 1987). Also, whilst practical knowledge is a matter of “know-how”, it is not the know-how of techniques (Bright, 1989); because it is knowledge embodied in acting at the workplace. The difference between practical knowledge and technique is that, as Usher and Edwards (1994) have observed, a technique is learnt and therefore can become ‘rusty’ with disuse; and an important aspect of techniques is that a technique is a means to achieve a pre-given and determinate end (Woodley *et al*, 1987). A technique is the most efficient and effective way to achieve a particular end and usually a technique is fixed within fairly narrow parameters and, hence admits only a certain limited degree of variations (Usher, 1992; Usher and Bryant, 1989). Practical knowledge, on the other hand, involves neither fixed ends nor fixed means in advance. Indeed, according to the “technical-rationality” model, practitioners are instead in the business of matching means to ends. In this model, the practitioner’s task is one of choosing the most technically effective way of achieving the given end and what is most technically effective is decided by predictive theoretical knowledge (Usher and Edwards, 1994).

Schon's (1983) suggestion is to abandon "theory" altogether and to concentrate instead on improving techniques. This resolution of the theory-practice problem seems attractive, but doubts have been expressed on the grounds that this resolution is likely to deprive practitioners of the means by which they can confront their practice critically. The argument is that the nature of practice is such that it must always be "under determined" by theory. Yet the question "what is to be done?" which is at the centre of practice, is not one which can be answered simply by reference to theory. Schon (1987) has argued that "practitioner knowledge" is "performative" rather than propositional, in other words, that practice is centred on action (Cadena, 1991). Such action, however, is of a particular kind; it is neither random behaviour nor behaviour predictable from a body of theoretical knowledge. Rather, it is action which is appropriate to the context (Bright, 1992).

Another point to consider is that from the perspective of learning theory, critics such as Nunnally (1976) have pointed out that, theoretical knowledge is neither situational nor action oriented. As indicated above, theoretical knowledge strives for a universality which cannot "speak" to particular contexts. It therefore cannot tell practitioners what is the right action to take in relation to a particular problem in a specific context. However,

attention has been drawn to what has been called “informal theory” (Usher and Bryant, 1989). This is a kind of theoretical knowledge which is not abstract and decontextualised, and yet, it is not merely intuitive and unsystematic. It is theory that both enters into and emerges from practice and it is the inseparability (rather than the separability) of theory and practice which is emphasised (Bright, 1989). In such informal theorising, practitioners are not confined to applying theory developed elsewhere by theorists, but are themselves engaged in the theoretical and practical resolution of the dilemmas presented by their day-to-day practice. This means that there is no longer any need to accept the theory – practice dualism and the metaphor of a “gap” between theory and practice. One possible way forward therefore, is to begin by clarifying the nature of “theory”. As Usher *et al* put it,

“there is another and more productive way of understanding theory, a way which relates it to the actions and intentionality, the intentions of the practitioners are a crucial feature of practice. Intentions are embedded in conceptual frameworks which are referred to as informal theory. The argument is that practice presupposes that the practitioner has an informal theory; therefore the relationship between theory and practice is not contingent but conceptual, that is, it is necessary”. (Usher *et al*, 1997; p.117).

The point is that practice needs to be conceived as action informed by theory (Usher and Bryant, 1989), and that whilst formal theory seeks to represent and explain “the world”, informal theory is concerned with judgement, interpretation and understanding (Woodley *et al*, 1987); such

theory enables practitioners to work within the context of practice in which they find themselves. For Schön (1983), every practice has a “theory-in-action”; but it is a theory which is not generalisable, and which is neither predictive, nor rigorous.

The debate about theory *versus* practice echoes the much older and commonplace distinction between “knowing how”, “knowing that”, and “knowing why” (see, for example, Ryle, 1949; Stevenson, 1991). However, cognitive scientists have sought to distinguish between three types of knowledge, namely, “declarative”, “procedural” and “metacognitive” knowledge (Reid, 1961; McGilly, 1996). “Declarative knowledge” is “knowledge that” and is also termed “propositional knowledge” (Anderson, 1982); it refers to the knowledge of facts, concepts and propositions. Hence, in the present study “declarative knowledge” was taken to range from the factual knowledge of the components of a machine or of a chemical solution, to a knowledge of the principles underpinning respectively the operation of a machine or the reactions of chemicals. “Procedural knowledge” or ‘know-how’ on the other hand, refers to the knowledge of techniques and procedures and to the ability to secure goals through skilful action (Billett, 1996; Stevenson, 1991). Hence, procedural knowledge was another area of concern in the present study. Such knowledge can be at different levels (Alexander and Judy, 1988; Scandura,

1982). At one level, specific procedures are followed in order to achieve specific goals in routine tasks or “situations”; however, at another level, non-routine procedures are necessary for non-routine tasks and include those procedures needed for breaking such tasks up into a series of parts, each with its own sub-goal, and for engaging in means-end-analysis to achieve the sub-goals (Newell and Simon, 1972). The third type of knowledge “metacognitive knowledge” refers to learners’ own views about their learning and about the active regulation of their learning processes (Flavell, 1987). “Metacognitive knowledge” was another area of concern in the present study as it was important to find out the apprentices’ own monitoring of the learning process, their own diagnosis of the cause of their difficulties and their own adjustments to their learning process.

2.2.2 Problem-solving

Problem-solving, within cognitive psychology, is seen as being of two kinds: routine and non-routine. Problems are solved routinely in every day activities; such problem-solving is set within a particular community of practice - it being the source of knowledge (Glaser, 1990). Therefore, over time, routine problem-solving, incrementally constructs and reinforces knowledge (Billett, 1996). On the other hand, in non-routine problem solving, existing knowledge is retrieved and employed to solve problems that have not been encountered before. Through this process of problem

solving new knowledge is appropriated. This new knowledge is the product of interpretive construction based on the circumstances in which previous experience is brought to bear on such construction (Posner, 1982).

However

“the delineation between routine and non-routine is person dependent. What for one individual may be a routine problem could be novel to another. Moreover, how individuals represent problems may determine whether they are treated as routine or non-routine, as individuals may turn a routine task into a non-routine problem”. (Greeno & Simon, 1988; p.16)

Another consideration is that problem-solving is a goal – directed activity and it is engagement in such activity which, over time, results in the appropriation and organisation of functional knowledge. The theoretical principle that underpins this proposition is that goal-directed activity promotes the psychological functions of the learner (Martin and Scribner, 1991). Put another way, as individuals engage in goal-directed activities, they access and transform cognitive structures which are socially sourced, resulting in the construction and organisation of knowledge. So, central to this appropriation of knowledge are the routine and non-routine problem solving activities in every day practice, because both problems and their solutions are socially determined (Brown *et al*, 1989). Also, individuals’ responses to problems are likely to be influenced by their standing in the community of practice, for their standing may determine the scope of their options for solving problems.

From his experiments on learning, Thorndike (Lovell, 1989) concluded that the development of stimulus – response bonds in goal-directed activity came about as the result of a process of trial and error. He formulated the “law of effect”, which states that responses that are accompanied by satisfaction are more likely to happen again when the “situation” recurs (Lovell, 1989). Further well-known studies in experimental psychology by Skinner (1974) have shown that the stimulus-response bond is strengthened when the response is reinforced and when both (the response and the reinforcement) take place together in time.

The theory of learning by trial and error is not without its critics; for, although left to one’s own devices, one may by trial and error work out a way to do a particular task, without formal instruction one may not learn to do the task with the speed and efficiency of the formally trained person (Belbin, 1965). Furthermore, not all problems could be solved using the trial and error technique as proposed by Thorndike, and according to the “Gestalt” theory of learning and problem-solving (Kohler, 1957), the learner attempts to organise and integrate his/her perceptions into a whole in order to achieve an overall pattern or “Gestalt”, the whole being greater than the sum of the parts. Kohler had concluded that the subjects in his experiments when attempting to solve a problem came to a sudden,

insightful solution which seemed to be the result of a restructuring of the components of the problem. However, such insightful learning appeared to be dependent on previous trial and error learning and learners acquired learning strategies or “learning sets” for solving particular kinds of problems.

2.2.3 Understanding at the Workplace

Understanding is a product of the mental processes by which the relationships between the elements in a piece of information are inferred and mental models constructed (Maddox, 1970). According to Johnson-Laird (1983), human beings understand the world by constructing such working models of it in their minds. To quote him:

“(with understanding), you know what causes a phenomenon, what results from it, how to influence it, control, initiate, or prevent it, how it relates to other states of affairs or how it resembles them, how to predict its onset and course, and what its internal or underlying structure is”.

According to Yekovich *et al* (1991), understanding requires that certain pre-conditions are met; these are prior knowledge, an awareness of what is relevant, and a recognition that the construction of a mental model is required. In addition, there must be an ability and a willingness to reformulate the mental model, to articulate it, and to translate the outcome

into operational terms. These processes may call for a mix of declarative knowledge, procedural knowledge, learning strategies and metacognitive control. Furthermore, whilst understanding is an individual matter, it depends on the context in which the new information (to be understood) is received, on the interpretation of the new information (Nickerson, 1985; Kember and Gow, 1990), and on the way in which the information presented to the learner is organised, rather than simply on the amount of such information (Yarroch, 1985). McGilly (1996; p5) observed that:

“Experts and novices in a knowledge domain differ not only in the amount and organisation of knowledge they have; they also differ in what they choose to represent. Novices often represent and connect pieces of domain knowledge in terms of surface level features. Experts organise information in terms of deep-level, conceptual features”.

Further light has been thrown on the process of understanding through the finding of a distinction between the two observed approaches to learning (among students), the “deep-level” approach and the “surface-level” approach (Marton and Saljo, 1984). The distinction is that when a “surface-level” approach is used there is no intention to understand, as the individual relies upon memorising as a strategy for learning, whereas when a “deep-level” approach is used, the individual has the intention of seeking the meaning inherent in what he/she is learning and hence, ultimately understanding; the information presented to the individual may be

remembered, but this is viewed as an almost unintentional by-product (Ausubel, 1968).

More recently, Kember and Gow (1990) have found evidence of yet another approach to learning which they describe (strangely enough!) as a “narrow orientation”. In this approach the individual has the intention to both understand and memorise. A characteristic of this approach is that the individual works systematically through a set task, section-by-section, attempting first to understand and then to memorise what he/she has learnt from each section. Furthermore, in his study of students’ understanding, Burns *et al* (1991) found evidence of two other distinct orientations, one which is towards finding and recognising order within the subject matter of their studies, the other towards the ability to recall relevant information. Students with the former type of orientation (described as a “coherence orientation”), were more concerned about the relationships between pieces of new information, and between these and recalled information. They wanted to know the meaning of terms and why things happened as they did.

A major concern of students with a “coherence orientation” was to know what the teacher was “getting at”. They felt they had achieved understanding when they could make up “the whole” from the many pieces

of new information they were receiving, together with those they could recall from memory. This orientation was thus reminiscent of Gestalt theory. On the other hand, students with the latter type of orientation (described as a “knowledge orientation”), associated understanding with recognising specific terms and with memorising facts and rules. They were concerned with the amount they recalled, and wanted to know what and how things happened (as against why things happened).

2.3 The motivation to learn

To be motivated is to be in a state of “being aroused” to action, that is, of being aroused from passivity to directed purposeful action (Lawther, 1977). As is well-known, amongst the basic urges which impel human beings to respond to their environment, there are physiological needs, such as those for food and water, and many motives, such as the desire for esteem, praise, social status, security, self-respect, and self-actualisation (Maslow, 1970).

To motivate students to learn is one of the educational objectives in Bloom’s Taxonomy for the affective domain. However, the evidence as to the effect of the strength of motivation on learning is somewhat conflicting, although the rate of learning seems to increase with an increase in intellectual stimulation (Brown,

1971). According to Peters (1973), in general, motivation influences such matters as (a) the selection of the particular behaviour which is to be learned, and (b) the perseverance at learning the behaviour. Importantly too, motivation may be either intrinsic or extrinsic (Dweck, 1986). When the origin of the drive is from within a person, that is to say, when he/she does something for its own sake, he/she is said to be intrinsically motivated.

An extrinsically motivated person, on the other hand, persists at an activity for the reward he/she can receive, such as the glory of winning a competition.

From the perspective of some educationists, intrinsic motivation is to be more valued than extrinsic motivation in learning. However, giving feedback to learners (about their learning) can serve to motivate them to learn (Bender, 1993), by encouraging them to continue working on a particular task. Feedback is better, if it is informative, providing increments in knowledge, rather than being simply a statement of whether one's performance is correct or not (Ilgen *et al*, 1979).

Such “information feedback” (Presley and Ghatola, 1996) is obtained not only from the information yielded through the inspection (of results) based on indicators of performance for set tasks, but also from conversations with others, such as peers and trainers, and from learners’ own effortful reflections on their performances and their results. Indeed, if feedback is simply supplied by trainers, it is less effective than if learners take a more active role, in such feedback, through shared dialogue and analysis (Ashford and Cummings, 1983).

Some studies (Newman, 1994; Pintrich and deGroot, 1990) have found that learners who believe that they are capable of understanding principles and concepts (instead of simply memorising facts and procedures) are more likely to self-regulate their learning. Interestingly too, learners’ perceptions of their cognitive competence are positively related to their help-seeking behaviour (Newman, 1990): learners who have a high perception of their own cognitive competence are more likely to seek help when they need it, and do not attribute such need for help to a lack of ability on their part.

To return to Bloom’s Taxonomy of educational objectives (in the affective domain) one objective which relates to the motivation to learn is the development of appropriate attitudes in learners. The term “attitude”,

according to Bloom *et al* (1964), has a wide range of meanings and for Allport (1935), an attitude may be defined as:

“A mental and neural state of readiness, organised through experience, and exerting a directive or dynamic influence upon the individual’s responses to all objects or situations”.

It is generally held that the attribute which best explains one’s behaviour is one’s attitude; and indeed, a person’s attitude may be said to comprise his/her disposition, interests and values (Prawat, 1989; Evans, 1991). The potency of attitudes can be appreciated through acknowledging the difference between what individuals may be capable of doing and what they actually do; so much so, that an individual’s attitude at the workplace is generally acknowledged to be a component of his/her competence at work.

2.4 Training

Whilst the present study concentrates on the learning process at the workplace, it was recognised that learning and training are intrinsically linked and, consequently, the literature on training was also reviewed, though only from the perspective of the formal training of employees and apprentices in the formal sector of industry/commerce/the public service, because most of the available literature on training is about that sector.

2.4.1 Formal, on-the-job training

Structured forms of on-the-job training for the formal sector have long been developed (McCord, 1987). They involve pre-determined training plans and objectives on the basis of task analysis, and the use of systematic, step-by-step, instructional methods (by the trainers) with access to resources, such as printed learning materials and job guides.

A training strategy which has been developed in Germany with the intention of increasing gradually the apprentice's responsibility for his or her own learning is the "Leittextmethode" (Van Der Sander, 1993), so named after the founder of the method. This method was developed in response to the dissatisfaction with the existing training methods in Germany. It is a characteristic of this method that:

- a) the apprentices carry out only some "skills acquisition activities" (which are especially those of memorising rules and procedures, imitating trainers and practising the procedures).
- b) the trainers take over those activities which have the potential for facilitating learning, especially the "focusing activities" (that is, those activities which focus on the tasks in hand, such as determining goals and the criteria for achieving those goals), "control activities" (for example, diagnosing the causes of difficulties), and "evaluation activities".

2.4.2 Formal, off-the-job training

Turning to formal, off-the-job training in Vocational Training institutions, Bloom's (1956; 1964) concept of taxonomies of educational objectives for the cognitive and affective domains has been shown to be relevant in this context and indeed has influenced greatly training in these institutions, as shown by, for example, the emphasis placed on the writing of objectives in the City and Guilds of London Institute 7307 Further and Adult Education Teachers' Certificate course (Benett, 1969; Carroll and Duggan, 1972). However, it must be noted that, Bloom's taxonomies were used as an initial framework for the study. The objectives in the cognitive domain include the acquisition and recall of knowledge of specific facts, concepts, principles and theories, and comprehension, and the affective domain covers objectives which relate to the changes in students' interests, attitudes and values as an outcome of a programme of education and training. The objectives in the psychomotor domain relate to the acquisition of manipulative or motor skills, and although Bloom *et al* recognised the existence of this domain, it was left to others (Sumner, 1968; Seymour, 1966) to develop a taxonomy of objectives in this domain. Their suggestions for a taxonomy in the psychomotor domain relate to motor skills under headings such as : simple movement, elementary movement, movement which is moderately controlled, well controlled and finely controlled. There is an increased awareness of the central place of

the psychomotor domain as a major vehicle for learning a craft, although the taxonomies published so far have not been acknowledged world wide as a basis for analysis.

Bloom *et al*, were concerned to formulate and classify educational objectives so that teachers could discuss, communicate and evaluate what they were doing. However,

there are issues about what is to count as an educational objective and on what principles are educational objectives to be classified, so that they become manageable teaching units (Pring, 1971). Such issues necessarily raise epistemological questions about, for example, the nature of knowledge, understanding and evaluation. Furthermore, Sockett (1971) has argued that Bloom *et al*, would wish to omit from any list of objectives any statement which is so general that it cannot give practical guidance to teachers as to what to do “here and now”; objectives must be much more specific than that. On the other hand, it is not clear how specific any goal has to be before it would count as an objective.

An even stronger case can be made for questioning the dichotomy (of cognitive and affective domains) that underlies Bloom *et al*'s taxonomies. For, it is logical to say that the identity of any emotion lies in the sort of

judgement being made and the sort of object to which the judgement is directed. Thus,

“it does not make sense to talk of “anger”, or “jealousy” or “envy” or “pity” unless there is an object or a person with whom one is angry, or of whom one is jealous or envious, or whom one does pity. Moreover, to be angry or jealous or envious or pitying, pre-supposes some prior judgement of the situation, that is, that someone has done something he ought not to have done, or has something which he lacks and to which he thinks he has a right”. (Pring, 1971; p.85)

Although as already indicated Bloom *et al* did not propose a taxonomy of educational objectives for the psychomotor domain, the importance of this particular domain is not to be overlooked, for it relates to the learning of practical skills at the workplace; and indeed, vocational training is linked to specific occupations and hence to the learning of specific skills (ILO, 1991). However, the term “skills” is not easy to define; what can be said is that any human activity may be analysed into three elements, and as already stated, competence in such activities is in terms of these elements; they are namely, “the knowledge to understand the context of the activity and to predict the likely outcomes, the skills with which to act, and the attitude or motivation to act” (Wellington, 1982).

2.5 Summary of the literature review

The literature review has provided a useful theoretical background for (a) the formulation of the problem of the study (b) the direction taken for the collection, analysis and interpretation of the empirical data.

The review has taken into account the relevant information which is currently available about the theories of learning in general, and also about previous studies of learning in the informal sector. Throughout, the available literature was evaluated in terms of its worth to the study and was used to place the work in a wider context. Thus the key findings that emerged are:

- Apprentices learn through observing and emulating tradespersons at the workplace.
- Guided learning involves four phases namely: modelling, coaching, scaffolding and fading.
- Apprentices' learning at the workplace is holistic and is the outcome of a combination of experiences, perceptions, cognition and change in behaviour.
- Cognitive apprenticeship refers to a form of apprenticeship whereby apprentices are deemed to be in an authentic environment at the workplace; that is, they undertake real tasks which allow them to interact with the people and activities involved in their chosen trades. When learners are engaged in cognitive apprenticeship they undergo a process of enculturation.
- In andragogy there is a decreasing emphasis on the transmittal methods of traditional teaching and an increasing emphasis on experiential learning, that is, learning which taps the experiences of learners.

- Technical Rationality refers to practitioners' command of a body of knowledge (within a discipline) which they draw upon to analyse and solve problems that they encounter in their every day practice.
- Practical wisdom is the capacity to discern the right course of action when confronted with complex problems.
- Theorising is not confined to applying theories developed elsewhere by theorists; for, practitioners are themselves engaged in the theoretical and practical resolution of the dilemmas presented by their day-to-day practice, and thus develop their own "informal theory".
- Students' understanding depends on whether their approach to learning is "deep-level or surface-level"; and on whether their orientation is "narrow" or "coherent" or one based on knowing facts and rules ("knowledge orientation").
- Feedback to students (about their performance in their studies) is better if it is informative, thus providing increments in knowledge, rather than being simply a statement of whether their performance is correct or not.
- There are three aspects in memorising information, namely, registration, retention and recall.
- Three types of knowledge may be distinguished, namely, declarative ("knowing that") or propositional knowledge, procedural knowledge ("knowing how") and "knowing why". Cognitive Scientists distinguish, in addition, metacognitive knowledge.

CHAPTER 3 : METHODS AND PROCEDURES

3.1 The Research Design

As explained in chapter 1, the thrust of the present study was on how apprentices learn in the informal sector in The Gambia. A multi-method approach was used to collect relevant data at the workplace in two trades : the Motor Vehicle trade and the Tie Dye trade. These trades were selected because the population of small businesses was relatively large in these trades; (however, unfortunately official statistics were not available). Ten businesses were sampled in each trade area. The study covered two geographical areas of The Gambia, namely: (a) Banjul – the capital city, for the study about motor vehicle apprentices, and (b) Serre Kunda – the largest town (in terms of size and population) about twelve kilometres from Banjul, for the study about tie-dye apprentices. These are also the two urban areas with the fastest growing number of informal sector businesses in The Gambia (CSD, 1993).

The research plan was to employ exclusively the qualitative approach for the present study through the following (as explained in detail later in sections 3.1.1 and 3.1.2):

- a) Documentary studies.

- b) A review of the relevant theoretical literature.
- c) Case studies of the learning process at the workplace in the two trades through:
 - i) individual interviews of key informants (namely, apprentices, tradespersons and entrepreneurs).
 - ii) accounts of critical events at the workplace.
 - iii) on-site observations at the workplace.

The notion of case study adopted in the present study was sufficiently broad to encompass an ethnographic study of the Motor Vehicle Trade and of the Tie-dye Trade respectively, given that one of the great strengths of case studies is their flexibility. For Ethnography is an approach to the study of groups ; that is, this approach seeks to provide a written description of the implicit rules and traditions of some groups, through researchers' personal involvement with groups. The intention is to provide a rich (or "thick") description which interprets the experiences of the people in the groups from their own perspectives (Robson, 1999; p148).

Ethnography leads to an understanding of and empathy with a social scene. It is said to exclude, over time, the preconceptions that researchers may have and to expose them to a new social milieu which demands their engagement. According to one view (May, 1997; p136), theory can then

be generated from the empirical data. Another view (Silverman, 1994; p53) is that in doing ethnography:

“ researchers attempt to draw a picture of what some phenomenon ‘looks like’ from an insider’s account of the phenomenon and for some audience who wants to know about it”.

Ethnography research is the craft of participant observation.

Ethnographers often combine different methodological techniques, some of which are devised personally, in such a way as to facilitate their data collection in particular situations.

Also, in ethnography, one studies the records of interviews and observations in order given that understand the cultures that people inhabit and their relationships to each other; culture remains a unifying construct of this research tradition (Merriam, 1988; p24). An important stage in such research is to become familiar with the empirical data and this is assisted by writing up field notes or transcribing taped conversations. The point of this approach is that by moving chronologically through a person’s account of an event and of his/her experience of it, a picture of the event is constructed; and people’s accounts are enhanced by focusing on the ways in which different people relate their experiences of the same event according to the circumstances they found themselves in (May, 1997; p126)

The choice of the qualitative approach for collecting data was governed by the problem of the study which was to research the process of learning (see Chapter 1). This research required close observations and probing interviews of individuals rather than a quantitative survey of workplaces in the two trades. Such a survey would have been impossible in the research period, given the practical problems in a developing country such as The Gambia (for example, the lack of transport facilities, the inadequacy of the telephoning system and the strong likelihood of postponed or cancelled interview appointments with busy entrepreneurs); also, the researcher needed to study the learning process within the context of the workplace and a quantitative survey could not have informed the researcher sufficiently about the conditions of learning at the workplace. The qualitative method enabled the researcher to take a flexible approach to interviewing and to observing and allowed him to explore in some depth respondents' views and to observe closely their behaviour patterns (Hoinville *et al*, 1978). In point of fact, this method proved to be a valuable source of well-grounded data with "thick descriptions" and explanations of the learning process in the context of the workplace (Van Maanen, 1983).

The use of the qualitative method has been criticised (Miles and Huberman, 1984) and this is acknowledged in the present study, since there are questions about the generalisability of the findings, the representativeness of the study samples, and the researcher's bias. Nevertheless, drawing on the literature about research methods (such as Merriam, 1985) a number of strategies were adopted to ensure that the research findings were reliable and valid, including the following strategies:

- a) from the outset the informants were explained the assumptions and the rationale behind the study, the researcher's position in the study and how he relates to the apprentices in this context, and the basis for the selection of informants.
- b) the method of "triangulation" was used, that is, multiple methods of data collection and of data analysis were employed.

3.1.1 Documentary Studies

Relevant documents, that is, documents which represented the "sedimentations of social practices" (May, 1997) in The Gambia were studied; they were the reports of people, such as researchers, Government officials, and officials of aid agencies.

In accordance with the research plan the present study started with an analytical review of these relevant documents and was followed by the

review of the theoretical literature (see Chapter 2). The key documents were:

- i) Strategic formulation for the Development of Vocational Education and Technical Training in The Gambia (Jobarteh *et al*, 1992).
- ii) Education policy for The Gambia, (1988-2003) and its revised edition of 1998 (DoSE, 1998).
- iii) Mid-term analysis of The Gambia's fifteen year education policy (Senghore, 1995).
- iv) Employment, Income and Production in the informal sector in The Gambia (ILO/JASPA, 1980).
- v) Small scale industries in The Gambia (HAC, 1985).
- vi) Small Enterprises and Entrepreneurship Development in The Gambia (IBAS, 1984).
- vii) Structural Adjustment Programme (GG, 1985).
- viii) Helping the poor: IMF's new facilities for structural adjustment (IMF, 1989).
- ix) Vision 2020: The Gambia incorporated (GG, 1996).
- x) The Gambia Development Corporation report (UNDP, 1994).
- xi) World Bank Social Dimensions of Adjustment in Sub-Saharan Africa (World Bank, 1992).
- xii) The social dimension of adjustment: World Bank review (Grootaart *et al*, 1991).

xiii) The Education Master Plan 1998-2005 (DoSE, 1998).

3.1.2 Case Studies

3.1.2.1 Interviews

After reviewing the various types of interview methods (Field, 1988), it was decided to use semi-structured, individual interviews to collect the relevant data for the present case studies. The interviews were related to the aim and to the underlying argument of the study. Drawing on the review of the literature and on the researcher's own experience (as a qualified engineer and educationist), a few general but salient points were incorporated in an interview guide to help uncover the interviewees' perspectives on the research topic. Using this approach it was possible to respect each interviewee's opinions and how he/she framed and structured his/her responses.

In designing the interview schedules, care was taken to avoid the common mistake of including many more questions than necessary and making the schedules too long. The final interview schedules for the entrepreneurs and apprentices consisted of four sections each with a number of questions dealing with specific aspects of the learning process (see Appendices 1,2,3 and 4). Drawing on Bloom's (1956; 1964) Taxonomies of educational

objectives and on learning theory (see Chapter 2), the sections that emerged were:

- a) learning of practical skills
- b) learning of theory
- c) learning through understanding
- d) the motivation to learn

The areas of questioning during the individual interviews were, broadly speaking, the same for the different categories of respondents but the slant given to the questions differed according to the particular category of respondents being interviewed.

3.1.2.2 Accounts of critical events

A “critical event” is one which makes a “significant” contribution either positively or negatively, to the general aim of a particular task (Flanagan, 1954). Hence, in the present study the “critical event” technique was essentially a procedure for collecting certain important facts concerning the behaviour of apprentices in defined situations at the workplace. Thus, the critical event technique was an attempt to identify the more “noteworthy” aspects of job behaviour and was based on the assumption that the apprentices’ activities at the workplace were composed of critical and non-critical tasks (Oxtoby, 1979; Bell, 1987); a critical task being defined as

one which makes the difference between success and failure in carrying out an important part of a job. The apprentices were requested to recall and recount specific events that they thought had been critical to their learning at the workplace and thus their responses were grounded in actual events.

It was assumed that the apprentices would have experienced moments of great significance to them, such as when they were able to achieve successfully particular tasks at work for the first time, or when they faced problems at work that were beyond their ability to resolve on their own.

According to Patrick (1992), there are number of advantages and disadvantages of the critical event technique. The advantages are that:

- a) the technique should identify parts of the task which are important and therefore form part of a learning process.
- b) those task components which are judged as critical because performance was ineffective automatically become the needs of a learning programme.

The major disadvantage is that Expert analysts are required.

3.1.2.3 On-site observations at the workplace

On-site observations were made of the on-going behaviours of the key informants (the apprentices, the tradespersons, the entrepreneurs and the

clients) in the natural settings of the workplaces. The observations aimed to have first hand experience of the many aspects of life at the workplace in the informal sector and to establish adequate relationships with the tradespersons and the apprentices (quite apart from serving to ensure at the same time the validity of the interview data). Given the researcher's experience in technical education and training, it was not difficult for him to establish good "rapport" with all the informants at the workplaces visited and thus to get to know how the apprentices learn at the workplace.

Most of the time the researcher observed the tradespersons explaining and demonstrating their activities to the apprentices. The term "demonstrations" as used in the present study refers to the on-going activities of the tradespersons, as the jobs in which they were engaged progressed.

3.2 The Pilot Study

The interview schedules and observation recording sheets for this study were piloted in order to remove ambiguities, inappropriate wording, and misleading questions from the interview schedules and to make more focused observations. (Powney, 1987; Oppenheim, 1992). Piloting was particularly necessary in that the interview questions had to be translated into and asked in Creole (the local dialect which is essentially broken

English) after having been prepared initially in English. However, the data collected were translated back from Creole into English.

For the pilot study, three entrepreneurs from each trade – motor vehicle and tie-dye – were interviewed on-site, at their respective workplaces in Banjul and in Serre Kunda. Also, two apprentices at each workplace were observed working with their tradespersons and after the observations the apprentices were interviewed individually. As a result of the pilot study,

- a) new questions were added to the interview schedules and redundant questions were deleted.
- b) the researcher obtained the necessary confirmation that:
 - i) the entrepreneurs, the tradespersons and the apprentices were all aware of the questions, that they had their own opinions about the questions, and that they could convey those opinions
 - ii) the fieldwork could be conducted in the manner intended.

3.3 The Main Study

3.3.1 Data collection procedures for the main study in the Motor Vehicle Garages

3.3.1.1 The sample of motor vehicle garages

The hierarchy for the personnel in each of the sampled garages was as follows:

- a) At the top of the hierarchy was the Entrepreneur who was the owner of the garage and who was also a qualified tradesperson.
- b) Below the entrepreneur were the Tradesperson(s) who were qualified motor vehicle mechanics employed by the entrepreneur.

Working under the tradespersons were

- i) The Senior apprentices; these were apprentices with three to five years' experience in the trade.
- ii) The Junior apprentices; these were apprentices with less than three years' experience in the trade.

As Table 2 shows, the relevant data were collected in each garage by the following methods:

- i) The entrepreneur was individually interviewed on his role.
- ii) The tradesmen and the senior apprentices were observed at the workplace to see how the apprentices learned at the workplace while working with a tradesman.
- iii) The senior apprentices were interviewed about how they learned at the workplace, and also gave accounts of what they perceived as 'critical events' with regard to learning during their apprenticeship period at the workplace.

Table 2 : The data collection methods used for the different categories of informants

Data collection methods used	Categories of informants		
	Entrepreneurs	Tradesmen	Senior Apprentices
Interviews	✓	-	✓
Observations	-	✓	✓
Accounts of Critical Events	-	-	✓

Ten motor vehicle garages were sampled in Banjul using stratified, random sampling procedures; that is, given that Banjul is divided into five Wards, two garages were selected on the High street of each ward. The five wards were:

- a) the soldier town ward.
- b) The Jollof and Portuguese ward.
- c) The Half-die ward.
- d) The Central ward.
- e) The Northern ward.

Of the sampled garages, seven specialised by the make of cars that were repaired. The remaining three were collective endeavours with independent partners representing different relevant occupations (such as, painting, panel-beating, body work repairs, auto-electric), sharing a location, facilities (such as electricity) and clients. All of the people who worked in the sampled garages were men. As Table 3 shows, on average,

the garages were about eight years old and employed three tradesmen and four apprentices.

Table 3 : The targeted garages : some descriptive statistics

Garage Code Number	Number of Years since the establishment of the garage	Number of tradesmen per garage *	Number of Apprentices per garage **
1	12	3	4
2	10	4	5
3	6	4	4
4	5	2	4
5	5	2	4
6	13	3	4
7	8	4	5
8	8	4	4
9	10	3	3
10	8	3	4
Total	85	32	41
Average per garage	8.5	3.2	4.1

* In addition to the entrepreneur/owner of the garage who was also a qualified tradesman.

** This number included both Senior Apprentices and Junior Apprentices.

3.3.1.2 The sample of respondents in the motor vehicle garages

The entrepreneurs were themselves former tradesmen and, in general, tradesmen in the informal sector in The Gambia were relatively uneducated (see Tables 4a and 4b). As Table 4a shows, only few (3) in the sampled garages had attended primary schools. All the tradesmen had learned the trade through the system of apprenticeship training.

Another factor about the personnel in the selected garages was that four of the sampled tradesmen were between 31 to 40 years old; three more were between 20 to 30 years and formed the second largest group (see Table 4a). Yet another factor about the sample was that five of the tradesmen were born in Banjul. The rest were migrant tradesmen born in localities situated within 50 miles of the city, such as the Western Division and the North Bank Division (see Table 4a).

Table 4a : The sampled tradesmen : their age, level of formal education and birth place

Garage Code No.	No. of T/Men per Garage	Tradesmens' Age					Tradesmen's Level of Formal Education					Birth Place						
		No. of Yrs. of Primary School Educ.													The Gambia			
		20-30	31-40	41-50	50+	None	1-2	3-4	5-6	Banjul	W/D	LRD	NBD	CRD	URD			
1	1	1				1				1								
2	1		1			1				1								
3	1				1		1			1								
4		The entrepreneur acted as tradesman – his particulars are recorded in Table 4b.																
5	1	1						1										
6	1		1			1				1			1					
7	1			1		1						1						
8	1		1			1					1							
9	1		1				1			1								
10	1	1				1					1							
10	9	3	4	1	1	6	2	1	0	5	2	1	1	0	0			
10	9	9					9					9						
Grand Total																		

Key:

T/M = Tradesmen

Yrs = Years

Educ = Education

W/D = Western Division

LRD = Lower River Division

NBD = North Bank Division

CRD = Central River Division

URD = Upper River Division

Table 4b : The sample entrepreneurs : their age, level of formal education and birth place

Garage Code No.	No. of Entrep. per Garage	Entrepreneurs' Age					Entrepreneur Level of Formal Education					Birth Place				
		No. of Yrs. of Primary School Educ.					The Gambia									
		20-30	31-40	41-50	50+	None	1-2	3-4	5-6	Banjul	W/D	LRD	NBD	CRD	URD	
1	1	-	1	-	-	-	1	-	-	-	1	-	-	-		
2	1	-	1	-	-	-	-	-	-	-	1	-	-	-		
3	1	-	-	1	-	-	-	-	-	-	1	-	-	-		
4	1	-	-	-	1	-	-	-	-	-	1	-	-	-		
5	1	-	-	1	-	-	-	-	-	-	1	-	-	-		
6	1	-	-	-	1	-	1	-	-	-	1	-	-	-		
7	1	-	1	-	-	-	1	-	-	-	1	-	-	-		
8	1	-	1	-	-	-	-	-	-	1	-	1	-	-		
9	1	-	-	1	-	-	-	-	-	-	-	1	-	-		
10	1	-	-	-	1	-	-	-	-	-	1	-	-	-		
10	10	-	4	3	3	7	3	-	-	6	2	2	-	-		
Grand Total	10	10					10					10				

Key:
Entrep = Entrepreneur
Yrs = Years
Educ = Education

W/D Western Division
LRD Lower River Division
NBD North Bank Division

CRD Central River Division
URD Upper River Division

Turning to the apprentices in the sample, Table 5 shows that the apprentices were young people between the ages of 16-25; the stipulated entry age to the labour force is 16 years (Ministry of Trade, Industry and Employment, 1997). Interestingly, the apprentices were relatively educated compared with their unschooled masters (the tradesmen). Most had between two and four years of primary school education.

Four of the apprentices were born in Banjul. The rest were migrant apprentices born in localities situated within 100 miles of the city, namely, the Western Division, the North Bank Division, the Lower River Division and the Central River Division (see Table 5). Through migration to the urban areas the apprentices invested in their own future by taking advantage of opportunities not available in their localities. The skills they acquired became a form of productive capital. Interestingly too, at the time of the study the majority of the senior apprentices in the selected garages had spent between three to six years in their apprenticeship (see Appendix 16 for full details of the apprentices in the sampled garages : their age, level of formal education, years of apprenticeship and birthplace).

Table 5 : The sample of Apprentices: Their age, level of formal education, number of years of apprenticeship and birth place

Garage Code No.	No. of App. Per Garage	Apprentices' Age					Apprentices' Level of Formal Education					No. of Years of Apprenticeship						Birth Place in The Gambia					
							No. of Years of Primary School Education											Urban		Rural			
		10-15	16-20	21-25	26+	None	1-2	3-4	5-6	1-2	3-4	5-6	7+	Barjul	W/D	LRD	NBD	CRD	URD				
1	1		1					1					1										
2	1			1			1								1								
3	1		1				1						1			1							
4	1		1					1					1										
5	1		1				1						1										
6	1		1				1									1							
7	1			1				1						1									
8	1			1				1						1									
9	1			1			1										1						
10	1			1				1															
Total	10	0	5	5	0	0	5	5	0	0	0	2	8	0	1	2	1	0	0				

Key:

App.	=	Apprentices	W/D	Western Division
LRD		Lower River Division	URD	Upper River Division
NBD		North Bank Division	CRD	Central River Division

3.3.1.3 The interviews of the Motor Vehicle entrepreneurs

Ten entrepreneurs were interviewed (see table 4b), one from each of the sampled motor vehicle garages. The individual interviews were conducted at the entrepreneur's own garage and were either tape recorded or stenographically transcribed. The interviews were planned to last 45 minutes each; however, sometimes they were considerably longer (80-90 minutes), because there were constant interruptions by tradesmen and apprentices, the former reporting on completed jobs and the latter requesting from the entrepreneur one thing or another (such as collecting the key for the stores). In one particular garage, the telephone did not stop ringing during the interview and, consequently, the interview had to be continued in a car parked in the street opposite the garage. As Appendix 1 shows, entrepreneurs were asked in particular, about:

- a) how they saw their role at the workplace with regard to the apprentices?
- b) how they facilitated learning?
- c) whether the apprentices were motivated to learn?
- d) whether the apprentices had enough practice time at the workplace?

3.3.1.4 The observations of the tradesmen's activities

Ten tradesmen were closely observed (see table 4a), one from each of the sampled motor vehicle garages. One of these tradesmen was the owner of the garage. In each garage the selected tradesman was the one with whom the senior apprentice who was selected for the study was attached.

3.3.1.5 The interviews of the Motor Vehicle Apprentices

Ten most senior apprentices were selected for the study (one apprentice from each garage). Given the high illiteracy rate in the informal sector in The Gambia, it was important to obtain a sample of apprentices who were articulate (in addition to being the most experienced apprentices in the garage). So, the Opportunity Sampling method (Field and Morse, 1985) was deemed appropriate because the researcher in his previous capacity as the Vocational Co-ordinator of The Gambia Technical Training Institute (GTTI) had developed a very close working relationship with the local garages and was allowed to select those apprentices for whom the medium of communication was Creole.

All the apprentices interviewed were male, since there were no female apprentices in the sampled garages. The interviews were conducted at the apprentices' place of work, and, as for the interviews of the entrepreneurs,

each interview lasted about 90 minutes. The interviews focussed on the learning process at the workplace as explained in Section 3.1.2.1 (see also Appendix 2).

3.3.1.6 The observations of the Motor Vehicle apprentices and their accounts of Critical Events

In each garage the researcher spent on average some 30 hours in all observing and interacting with the apprentices, as well as with the entrepreneurs, and the tradesmen. By such an immersion in each workplace it was possible to get to know the respective values and beliefs of the apprentices, the entrepreneurs and the tradesmen; and to understand the relevance and meaning of what the apprentices talked about, such as their problems, and their career plans. The time spent in each workplace opened up opportunities for questioning and probing during private, individual, conversations with the apprentices, much as Galton and Delamont (1985) had mentioned in their work. While observing each targeted apprentice at work, the researcher asked himself a number of questions, for example (see also Appendix 5).

- a) What was the tradesperson doing (while working on a particular task) to enhance the apprentice's learning?

- b) What were the apprentices' verbal and non-verbal reactions to learning facts, technical procedures, functions and principles, during a particular activity?

The accounts of critical events were obtained at the end of each apprentice's interview by asking the apprentices to recount those events that were critical to their learning during a break down errand or when working with the tradesmen.

3.3.2 Data Collection Procedures for the main study in the Tie-Dye trade

Given the researcher's engineering background and in order to facilitate appropriate questioning during the interviews and observations, the researcher attended a one-week 'crash' course on tie-dying at The Gambia Girl Guides Association's Vocational Training Centre. The aim of attending the course was to learn the techniques used in the tie-dye trade and the associated technical language and to understand the environment in which the businesses operated (see Appendix 6).

3.3.2.1 The sample of Tie-Dye businesses

As a geographical clustering of localities in Serre-Kunda already existed, stratified sampling procedures were used; in point of fact, Serre-Kunda is divided geographically into five Census Enumeration Areas (CSD, 1994).

These are:

- a) The Serre-Kunda main town area
- b) The Latri-Kunda area
- c) The Latri-Kunda German area
- d) The Dippa-Kunda area
- e) The Serre-Kunda London area

Two businesses from each Census Enumeration Area (CEA) were selected, at random, on each side of the five boundaries between the five CEAs. It was again considered important that the apprentices should be articulate in Creole (broken English).

The hierarchy for the personnel in each of the sampled tie-dye businesses was as follows:

- a) At the top of the hierarchy was the entrepreneur who was the owner of the business and who was also a ‘qualified’ tradesperson.

- b) Below the entrepreneur were the “qualified” tradespersons – all women.

Working with the tradeswomen were:

- i) the senior apprentices; these were apprentices with 12 to 24 months’ experience in the trade.
- ii) the junior apprentices; these were apprentices with less than twelve months’ experience in the trade.

As Table 6 shows, the relevant data were collected in each business by the following methods:

- i) the entrepreneur was individually interviewed about her role
- ii) the tradeswomen and the senior apprentices were observed at the workplace to find out how the apprentices learned at the workplace while working with the tradeswomen.
- iii) The senior apprentices were interviewed about how they learned at the workplace, and also gave accounts of what they perceived as ‘critical events’ with regard to learning during their apprenticeship period at the workplace.

Table 6 : The data collection methods used for the different categories of informants

Data collection methods used	Categories of informants		
	Entrepreneurs	Tradeswomen	Senior Apprentices
Interviews	✓	-	✓
Observations	-	✓	✓
Accounts of Critical Events	-	-	✓

As Table 7 shows, on average the 10 sampled businesses were about 11years old. Six of them had existed between six to ten years, the oldest was 22 years old and the youngest were six years old. The average number of tradeswomen per business was between six and seven, six of the businesses had between seven and eight tradeswomen per business, and only one business had four tradeswomen. The average number of apprentices per business was about six, most (7) had between five and eight apprentices per business, two businesses had each four apprentices, the lowest number in the sampled businesses.

Table 7 : The targeted Tie-Dye businesses : some descriptive statistics

Business Code Number	Number of Years since the establishment of the business	Number of tradeswomen per business *	Number of Apprentices per business **
1	10	5	5
2	8	4	5
3	6	6	4
4	6	7	6
5	9	8	7
6	18	8	5
7	8	5	4
8	12	7	8
9	14	7	8
10	22	8	10
Total	113	65	63
Average per business	11.3	6.5	6.3

* The number of tradeswomen in addition to the entrepreneur of the business who was also a qualified tradeswoman.

** This number indicated both Senior and Junior Apprentices.

3.3.2.2 The sample of respondents in the Tie-Dye businesses

As in the motor vehicle trade, the entrepreneurs were themselves former tradeswomen and, in general, the tradeswomen in the tie-dye businesses in The Gambia were also relatively uneducated. As Table 8a shows, of the 10 tradeswomen in the sampled businesses, only two had attended primary schools. All the tradeswomen had learned the trade through the system of apprenticeship training. Table 8a shows also the age structure with eight of the tradeswomen between 31 and 50 years old.

Table 8a : The sampled tradeswomen : their age, level of formal education and birth place

Business Code No.	No. of T/W per Business	Tradeswomen's Age					Tradeswomen's Level of Formal Education					Birth Place				
		20-30	31-40	41-50	50+	No. of Years of Primary School Education	None	1-2	3-4	5-6	Greater Banjul	W/D	LRD	NBD	CRD	URD
1	1	1						1				1				
2	1			1			1				1					
3	1		1				1				1					
4	1		1				1						1			
5	1	1					1				1					
6	1			1				1						1		
7	1			1			1							1		
8	1		1				1				1					
9	1		1				1				1					
10	1		1				1				1					
Total	10	2	5	3			8	2			6	1	1	2		

Key:

T/W Tradeswomen
LRD Lower River Division
NBD North Bank Division

W/D Western Division
URD Upper River Division
CRD Central River Division

Table 8b : The sampled entrepreneurs : their age, level of formal education and birth place

Business Code No.	No. of Entre. per Business	Entrepreneurs' Age					Entrepreneurs' Level of Formal Education					Birth Place				
		20-30	31-40	41-50	50+	No. of Years of Primary School Education	None	1-2	3-4	5-6	Greater Banjul	WD	LRD	NBD	CRD	URD
1	1	-	1	-	-	-	-	1	-	-	1	-	-	-	-	-
2	1	-	1	-	-	1	1	-	-	-	1	-	-	-	-	-
3	1	-	-	1	-	1	1	-	-	-	-	1	-	-	-	-
4	1	-	-	1	-	1	1	-	-	-	-	-	-	1	-	-
5	1	-	-	-	1	1	1	-	-	-	-	-	-	1	-	-
6	1	-	-	-	1	1	1	-	-	-	1	-	-	-	-	-
7	1	-	-	1	-	1	1	-	-	-	-	1	-	-	-	-
8	1	-	-	-	1	1	1	-	-	-	1	-	-	-	-	-
9	1	-	-	-	1	1	1	-	-	-	1	-	-	-	-	-
10	1	-	1	-	-	1	1	-	-	-	1	-	-	-	-	-
Total	10	-	3	3	4	9	1	-	-	-	6	2	-	2	-	-

Key:

Entrepreneur
LRD Lower River Division
NBD North Bank Division

WD Western Division
URD Upper River Division
CRD Central River Division

Turning to the apprentices in the sample, Table 9 shows that eight apprentices were young people between the ages of 16 and 25; this statistic indicates the interest shown by young women in the trade. The two apprentices under age were close members of the respective entrepreneurs' families.

The apprentices in the sample were relatively uneducated: eight never went to school and two did not have more than two years of primary school education (see Table 9).

Five of the apprentices in the sample were born in the Greater Banjul area. The rest of the apprentices were born in Western Division (3), a semi-urban area, and two in the North Bank Division, a rural area (see Table 9). (See Appendix 18 for full details about the apprentices in the sampled businesses; their age, level of formal education, length of apprenticeship and birth place).

Table 9 : The sample of apprentices : their age, level of formal education, number of months of apprenticeship and birth place

Business Code No.	No. of App. Per Business	Apprentices' Age					Level of Formal Education				No. of months of Apprenticeship				Birth Place in The Gambia							
		Age					Level of Formal Education				No. of months of Apprenticeship				Birth Place in The Gambia							
		10-15	16-20	21-25	26+	None	1-2	3-4	5-6	Less than 12 months	12-18 months	19-24 months	Greater Banjul	W/D	LRD	NBD	CRD	URD				
1	1	1	-	-	-	-	1	-	-	-	1	-	1	-	-	-	-	-				
2	1	-	-	1	-	1	-	-	-	-	-	1	-	1	-	-	-	-				
3	1	-	1	-	-	1	-	-	-	-	1	-	-	1	-	-	-	-				
4	1	-	1	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-				
5	1	1	-	-	-	1	-	-	-	-	1	-	1	-	-	-	-	-				
6	1	-	-	1	-	-	1	-	-	-	-	1	1	-	-	-	-	-				
7	1	-	-	1	-	1	-	-	-	-	-	1	1	-	-	-	-	-				
8	1	-	1	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-				
9	1	-	1	-	-	1	-	-	-	-	1	-	-	-	1	-	-	-				
10	1	-	1	-	-	1	-	-	-	-	-	1	1	-	-	-	-	-				
Total	10	2	5	3		8	2	0	0	0	4	6	5	3	0	2	0	0				

Key:

App. = Apprentices

LRD Lower River Division

NBD North Bank Division

W/D

URD

CRD

Western Division

Upper River Division

Central River Division

3.3.2.3 The interviews of the Tie-Dye entrepreneurs

Ten entrepreneurs were interviewed (see Table 8b), one from each of the selected tie-dye businesses.

The interview schedule content matched very closely the content of the interview schedule used with the motor vehicle entrepreneurs (see Appendix 3). The interviews were planned to last 45 minutes each; however, sometimes they lasted longer (70-80 minutes) because, as was the case in the motor vehicle trade, there were interruptions by the tradeswomen wanting the entrepreneurs' approval on the suitability of the dye-bath solution or by apprentices requesting the entrepreneurs to answer the telephone.

3.3.2.4 The observations of the tradeswomen's activities

Ten tradeswomen were closely observed (see Table 8a), one from each of the sampled tie-dye businesses. In each business, the selected tradeswoman was the one with whom the senior apprentice who was selected for the study was attached.

3.3.2.5 The interviews of the tie-dye apprentices

Ten most senior apprentices in the sampled tie-dye businesses were selected for the present study (one apprentice from each business). All were female, since there were no male apprentices in any of the tie-dye

businesses sampled for the study. As in the case of the motor vehicle apprentices, it was important to obtain a sample of apprentices who were articulate (in addition to being the most experienced apprentices in the business) and for whom the medium of communication was Creole.

The content of the interview schedule matched very closely that of the interview schedule for the motor vehicle apprentices, in that the focus was on the learning process at the workplace (see Appendix 4). The interviews were conducted at the apprentices' place of work and, as for the interviews of the entrepreneurs, each interview lasted about 80 minutes.

3.3.2.6 The observations of the Tie-Dye apprentices and their accounts of Critical Events

As was the case for the observations at the motor vehicle garages, at each selected tie-dye business, the researcher spent on average, during the research period some 24 hours observing and interacting with entrepreneurs, tradeswomen and apprentices. The aim was the same as that indicated for the observations in the motor vehicle garages (see section 3.3.1.6).

The accounts of critical events were obtained at the end of each apprentice's interview as was the case for the motor vehicle apprentices.

3.3.3 The Analytical Procedures

The analysis of the qualitative data consisted of two main flows of activities, namely:

- a) content analysis (Marshall, 1989)
- b) comparisons:
 - i) with the way that students in Vocational Training Institutions are trained.
 - ii) between the findings in the Motor Vehicle trade and those in the Tie-Dye trade.

3.3.3.1 Content analysis

A content analysis of the data was done for each trade by:

- i) analysing the respondents' views on the issues raised in the interview schedules and categorising the responses.
- ii) relating both the observational data and the accounts of "critical events" to the interview data.
- iii) relating the research findings to
 - the theoretical literature on learning reviewed in Chapter 2, drawing mainly on Bloom *et al*'s (1956; 1964) taxonomies of educational objectives in the cognitive and affective domains.
 - the aim of the study and to the research questions.

3.3.3.2 Comparisons

- i) where possible, comparisons were made between how the sampled apprentices learned at the workplace and how students learn in the formal setting of Vocational Training Institutions, paying particular attention to the missed opportunities for facilitating learning at the workplace in the informal sector.
- ii) where possible, comparisons were made between the findings in the motor vehicle trade and those in the tie-dye trade; in particular, between how the tradesmen in the motor vehicle trade and the tradeswomen in the tie-dye trade facilitated learning at the workplace.

3.3.4 Constraints and limitations

3.3.4.1 The constraints on data collection

In spite of selecting apprentices who were expected to be articulate enough (in Creole) and to provide insightful responses (to questions) and to elaborate on these, the responses were on the whole brief, and reserved, and did not therefore allow for “thick descriptions” of their views. To bring out the apprentices’ thoughts and obtain expressions of their feelings, one had to keep probing them using carefully worded fragmented questions.

Another difficulty was the punctuality of the entrepreneurs at interviews and indeed their failure on occasions to keep appointments. The point was that the Entrepreneurs would agree to be interviewed on a particular date and time, but the unknown nature of their business activities often meant that appointments had to be cancelled more than once and new ones made. These arrangements were costly in time (and financially too!).

A further point was that although, for interviewing purposes, attempts were made to move interviewees (apprentices and entrepreneurs) to suitably quiet sites on the business premises, in some businesses there were, at times, lots of interruptions (of the planned interviews) by other employees as they came to see the apprentices and the entrepreneurs on a number of matters; these interruptions ranged from tradesmen asking apprentices to give a helping hand in pushing vehicles out of the way in a garage, or calling entrepreneurs to answer the telephone or even calling them to meet clients. In most cases the interviews had to be suspended, and once an interview was suspended it proved very difficult to continue with it as planned.

Yet another constraint was that the measurement of learning outcomes at the workplace was difficult, as this would have smacked of officialdom's interference; also, there were no official records of apprentices'

achievements because the tradespersons who were in everyday contact with the apprentices did not carry out any formal, assessment of their progress at the workplace, or any formative or summative assessments of their performance. In the motor vehicle trade an apprentice was deemed to have reached the required standard of performance when the breakdown errands that he carried out were successful.

3.3.4.2 The limitations of the study

The size of the sample of businesses in each trade was small. However, the point was that given the limited number of technical procedures in the Tie-dye trade and of types of repairs in the Motor Vehicle trade, there was nothing to be gained in terms of hard evidence by having a larger sample of businesses in each trade. In other words, in each trade, the size of the sample was constrained, to some extent, by the nature of the trade in the informal sector.

Another consideration is that the present research was based on two qualitative case studies of the apprenticeship system in the informal sector; one in the Motor Vehicle trade and the other in the Tie-Dye trade; and the generalisability of findings are in question as implied in section 3.1. However, the present study is not concerned with statistical generalisations,

that is, with making inferences about the population of apprentices in the informal sector on the basis of empirical data collected from a representative sample of apprentices (Yin, 1989).

CHAPTER 4 : RESULTS FOR THE MOTOR VEHICLE TRADE

Introduction

The results for the sampled motor vehicle garages cover the following:

- a) The apprenticeship system in the motor vehicle trade.
- b) A day in a motor vehicle garage.
- c) Two different apprentices' accounts of critical events (one per apprentice).
- d) Recording of an interview with an apprentice.
- e) Recording of an interview with an entrepreneur.
- f) The analysis of results for the Motor Vehicle trade.

4.1 The Apprenticeship System in the Motor Vehicle trade

In almost all the streets of the city of Banjul and in the towns and major villages of the country, one finds a number of individual, separate, motor vehicle garages which are run as private businesses and which constitute the informal sector for the Motor Vehicle trade. They are mostly small garages but some may employ three to five apprentices. The reason for the large number of garages in the informal sector is the poor condition of the roads (especially in the provinces) which necessitates the constant maintenance, repair and servicing of motor vehicles.

The tradition in the motor vehicle trade used to be that the responsibility for running a garage was handed down from the father (as the owner) to one of his sons and that the son was employed as an apprentice; as a consequence, motor vehicle engineering crafts tended to become the preserve of certain families but with the development of the master-apprentice system, the “arrangement” method of recruitment (whereby apprentices are recruited outside the family circle) has replaced this tradition. However, entrepreneurs still give preference to their own relatives and to the place of birth of applicants for apprenticeships in the choice of apprentices. Also, parents may prefer their children to be apprenticed to entrepreneurs in their own vicinity, whom they invariably know personally.

In general, the apprentices in the motor vehicle trade start with an Introduction Phase in which they are “taught to behave” and made to do menial jobs, such as cleaning the garage or running errands; a typical errand at this stage is to buy “cola” nuts and cigarettes, and to buy food for breakfast for the tradespersons (such as bread and beans), or to light the ‘coal-pot’ for brewing Chinese tea (locally known as “ataya”). The duration of this phase can vary widely depending on a number of factors, such as, the diligence of the apprentice, and his/her motivation. In general this phase can last about 12 months.

The next phase consists of getting to know all the tools of the trade and to identify the component parts of motor vehicles. Meanwhile, the apprentice is expected to observe and discover (without asking too many questions) what the work is all about. The tradesmen occasionally “demonstrate” a particular operation (such as, bleeding air from a diesel engine fuel system).

Gradually, as the apprentice progresses through his/her apprenticeship, s/he is introduced to more complex tasks (such as adjusting brakes or timing the ignition system) and is given increased responsibility, such as being sent out on a breakdown duty, or supervising junior apprentices, or dealing directly with customers.

The length of the apprenticeship depends on several factors. In addition to legal contractual obligations, some tradesmen fix the duration mainly in accordance with tradition, or with the aptitude for work of individual apprentices, or with “what other tradesmen do” (which may or may not be in accordance with tradition), or still, with the age of the apprentice (because the general perception in the trade is that older apprentices tend to learn the trade more quickly than younger apprentices).

The working week for apprentices (and tradesmen) in the informal sector garages is long: typically six days of ten hours each (from 8am to 6pm), with an official break of one hour on each day; the particular time at which the break is taken on any one day normally depends on the level of activity in the garage on that day. Garages tend to be busier during the one-week periods immediately preceding the religious holidays, when they tend to work for longer hours. However, apprentices are likely to obtain permission to respect family obligations, such as attending funerals and weddings, even if attendance involves travelling out of the city. There is no annual leave for the apprentices (and indeed for the tradesmen).

Apprentices do not normally receive wages for the work that they do; however, pocket money at the entrepreneur's discretion is the rule rather than the exception. Sometimes pocket money is called "soap money" because it is given to apprentices at weekends for them to buy soap to wash their overalls. The frequency and the amount of "soap money" tend to increase as the apprentices become more productive at the workplace. Some apprentices (especially the few from the provinces) receive free lodgings because the entrepreneurs allow them to work as night watchmen in the garages. Furthermore, in most garages the entrepreneurs provide a free lunch for all their employees in the garages. This lunch is provided

under a contractual agreement between the entrepreneur and one of the local restaurants.

In general, at the end of their apprenticeships, the apprentices are expected (by the entrepreneurs and the tradesmen) to be assessed and to pass a test.

However, this is not a test in the sense of an end-of-course examination of the sort that students take in Vocational Training institutions. Instead, the tradition in The Gambia (among motor vehicle tradesmen in the informal sector) is to assess on the basis of how successful have been the breakdown errands that the apprentices attended to, as such success would signify their ability to diagnose faults competently and to come up with the right solutions. Upon passing the 'test' an apprentice is free to look for employment; for he/she will become a qualified tradesperson during a celebration at the workplace in which he/she will thank the tradesman and the entrepreneur with "cola" nuts and the entrepreneur will present him/her with a tool box (which contains, in most cases, second hand tools). This celebration is like a graduation ceremony and the tool box is regarded as a Certificate of competence which allows the apprentice to practise the trade. Other tradesmen and entrepreneurs from neighbouring garages are usually invited to this celebration. Without this celebration, the newly qualified tradesman (and aspiring entrepreneur) is likely to encounter harassment (or worse!) from the established tradesmen in the trade, who would argue that

there was unfair competition from someone who, in their opinion, is still an unqualified individual. Rarely, however, are “qualified” tradesmen discouraged or prevented by others from starting their own garages and, as mentioned in Chapter 1, the Code of practice in the trade applies to the newly qualified tradesmen.

Moreover, learning about the motor vehicle trade continues as far as the newly qualified tradesmen is concerned. For, when a vehicle enters a garage the client will normally explain to the owner/entrepreneur of the garage his/her “problem” with the vehicle and the owner/entrepreneur will then call a tradesman to verify the fault while the client will be waiting in the owner’s/entrepreneur’s ‘office’. After diagnosing the fault, the tradesman will report back his/her assessment of the fault to the owner/entrepreneur who will then estimate the cost for the repairs to be done. The entrepreneur will next discuss the cost in the ‘office’ with the client and negotiate a fee. At times the tradesman (who diagnosed the fault) will remain in the ‘office’ to help the entrepreneur with the costing. He would thus learn about the business side of the work from this negotiation. Occasionally, the entrepreneur of a garage and a client might negotiate the fee whilst standing by the ‘bonnet’ of the vehicle, with the tradesman and an apprentice also standing by. It was from such occasional negotiations that the tradesmen (and sometimes the apprentices) learned a

great deal about the business side of running a garage and such knowledge would become very useful to them in future when they in turn become entrepreneurs.

4.2 A day in a Motor Vehicle garage

Introduction

The hierarchy of personnel in the garage under observation consisted of:

- a) the Entrepreneur (owner)
- b) three Tradesmen
- c) three Senior apprentices (3 to 5 years in their apprenticeships)
- d) one Junior apprentice (1 to 2 years in his apprenticeship)

This particular day – a Saturday – was chosen for a visit to a garage firstly because the researcher was free from his normal administrative duties at The Gambia Technical Training Institute and would be able to spend the whole day at the garage; secondly, because most people, especially civil servants, took their cars to the garage on Saturdays for repairs, since they were off-duty, and consequently, there was the guarantee that there would be some jobs in the garage on that day.

The garage itself was a disused compound, measuring about 120 x 80 ft (a normal Banjul size compound), and with two large gates to allow cars to enter the garage easily. There was a ground floor area of about 12 ft x 80 ft from the garage entrance to the main road. The garage used this area to undertake quick repairs when the garage floor as such was full with vehicles.

4.2.1 The particular day

On that particular day, the researcher arrived at the garage around 8.05 (as advised by the entrepreneur) to allow the garage staff time to take care of the morning rituals such as lighting the ‘coal pot’ to brew Chinese tea, sweeping the garage floor and bringing out the tool boxes. As the researcher entered the garage, the entrepreneur was allocating jobs to the different tradesmen and apprentices. These were jobs that had arrived towards the close of the previous day; the faults were already diagnosed and the costs already negotiated with the entrepreneur. One tradesman and his apprentice (designated as team ‘A’ for the purposes of this study) were allocated a ‘brake’ job. Another tradesman and his apprentice (team ‘B’) were allocated a ‘clutch’ job; and yet another tradesman and his apprentice (team ‘C’) were allocated a ‘tuning’ job. Team C was the focus of the researcher’s observations. The Entrepreneur took the Junior apprentice to the office-cum-store which he (the entrepreneur) said needed some tidying.

Everyone went to work immediately. The place was very business like as the tradesmen gave instructions to their apprentices (such as ‘bring the tool box and fetch me my overalls’). The apprentices were already in their working gear: two had old overalls (and for one of them, the overall was too long so that he had to adjust the leg of the overall by rolling it); the other two wore shorts and ‘T’ shirts.

The technical equipment of the garage consisted of a totally arbitrary combination of machines and tools of different makes, origins and vintage. The equipment in the workshop was made up of one ‘lifting crane’, two hydraulic ‘floor jacks’, one ‘bottle jack’ (manually operated), one ‘pillar drill’ and various sizes of locally made ‘jack stands’. Considering that many of the operations in the garage could be carried out by hand, such hand tools were of fundamental importance; indeed a pre-requisite in employing a tradesman was that he must own a tool box, and so each tradesman had his own tool box.

As the researcher observed the targeted team ‘C’, the tradesman instructed the apprentice who worked with him (and who was in his third year) to remove the ‘rocker cover’, the ‘carburettor’ top cover and the ‘contact breaker points’ of the distributor of the Toyota car in the garage. The apprentice took a 5/8” “flat spanner” and a “screw driver” from the tool

box and started removing the component parts as instructed. A cursory glance around the garage revealed that the apprentice who was working with the tradesman in team 'A' (for the brakes job) was positioning a 'floorjack' under a Renault car, whilst Team 'B' (for the clutch job) was busily discussing under the raised bonnet of a Peugeot car.

When the apprentice under observation had completed the removal of the 'rocker cover', the 'carburettor' top cover and the 'contact breaker points', he called his Boss (the tradesman) who had by then joined Team B for the discussion under the raised bonnet. The tradesman came over and told the apprentice that he (tradesman) was going to check the "tappet clearance" of the engine; he then instructed the apprentice as to the type of tools the latter must get ready for the operation (these comprised a 'feeler gauge', a 'screw driver' and a '5/8 inch flat spanner'). The apprentice brought the tools out and the tradesman asked him to rotate the engine manually. Since there was no 'cranking dog' on the engine to facilitate the use of a cranking handle (to rotate the engine), the apprentice applied the 'tight-belt' technique, which consisted in pressing the fan-belt hard towards the pulleys and rotating the 'fan-blades' which were attached to the 'water pump'. The tradesman did all the necessary checking and adjusted the tappets clearance while the apprentice was rotating the engine and observing every

movement of the tradesman. The apprentice did not ask any questions nor did the tradesman volunteer any explanations.

After the 'tappets clearance' was checked and adjusted as required, the tradesman went over to the 'carburettor'. He took the 'floater' out of the 'carburettor float chamber' and then cleaned inside the 'float chamber'. He rearranged the 'floater' and checked the rise and fall of the 'floater' to determine the level of fuel when the 'chamber' was full. After making some minor adjustments of the 'floater' he reassembled the floater. The tradesman then took out the 'main jet' and the 'accelerator jet' of the carburettor and gave them to the apprentice to clean and blow, in order to remove any foreign matters that might have found their way inside the 'jet holes', thus restricting the flow of fuel. When the apprentice had cleaned and blown the 'jets' he brought them over to the tradesman. The latter asked for the 'main jet' but the apprentice unknowingly passed him the 'accelerator jet'. The tradesman then told the apprentice that the 'main jet' was the bigger one of the two 'jets' and the apprentice, still holding the two 'jets', compared them to make sure that the 'main jet' was indeed bigger. The tradesman then reassembled the 'jets' and returned the 'carburettor top cover'.

Meanwhile, the tradesman and the apprentice in team 'A' had finished adjusting the brakes and the tradesman had taken the car on a test drive.

The team 'A' apprentice went over to join the tradesman and the apprentice in team 'B' who were working on the clutch job. The entrepreneur then called over the team 'A' apprentice who had just joined team 'B', and asked him to assist the Junior apprentice (who had been tidying the store) to bring out the previously discarded bits and pieces (such as valves, distributor casing, and track rods). After the two apprentices had completed the stores job, both went over to join team 'B' (for the clutch job).

By then, the team under observation (team 'C', for the tuning job) had started their work on the distributor. The apprentice handed over the 'contact breaker points' to the tradesman. The latter inspected the 'contact points' and told the apprentice that the points were usable. The tradesman then took a file and smoothed out some metal that had been deposited at one of the "contact points". He then assembled the 'contact points' and instructed the apprentice to reassemble the 'rocker cover'. Next, the tradesman asked the apprentice to start the engine for the 'tuning' proper. The apprentice went inside the car and started the engine. The tradesman adjusted the 'idle screw' until the right idle speed for the tuning was attained. The apprentice came out of the car and stood by the tradesman, observing every action of the tradesman as the latter went through the routine of 'tuning' the engine. The tradesman went to the back of the car

and checked the exhaust fumes which were a bit white (signifying that there was too much air in the mixture), came back, and screwed in the 'main jet' a few more turns. He again checked the exhaust fumes and was satisfied with the outcome. He asked the apprentice to switch off the engine and restart the engine again. The engine 'fired' at the first attempt, and the tradesman then took the car for a test drive.

Meanwhile, the tradesman of team 'A' had completed the 'brakes job' and handed the car over to the entrepreneur (who was awaiting the arrival of the client to collect the car). The same tradesman then went over to assist the tradesman of team 'B' (for the clutch job), since there were no jobs pending at the time.

After some ten minutes the tradesman of team 'C' (the targeted team) returned after the road test of the 'tuning job' and handed over the car to the entrepreneur who then asked the apprentice of the 'C' team to wipe out the exterior of the car and make it look good for the client. This tradesman too, joined the ever increasing team 'B' after the car had been handed over to the entrepreneur. The three tradesmen took out the engine of the car with the clutch fault, in order to gain access to the clutch assembly, and asked the apprentice in team 'B' to remove the 'pressure plate' and the

‘friction disc’. When the apprentice had removed these, a thorough examination revealed a worn out ‘friction disc’.

As the tradesman of team ‘B’ went away to buy a new ‘friction disc’ from one of the motor parts dealers in the city, the four apprentices went to a corner at the rear end of the garage where they sat, informally, to have their breakfast. The time was around 10.30am and the researcher joined the group. Whilst they were eating, the apprentice of team ‘A’ told the other apprentices that he was surprised during the adjustment of the brakes, that his ‘Boss’ only adjusted the rear brakes and did not adjust the front brakes. The team ‘B’ apprentice (who was a fourth year apprentice) told the puzzled apprentice ‘A’ that the reason was that the front brakes were ‘disc brakes’ and that ‘disc brakes’ were self-adjusting. Still puzzled, apprentice ‘A’ asked apprentice ‘B’ why were ‘disc brakes’ self-adjusting and the latter replied “because they adjust themselves”. He told apprentice ‘A’ to ask his Boss how ‘disc brakes’ worked, because he was not sure as to how ‘disc brakes’ worked, but he knew that ‘disc brakes’ were self-adjusting.

After the apprentices finished eating their breakfasts all four of them went out to the corner shop to buy cigarettes. Returning some five minutes later, they congregated on the car with the clutch fault, by which time the tradesman in the ‘B’ team had returned with the new ‘friction disc’.

He reassembled the clutch and then the other two tradesmen, together with all the apprentices, joined him and finished the job. The tradesman for the 'B' team road tested the car and handed it over to the entrepreneur who waited for the car to be collected by its owner.

It was now almost mid-day and there were no other jobs for the tradesmen. They ordered the apprentices to light the 'coal-pot' and to brew some Chinese tea for the tradesmen (as this was common practice during idle periods). The tradesmen sat together informally in a circle and the apprentices sat in their own groups, save for the Junior apprentice who was brewing the Chinese tea. The client of the Renault car came in and went over to the entrepreneur, and after some discussion about the car, the client paid for the job and drove the car away. The researcher went over and joined the apprentices' group. The apprentices' conversation centred initially on their Bosses (tradesmen) : how they rushed jobs without giving explanations to them (the apprentices). The researcher asked the apprentices why they could not ask the tradesmen questions instead. One apprentice replied that some tradesmen did not answer their questions and even when the tradesmen did answer, the answers were rushed and not explicit enough. The apprentices' conversation then switched on to politics and to sports, and they were just starting to discuss economics when another Toyota car came in and they knew it was time to go back to work.

The client parked the car as directed by one of the apprentices, who later escorted him to the entrepreneur. The client reported a damaged exhaust pipe, and the entrepreneur called the tradesman of team 'A' to take a look at the exhaust pipe. The tradesman inspected the exhaust system of the Toyota car and informed the entrepreneur that the exhaust pipe would need 'plating' (that is, removing the corroded parts and replacing it with a new sheet metal plate). The entrepreneur then discussed the cost of this job with the client and later asked the tradesman to remove the exhaust pipe and to take it to the 'welding' workshop down the road. The exhaust pipe was returned some half an hour later, completely plated (and looking like new).

The time was now 1.45pm and the 'lunch lady' arrived with the lunch. The Junior apprentice went over to the lunch lady and helped her dish out the food into two big basins - one for the group of entrepreneur and tradesmen, and the other for the group of apprentices. Another apprentice went over to the entrepreneur who gave him some money to buy 'ice water' from a nearby corner shop. The Junior apprentice who was assisting the lunch lady carried the food to the respective places in the garage where both groups ate in silence. After the food, the bottles of ice water were passed round and every one had a drink. Next, the 'cola-nuts' were distributed by the entrepreneur. The lunch break lasted for 30 minutes.

Work resumed at 2.20pm. The tradesman doing the exhaust pipe job gave the exhaust pipe to his apprentice for the latter to reassemble and when the apprentice had completed the job, he called the tradesman who then started the engine, accelerated it for a few minutes and tested it for any leaks of exhaust fumes. When the tradesman was satisfied that the system was not leaking exhaust fumes at any point, he handed over the car to the entrepreneur. This job was completed by 2.55pm.

The garage was quiet again and the two groups converged into their separate groupings. But the groupings were short-lived, as a car entered the garage 'misfiring'. Again, one apprentice directed the car to the car park and escorted the driver to the entrepreneur. The client explained that he was driving along the road when suddenly he heard the engine misfiring; and the car became overheated and had a sudden loss of power. The job was allocated to team 'C' the tradesman and the apprentice under close observation by the researcher.

The tradesman called the apprentice and together they went over to the car. A preliminary investigation revealed that the 'cylinder head gasket' was burnt. The tradesman reported his findings to the entrepreneur who discussed the cost of repairs with the client. The tradesman came back to

the car - a Nissan Patrol - and asked the apprentice to remove the 'cylinder head' of the engine. The other apprentices came over to assist the apprentice and within a short time the cylinder head was out. The tradesman took the burnt 'gasket' to the entrepreneur who gave him some money to buy a new 'gasket' from one of the parts dealers in the city. While the tradesman was away to buy the new 'gasket', the apprentices were busy cleaning the 'cylinder bores' of the engine and the 'cylinder head'.

The tradesman returned some thirty minutes later. He laid the new 'cylinder head gasket' on the 'engine block' and asked his apprentice to assist him as he guided the 'cylinder head' over the 'gasket' on the 'engine block'. The tradesman and all the apprentices then 'finger tightened' all the bolts securing the 'cylinder head' to the 'engine block'. The tradesman then asked the apprentice to fetch the 'torque wrench' for him. He (the tradesman) set the 'torque wrench' to 70 lb/ft (the recommended torque setting for Nissan Patrol cylinder head bolts), and started to torque down the head in the conventional way (starting in the middle and spreading out evenly). He explained to the apprentices that one must always follow the convention, as otherwise, the head would be "wrapped" and distorted causing both gas and water to leak between the engine block and the

cylinder heads, and this leakage would eventually burn the ‘cylinder head gasket’.

All the apprentices completed the set job by returning the ‘radiator’, the ‘water hoses’ and the grill. The ‘radiator’ was then filled with water and the car was road tested by the tradesman and handed over to the entrepreneur who, in turn, handed it over to the client. The job was completed by about 5.45pm.

At 6.00pm the entrepreneur called it a day. The apprentices returned all the tool boxes to the store-cum-office. The tradesmen took off their overalls and gave them to their apprentices to take to the store. The tradesmen then went over to the stand-pipe, washed their hands and faces, changed into their clean shirts and trousers, and left. The apprentices packed all the equipment in the store, cleaned the work benches, washed their hands and faces (without changing their working gears) and then assisted the entrepreneur to close the garage gates. The three Senior apprentices went away together and the Junior apprentice went with the entrepreneur carrying his bag for him.

4.3 Two Apprentices' accounts of critical events

4.3.1 First account of a critical event (an event in connection with starting a motor vehicle engine)

What this critical event demonstrated was that the apprentice had learned through practical work:

- a) the step-by-step procedures in tracing faults
- b) the recall of facts and procedures
- c) the application of past experience.

A fifth year apprentice called Kebba (for the purpose of this study) was sent on a 'breakdown mission' with a second year apprentice, called Bakary (for the purpose of this study). The 'assignment' during the mission was to rescue a Toyota car in which the engine had suddenly failed in the middle of a journey.

Kebba said that the event was critical because in all the years that he had worked in the garage he had never experienced such a fault. He was used to being told what to do, or to be given directions as to what to look for, what to test and how to remedy faults (as his apprenticeship progressed).

But for this particular event he was alone with Bakary.

Kebba said that he recalled (from his training) how car drivers were interviewed in order to assist in tracing faults. He also recalled his own questioning and probing of the car driver, and his confidence in his own ability to handle the task. He recalled how he started to trace the fault by drawing on the demonstrations he had observed previously and from the practice he had had in checking for 'sparks' at the 'spark plugs' via the 'high tension leads' in the distributor. He found that the 'sparks' that jumped across the 'electrode tips' of the 'plugs' were good and sharp enough to start the engine, and so this confirmed that the fault was not one of 'ignition'. He next checked whether the fuel supply to the carburettor was continuous. He asked Bakary to take the 'carburettor' top off. Using the manual lever of the 'fuel lift pump', Bakary pumped fuel to the carburettor, but this was in good order. Yet, still the engine would not start at the next attempt to restart the engine.

Kebba recalled that at this point he was tempted to rush back to the garage (some 8 miles away) to inform his Boss that he had done all he could, but that the engine would still not start. However, on second thought, he remembered a fuel line test that he once saw demonstrated by his Boss.

He said that he asked Bakary to go underneath the car and remove the main fuel pipe which connects the 'fuel tank' to the 'fuel lift pump'. With

the main fuel pipe out, he blew into the pipe and, to his astonishment, he saw a piece of cotton wool sticking out at the other end of the pipe. He pulled the cotton wool out, and asked Bakary to reconnect the main fuel pipe. Kebba said that he then restarted the engine and it 'fired' at the first attempt.

The important technical issue here was that the original fuel line test using the manual lever of the 'fuel lift pump' had revealed that fuel was flowing well enough, but this was because the fuel was being lifted manually by pumping the lever of the 'lift pump'. However, when the 'lift pump' was being activated by the 'engine camshaft' to draw fuel automatically to the carburettor to start the engine, then there was a problem. Kebba said that Bakary had asked him why was it that the fuel was flowing well when the lift pump was activated manually by using the lever but would not flow well when activated automatically by the 'engine camshaft'. Kebba said that he explained to Bakary that with the manual lever the fuel is drawn with every stroke of the lever so that the fuel could by-pass the cotton-wool, but when the pump was activated by the 'engine camshaft', the lever was only activated at every other revolution of the camshaft due to the shape of the 'cam-lobe' which activated the pump lever.

4.3.2 A second account of a critical event (an event in connection with an overheating engine)

This event was chosen because it demonstrated in some detail how the apprentice was able to recall specific facts from a demonstration, how he had had an in-depth discussion with a tradesman, and how consequently, he took the right approach in solving the problem.

Dawda, a fourth year apprentice, explained that his Boss came over to him as he (Dawda) was about to ‘knock-off’ for the day, and told him that he was to go to Bakau (a town about 7 miles from Banjul) alone in order to rescue a car that was reported to be overheating. He therefore took some tools from his Boss’s tool box and set off for Bakau.

On arrival he found the car parked under a tree and the driver standing by. He asked the driver what was wrong with the car. The latter reported that he had hardly driven the car for four miles when he experienced excessive heat reaching him from inside the car. He stopped the car, came out, and opened the ‘bonnet’ and heard the noise of boiling water from the ‘radiator’. Dawda said that he asked the driver whether the ‘radiator’ was short of water; the driver replied that he had checked the water level before commencing the journey. Dawda said that upon hearing that report he knew he had to check first of all what caused the overheating. He

explained that, from his experience, overheating was caused by either a burst 'water hose', or a slack in the 'fan-belt', or a leaking 'radiator'. He checked the radiator for signs of leakage but everything seemed alright. He checked the water hose and there were no signs of a burst hose. Finally, he checked the 'fan-belt' and found that the belt was a bit too slack. He thought that this could cause the overheating because the belt was not tight enough to drive the water pump for the proper circulation of the cooling water. He re-adjusted the fan-belt to the required deflection (of about a quarter of an inch).

Dawda said that the critical point came when it was time to refill the radiator. He explained that he had once observed a tradesman going through the rigorous procedures of refilling a 'radiator' with water after overcoming a problem of extreme overheating; and that afterwards he had entered into an in-depth discussion with the tradesman in question as to the reasons for his action.

Dawda recalled how, from his previous experience (as a result of his observation of and discussion with the tradesman), he had to decide on one of two options before refilling the 'radiator'. The options were: either to wait until the engine was completely cold before refilling the 'radiator' with water,

or to start the engine and to refill the ‘radiator’ slowly with the engine running.

He decided that with the night fast approaching he would take the second option. When the ‘radiator’ was full he allowed the engine to run for about ten minutes, and then tested whether the radiator was overheating by putting the palm of his hand on the top of the ‘radiator’ and keeping it there for about two minutes. He explained that if one could bear the heat for two minutes then the cooling system was alright. He said that he kept his hand on the radiator for three minutes and felt no excessive heat; so, he was sure the cooling system was working alright.

4.4 Individual interviews of an apprentice and of an entrepreneur, Respectively.

4.4.1 Record of an interview with an apprentice

Ten apprentices were interviewed. This particular interview was chosen because the apprentice was very articulate and because his responses gave many insights about how apprentices learn at the workplace. The records of two more interviews with other apprentices are given in Appendices 10 and 11. The word Boss in this interview refers to the tradesman with whom the apprentice worked.

Researcher: Can I ask you, how old are you?

Apprentice: I am 17 years old.

Researcher: Did you go to school?

Apprentice: Yes, I attended the St. Mary's Primary School.

Probe: At what class did you complete your education?

Apprentice: I stopped at Primary Two (meaning after two years of primary education).

Researcher: What is your nationality – are you a Gambian?

Apprentice: Yes, I am a Gambian.

Probe: What part of the country are you from?

Apprentice: I am from Banjul.

Researcher: How many years have you been in this garage (that is, the number of years of apprenticeship)?

Apprentice: This is my third year, going to my fourth year.

Researcher: Were you able to recall the procedures used by the tradesman to diagnose the fault when the engine was misfiring?

Apprentice: It was difficult to follow the way the Boss was finding the fault because he did not explain to me, but I was able to see what he was looking at and how he was checking the fault. I followed the way the Boss went about to find the fault. The Boss first looked at all the parts that can cause misfiring, then

he decided that the fault must be with the distributor; again, in the distributor he found out that it was the advanced retard system.

Researcher: Can I ask you, did the Boss check whether you could recall the key facts or not?

Apprentice: No, the Boss never checked to find out whether I can remember the facts.

Probe: What method did you use to recall the key facts?

Apprentice: I tried to keep the important points in my mind and at times I practise them in my mind; anything that I cannot remember I will check properly next time (if I am doing a similar job) or ask some of my friends.

Researcher: Can I ask you, when you were working with the tradesman, did the tradesman explain to you the procedure for dismantling a distributor as the job progressed?

Apprentice: The Boss was dismantling the distributor on the workbench, step by step, and I was able to follow and see what he was doing. He did not explain to me how to dismantle the distributor but I was able to see what he was doing.

Researcher: Did the Boss actually explain to you the key terms when he was dismantling the distributor, terms such as contact set, base plate and fly weights?

Apprentice: No, the Boss did not explain the key facts about the contact set, the base plate and the weights, but he showed me what they were and I saw how he removed them from the distributor.

Probe: Can you remember how to remove them?

Apprentice: I think so but, may be, after I do it again.

Researcher: Did the Boss stress to you the important points you should recall when you are assembling the distributor?

Apprentice: Yes, the Boss showed me the important point I should always look for when I am fitting the distributor.

Researcher: I saw the Boss showing you the two springs of the advanced/retard mechanism; can you recall what the Boss said about the springs?

Apprentice: The Boss said the light spring retards the spark and the heavier spring advances the spark.

Probe: Did the Boss tell you how the spark is advanced and retarded?

Apprentice: The Boss said that as the speed increases the weights would open out pulling the base plate and the contact set, so advancing the spark to match the new speed.

Probe: How does the mechanism retard the spark?

Apprentice: When the speed slows down the lighter spring pulled the base plate and the spark is delayed to match the speed.

Researcher: I observed the Boss showing you how to set and adjust the contact set. Now tell me, when you want to adjust the contact set where do you position the heel of the contact arm?

Apprentice: The Boss said the heel must always be at the edge of the cam in the distributor shaft; that way the contact set is fully open.

Probe: How do you know that the points are fully opened?

Apprentice: You turn until the points are open; by this time the heel of the contact arm will be resting on the edge of the cam.

Probe: Is there any particular position on the cam where the arm must rest to show that the points are fully opened?

Apprentice: I don't know of that position, the Boss did not show me.

Researcher: Now, can you tell me, do you understand the functions and principles underlying the working of the distributor?

Apprentice: I knew the main parts of the distributor and how they work but I cannot say I knew everything about the distributor.

Probe: Did the Boss not explain to you how the distributor works?

Apprentice: The Boss showed me the parts but he did not explain to me how it works. He only explained to me the cause of the fault.

Researcher: Do you understand the procedure for timing and adjusting the distributor to the engine?

Apprentice: I understood the procedure for timing the distributor because the Boss showed me the steps to follow one after the other.

Researcher: Can I ask you; if you have problems in timing a distributor, how are you going to tackle the problem?

Apprentice: When I face a problem in the workshop, especially with a job I don't understand, I always go over the job in my mind and imagine how the Boss was doing it; and see whether I missed out anything important. If I still cannot do the job, I will call the Boss.

Researcher: Now, tell me, what do you mean when you say "I understand how the distributor works"?

Apprentice: You say you understand something (like the distributor) when you know all the parts and how the parts work and where each part is fitted. When you want to assemble the distributor you know all the parts by name and which parts follow which part (like when the contact set is screwed to the base plate and the condenser wire is connected to the contact set).

Probe: What you are saying is that you understood how the distributor works because you can identify the parts and how they are fitted.

Apprentice: I was able to understand the distributor because I knew the names of the parts and was able to see which part followed which part.

Probe: How do you know that you understood what the Boss was explaining?

Apprentice: When I am able to do the job by following the steps of the Boss. Understanding would depend mainly on the type of job. If it was a practical job, such as changing plugs or setting the “contact set”, I would follow the steps showed to me by the Boss.

Researcher: Can we look at another issue; if you have to exercise an option between listening to the tradesman’s explanation and observing the tradesman performing a demonstration, which one would you opt for?

Apprentice: I would opt for the demonstration.

Probe: Can I ask you why?

Apprentice: Because practical work, that is, learning how to do the work practically was more important to me than to listen to explanation.

Researcher: Can we now move to attitude. What part of the work interests you the most?

Apprentice: The practical part of the work interests me the most.

Probe: Why is it that the practical part interests you the most?

Apprentice: My interest is to do practical things to get myself involved in the job, that is, doing the job and seeing how things are repaired.

Probe: How does your interest help you to learn the trade?

Apprentice: My interest in practical work helped me to learn the trade easily and quickly because I am all set to go.

Researcher: What part does your attitude play in your learning of the trade?

Apprentice: In finding faults the most important aspect was attitude. One must have the right interest and attitude in whatever you are doing. Because if the attitude was not right you will lose sight of what you were doing.

Researcher: Tell me, did you receive any reward to motivate you in the garage?

Apprentice: The Boss does not normally give rewards; one thing was sure: the Boss will always shout at you if you make a mistake.

Probe: What type of incentive do you expect from the Boss?

Apprentice: I would expect the Boss to give me an actual job to do and to allow me to use my own ideas and then to guide me when I am going astray or doing the wrong thing.

Researcher: I observed that you were very keen about identifying the key terms and their definitions. Can I ask you why you were so keen about technical terms?

Apprentice: Knowing the names of parts is very important because at times you want to buy parts and if you don't know the right name then you are in trouble. Secondly, the other apprentices would always "bluff" you if you don't know the right name.

Probe: Does the Boss always explain the key terms to you?

Apprentice: The Boss did not usually explain the key terms in English and I always wanted to learn the terms in English.

Researcher: Do you receive any feedback from the tradesman, that is, did the Boss tell you how you were progressing?

Apprentice: The Boss don't usually tell me how I was doing in the job.

When I am given a job to do, the Boss will check it but will not give me any information about whether the job was good or bad.

Probe: But did you ask the Boss about your progress?

Apprentice: No, I don't usually ask the Boss about my progress.

Probe: Did the Boss tell you of your expected behaviour?

Apprentice: No, the Boss never explained to me what was expected of me in the workplace.

Probe: What was your own expectation in the garage?

Apprentice: To be able to work like the tradesman, that is, repairing and maintaining motor cars.

Researcher: How do you see the relevance of "theory" in the workshop?

Apprentice: “Theory” is important if you could read and write, whereby you could read the workshop books to help you repair the vehicle and find faults. But for the jobs we do in the garage we don’t usually need “theory”.

Probe: By the way, what do you mean by “theory”?

Apprentice: “Theory” is when the Boss is explaining to you how the part works and why it works that way.

Researcher: Now, tell me, in solving the distributor problem did the Boss apply theory to solve the problem?

Apprentice: The Boss applied his knowledge to solve the problem; maybe he used ‘theory’, but most of these things the Boss had done before. So, if it was not the “contact set” it was the “flyweight”. In most cases the Boss knew where the problem was, the only difficulty is to reach there.

Probe: Don’t you think that his knowledge of how the distribution works helped him solve the problem?

Apprentice: Yes, I think so. You must know how the parts work to be able to find fault. Because a fault is when the parts failed to work.

Researcher: Do you think about theory, that is how component parts work, when you work alone?

Apprentice: I don’t usually think about how parts work. These things came as a matter-of-fact and are taken for granted. I will not stop to think about how parts work.

Researcher: What do you expect from a demonstration?

Apprentice: I was expecting that the Boss will show me how to fix the distributor,
especially the “flyweights”, step by step. By that way i could see how to do it and learn from it.

Probe: Are you disappointed that the Boss did not demonstrate, that is, show you step by step how to fix the distributor?

Apprentice: I am not blaming the Boss, because he explained to me how to fix it, but showing me step by step would have been better.
Again, if you look at it properly, the Boss don't have time for demonstration.

Researcher: Do you receive enough practice in the garage, that is, did the Boss allow you to be involved in the job he was doing?

Apprentice: Most of the jobs I am involved in is to finish a job, that is, to return the parts that were removed (in order to access a faulty part).

Probe: What do you think is the cause of this limited practice?

Apprentice: I don't know.

Prompt: Don't you think that it is because all the cars that came into the garage were live vehicles, and the Boss cannot risk making any mistake.

Apprentice: I don't think so; because there are jobs that apprentices could do, with the Boss watching. For example: "brakes overhaul", that is, the apprentice doing one wheel while the Boss is doing another wheel and watching what the apprentice was doing.

Researcher: Tell me, does the Boss's explanation and demonstration actually help you? What I am asking is whether the explanation and demonstration helped you learn the job.

Apprentice: The Boss's interest is to do the job. All the explanations and demonstrations were all centred on the job, that is, how to solve the problem. When the Boss works (demonstrations) he did not show me the points or how to fix things, he just carried on with the job and I have to pick what I could from watching what he was doing.

Researcher: When the Boss was demonstrating a skill, did he show you the whole skill at once or a part of the skill at a time?

Apprentice: The Boss would carry on with the job and I have to watch what he was doing and learn from it. But I would prefer the Boss to show me the job, bit by bit.

Probe: When do you learn the most? The whole skill at once or part by part of the skill, one at a time?

Apprentice: I think I can learn more if the Boss showed me the job step by step, first this part, then the next part.

4.4.2 Record of an interview with an Entrepreneur

Ten Entrepreneurs (one per garage) were interviewed. This particular interview was chosen because the entrepreneur who was also a tradesperson was very articulate and his responses showed more insights about how apprentices' learning is facilitated at the workplace.

The record of an interview with another entrepreneur is given in Appendix 14).

Researcher: Can I ask you, how old are you?

Entrepreneur: I am 43 years old.

Researcher: Did you go to school?

Entrepreneur: No, I never attended school.

Researcher: What is your nationality; are you a Gambian?

Entrepreneur: Yes, I am a Gambian.

Probe: What part of the country are you from?

Entrepreneur: I am from Banjul; born and bred.

Researcher: Where did you do your training?

Entrepreneur: I did my training at Uncle Kebba's garage; I was there for seven years.

Researcher: Tell me, how many years since the business was established?

Entrepreneur: The garage has been going on for the past 12 years.

Researcher: Please tell me, how do you see your role in the garage, since you are involved in apprentices acquiring the necessary skills in the motor vehicle trade?

Entrepreneur: I don't see myself as a trainer but as a mechanic working with the apprentice, showing him the little I know about the job.

Probe: Why don't you see yourself as a trainer and yet still you have an apprentice under your charge who was supposed to learn the trade?

Entrepreneur: Training would require me to stop work at times and show the apprentice, bit by bit, how to do the job but here I don't have the time for that because with some jobs the client would be waiting and one could not afford to waste time by showing the apprentice everything bit by bit.

Researcher: Now, tell me, how do you expect the apprentice to learn the trade if you don't show him bit by bit?

Entrepreneur: The apprentice should always look at what I am doing and learn from it. What he did not understand he could ask me and I will try and explain things to him. But one could not stop the job to show him, then the job will not go on. Remember, the business is to make money and not to train boys (apprentices).

Researcher: I observed you working very closely with the apprentice of the distributor. Tell me, was the apprentice able to recall the specific facts?

Entrepreneur: The distributor is an important component in the car and the parts are very small. As I worked I expected the apprentice to observe what I am doing because I tried to work so that the apprentice could see what I am doing. I don't know whether he could remember the main points or not.

Researcher: Did you find out to know whether he could remember the main facts (the specific facts)?

Entrepreneur: No. I did not find out but as time goes on I will be able to check whether he remembered the main points.

Researcher: When will that time come?

Entrepreneur: When the apprentice is given the chance to dismantle and reassemble a distributor.

Researcher: Did you explain to the apprentice the procedures to dismantle and reassemble the distributor?

Entrepreneur: Well, I did not explain, but I worked in a way that the apprentice could see what I was doing; that is, I worked slowly, fixing the parts step-by-step for him to see how I was doing it.

Researcher: Did you stress to the apprentice the crucial points or show him the important parts that he should remember when repairing the distributor?

Entrepreneur: I tried to show him the main parts, especially parts that he should look out for: things like the springs, the weights, and how to fix the springs to the weights.

Researcher: Can we now turn to the apprentice's understanding.

Did you make sure that the apprentice understood the procedure?

Entrepreneur: Understanding is inside the head of the apprentice but I think when the apprentice was able to see how the parts work, that was a sign of understanding especially when the apprentice was able to see how the parts connected together.

Researcher: But, tell me, did you explain or show him the procedure in a way to enhance his understanding?

Entrepreneur: As I said earlier, the way I worked, the apprentice should be able to see the main points. I tried to show him the difference between the two springs: the small one and the big one. I also explained to him which one advances the spark and which one retards the sparks. It

is up to the apprentice to open his eyes, and see what I was doing.

Researcher: If the apprentice was to exercise an option between listening to your explanation and observing you demonstrate a procedure, which one do you think the apprentice would opt for?

Entrepreneur: The apprentices would definitely opt for observing a demonstration.

Researcher: Can I ask you why would the apprentice opt for observing a demonstration?

Entrepreneur: The apprentice did not like explanations. He always wants to use his hands, doing practical work; so, watching me working gave him the chance to use his hands. I would, during the job, ask him to fit or remove something, which was a practical part of the job.

Researcher: What about the apprentice's attitude towards work? Tell me, what part of the work interests the apprentice the most?

Entrepreneur: Doing the practical part of the job interests the apprentice the most.

Researcher: Did the apprentice's interest help his learning?

Entrepreneur: I think so, because if you have an interest in something you tend to be curious and so you learn more. For the apprentices, when there was a big job, like engine building, they are always interested; so, they pay more attention to what I was doing and in so doing they learn more.

Researcher: Did you give any feedback to the apprentice to help him check on his progress?

Entrepreneur: Yes, at times we discuss and I will tell him how he was getting on and he would ask questions about a job, a technique or even the name of a component part, and I would try and answer his questions.

Researcher: Did the feedback help his learning?

Entrepreneur: Yes, I think so. Because as we discussed he will see his faults and next time round he would try to correct them.

Researcher: When do you usually give the apprentice the feedback during the job or after completing the job?

Entrepreneur: As the job progressed one can check the apprentice, especially if he is doing something wrong and you correct him. But most of the feedback came after the job when I have time to discuss with the apprentice.

Researcher: Can I ask you, what do you understand by the term “theory”?

Entrepreneur: Since I cannot read and write in English, to me “theory” means explanation. That is how parts work and what makes them work that way.

Researcher: How do you see the relevance of “theory” at the workplace?

Entrepreneur: “Theory” is important if you could read and write in English whereby you could use the workshop books (manuals). “Theory” helps you to find faults quickly. So it is good to know “theory”.

Researcher: Did you think about theory when you were working?

Entrepreneur: One does not stop to think about theory when you work; it is taken for granted. As you work, you apply what you know and remember and put things together.

Researcher: Do you use your knowledge of theory to help you solve problems at the workplace?

Entrepreneur: I did not think about theory when I worked. Most of the work I did, I have done before so I did not need to think too much about the problem. When I am faced with strange (non-routine) problems, I normally look at how the parts work and then decide which one was faulty.

Probe: Don't you think that when you stopped to look at how parts work you were drawing from your theoretical knowledge?

Entrepreneur: You could say so.

Researcher: Can we now turn our attention to the apprentice practising at the workplace. Do you usually demonstrate procedures to the apprentice?

Entrepreneur: As I said earlier, I did not stop my work to show the apprentice the procedures. I usually carried on with my job and it is up to the apprentice to watch what I was doing and learn from it.

Researcher: If you did not stop your work to show the apprentice, how then does the apprentice learn the trade?

Entrepreneur: As I said earlier, by watching what I was doing and, at times, by asking questions and discussing with me.

Researcher: Did the apprentice have enough practice time at the workplace?

Entrepreneur: The apprentices are here the whole day, for the whole week, working with us. So they have all the practice they require.

Researcher: The apprentices are here at the workshop but do they really practise on their own.

Entrepreneur: Yes, I allow the apprentices to work, on their own, on jobs that they are capable of doing; that is, they would remove component parts to allow access to faulty component parts. After the fault has been rectified the apprentice would return the parts again.

Researcher: What do you think was responsible for the limited practice?

Entrepreneur: Well, all of the cars that come into the garage are 'live-cars' and at times the clients are waiting; so, I could not risk the apprentice working on the cars just to give him practice. On the other hand, jobs that I am sure the apprentice could do I always allow him to have a shot at while I am standing by watching over him.

Researcher: When you do show the apprentice a particular skill, do you show him the whole skill at once or part of the skill at a time?

Entrepreneur: That would depend on the type of job; with some jobs I would show him the whole task at once, with others I would show him, bit by bit.

Researcher: Which method do you think helped the apprentice to learn?

Entrepreneur: For the apprentice, learning bit by bit is the best, but you cannot show the apprentice some tasks bit by bit.

4.5 The Analysis of Results for the Motor Vehicle trade

Introduction

As stated in Chapter 1, the thrust of the present study was to investigate how apprentices learn at the workplace. This chapter looks in particular at how apprentices in the motor vehicle trade acquire their knowledge of motor vehicle theory and practice, on-site, in the motor vehicle garages where they work.

4.5.1 The learning of practical skills

4.5.1.1 Learning by observing

The apprentices' interview data showed that the tradesmen in the informal sector motor vehicle garages did not usually convey to the apprentices (before the commencement of a task), what the apprentices were expected to learn from observing. Another finding was that the tradesmen did not 'demonstrate' as such, that is, they did not go over the tasks which they undertook with the sole intention of showing to the apprentices all the steps involved in the procedures.

The researcher's observational data pointed to the fact that the tradesmen were acting as "models" for the apprentices, that is, the tradesmen executed the tasks in such a way that the apprentices were expected to observe and then build conceptual 'models' of the processes required to accomplish successfully the tasks. However, it was difficult for the apprentices to build a conceptual framework in this way because the tradesmen executed their tasks hurriedly. As one apprentice observed, "the job was so quickly done that I did not know what the Boss was doing". Another apprentice explained that he was observing a tradesman repair a 'fuel lift pump' because of damaged 'valves', but that the job was done so quickly that he could not 'pick-up' what the tradesman was doing, despite the fact that the job was done in the apprentice's full view on the work bench. The point was that crucial to the repair of the 'lift pump' were two 'valves', the "inlet valve" and the "outlet valve"; but the procedure was so disorganised that the apprentice could not distinguish between the 'inlet valve' and the 'outlet valve'. When probed, the apprentice reflected that the "Boss" should have guided him through the task, step-by-step, and with explanations. He could then have asked the Boss to show him which 'valve' was the 'inlet' one and which valve was the 'outlet' one.

It emerged that the tradesmen would normally focus on carrying out their jobs and that it was up to the apprentices to pick out the salient points from the tradesmen's technical activities ('operations') and learn what they could learn from these "operations". As one apprentice put it:

“It was difficult for me to learn properly about the job as the Boss was ‘doing’ the job, because the job was not arranged in order for me to follow the steps”.

The researcher’s observations corroborated this assertion: most of the ‘operations’ were not organised in the interest of the apprentices, that is, the steps involved in the procedures were not clear enough for the apprentices to discriminate between relevant and irrelevant steps. In illustrating this point, an apprentice explained that he had once observed a tradesman who was working on a ‘clutch slave cylinder’ (the sub-cylinder that actually activates the clutch pedal) of a ‘Land Rover’ which was leaking because of worn out seals. The apprentice said that the tradesman dismantled the ‘slave cylinder’, disregarding the procedural convention (which consists in dismantling the cylinder in an orderly manner). When the component parts of the ‘slave cylinder’ were displayed on the work bench for inspection, they were not laid out in any order that might have helped him (the apprentice) to learn the procedures. Furthermore, when the tradesman commenced the reassembling process, he (tradesman) was just picking the component parts of the ‘slave cylinder’ from the work bench and assembling them; but given the small size of the ‘slave cylinder’ and its component parts (such as the sealing rings, the piston, and the spring), it was very difficult for him (the apprentice) to see what the tradesman was assembling and how. When the apprentice was questioned as to what he expected from the ‘operation’, he said:

“I was hoping that the Boss would show me how to dismantle the ‘slave cylinder’ and then when he was reassembling it, he would show me the step-by-step procedures. That way it would have been easier for me to learn how to do it (to repair the slave cylinder)”.

Another apprentice explained that he was observing a tradesman “time” the ‘distributor’ to an ‘engine’, after the engine had been overhauled. He said that the job was so quickly done that he could not ‘pick’ what the tradesman was doing, despite the fact that the job was done in the apprentice’s full view. The learning points that were crucial to the timing of the ‘distributor’ were that, firstly, one should turn the engine until the number one cylinder was on the beginning of the ‘power stroke’; and towards the end of the ‘compression stroke’ at that point the distributor is “offered” to the engine. Secondly, the distributor should then be rotated bodily until the ‘contact sets’ were just beginning to open and the ‘rotor arm’ was facing the number one segment in the ‘distributor cap’. But that procedure was so completely rushed and disorganised that the apprentice could not discern the crucial points. When probed, the apprentice reflected that the Boss should have guided him through the task step-by-step with explanations. He could then have asked the Boss to show him how timing distributors was done.

There was further evidence of the ineffectiveness of the tradesmen’s explanations in the following example. An apprentice said that he was working with a tradesman on a ‘gear box’ with disintegrated gear wheels which had caused the ‘gear box casing’ to crack. After dismantling the ‘gear box’, a suitable ‘casing’ was found to replace the cracked one. On reassembling the ‘gear box’, the

tradesman assembled on the one hand the 'lay shaft gears' and, on the other hand, the 'main shaft gears'. He then assembled these two sets of gears and the synchroniser before connecting the pilot shaft to the main shaft. When the apprentice was probed as to whether the tradesman's "operations" had enhanced his (the apprentice's) learning, he said:

"the approach was very simple because the tradesman had done the job step-by-step and since the job was done on the workbench, I was able to see what the tradesman was doing. The only problem was that the job was hurriedly done".

Another aspect of learning during "demonstrations" (as understood in this study) came to light when an apprentice was observed working with a tradesman on a 'gearbox'. The apprentice explained that the 'problem' that he was tackling was that of a difficult gear change and that, consequently, he was not sure whether the change had to do with the 'gearbox' itself or with the 'clutch'. He said that the tradesman had depressed the 'clutch pedal' and had tried to shift the 'gear lever' without success. The tradesman then went underneath the vehicle and, after a short while, came up and asked the apprentice to remove the 'gearbox'. When the apprentice questioned the tradesman as to what he suspected to be the 'problem', the tradesman replied that he suspected that the 'toggle levers' of the 'clutch pressure plate' were broken. The apprentice said that he probed the tradesman further as to how sure he was about his diagnosis. The latter explained that when he (the tradesman) initially depressed the 'clutch pedal', he observed that the 'clutch pedal' was not making the complete "travel" to disengage the drive. The tradesman explained that in order to verify his suspicion he went underneath the vehicle to check whether the 'clutch fork' was

dislocated. The apprentice agreed that the tradesman's explanation was very helpful for enhancing his learning, but lamented the fact that the tradesman's "demonstration" (as understood in this study) was not too helpful, because he (apprentice) had not been able to "feel" the pedal to ascertain the fault. When the apprentice was probed about his interest in having a 'feel' for himself to ascertain the fault, he observed:

"I can understand that by watching the Boss doing the job I can pick the idea of how to do it, but I would have liked sometimes to check how it looked like when the part was faulty".

As explained in Chapter 2, 'Coaching' consists of a process of learners observing and supervisors monitoring as learners undertake their activities. The "expert" (the tradesperson) provides hints, feedback, clues, and tricks of the trade to assist the learner achieve the desired outcome.

A case in point was given by one apprentice who was working with a tradesman on a 'diesel engine' which would not start. Even after checking all the probable causes, the engine still failed to start. So, according to the apprentice, the tradesman took a piece of cloth, dipped it in petrol and held the cloth over the 'inlet manifold' of the engine; upon rotating the engine with the electric starter motor, the engine 'fired' immediately. For the apprentice this was one of those 'tricks of the trade' which one could only learn through experience.

“Scaffolding” in the learning context (see Chapter 2) would require a tradesman to delineate his ‘job task’ and the apprentice to be aware of his ‘learning task’ in connection with the ‘job task’, the underlying intention being that the apprentice should take as much responsibility for the ‘job task’ as possible. Yet the researcher’s observation was that the tradesmen were both giving directions and doing their jobs simultaneously with the apprentices waiting upon the tradesmen and simply assisting them. There was not much evidence that the tradesmen gave the apprentices the responsibility of making preliminary diagnoses of faults, following up correct diagnoses and taking the responsibility for repairing vehicles. In a formal setting (in a Vocational Training institution), “scaffolding” would be apparent when, upon a vehicle entering a motor vehicle workshop for repairs (during the students’ practical lesson), the instructor would ask a student to make a preliminary diagnosis of the fault and to offer a solution to the identified problem. The student would be allowed to do the repairs with the instructor watching, giving hints and clues as appropriate. Thus, students would take responsibility for job tasks; they would be given the criteria by which to judge whether they had completed the tasks successfully and would be guided as to how to evaluate their performance. In the informal sector garages, all such guidance was absent.

To illustrate this point an apprentice gave the following example of a tradesman giving directions whilst doing a job. The latter explained that a vehicle came in with faulty ‘brakes’. The tradesman went over to the vehicle, tested the ‘brakes’

and directed the apprentice to fetch the ‘brake adjusting spanner’ for him. The tradesman jacked the vehicle and proceeded to adjust the ‘brakes’. The apprentice’s view was that he himself could have diagnosed the fault and adjusted the brakes because he had once participated in a complete ‘brakes’ overhaul (with the same tradesman). When the apprentice was questioned as to why the tradesman did not allow him to do the job, he answered:

“I can understand that it was the brakes and brakes are ‘important’. But I could adjust the brakes while he was standing there watching me and at the end he could ‘test it’. But as the owner (the client) was standing by, the Boss did not want me to work on the vehicle”.

For practice itself to be a meaningful learning experience in the motor vehicle garage, apprentices must be attentive (see Chapter 2) to particular cues. The observational data showed that apprentices experienced difficulties in isolating the key elements in a given task and in concentrating their attention on them. The reason was that as indicated earlier the tradesmen did not usually stop during their work to “demonstrate” (as understood in this study) to the apprentices the key elements in the tasks that they undertook. One apprentice said:

“By watching the tradesman work I don’t know what to look for and what is important. I always try to take in the whole thing – which was always difficult with one operation (meaning only one opportunity for practising)”.

However, another apprentice was working with a tradesman on a vehicle with a broken ‘fan belt’ and he described how he observed the tradesman change and adjust the ‘fan belt’ as follows. The tradesman slackened the nuts which secured

the ‘alternator’, in order to allow the alternator to move freely up and down. The tradesman then fixed the new ‘fan-belt’ over the respective grooves of the three interconnected pulleys (the ‘crank shaft pulley’, the ‘water pump pulley’ and the ‘alternator pulley’). The tradesman then pulled the ‘alternator’ to position to take up the slackness of the ‘fan-belt’ and tightened the bolt and the nut which secured the ‘alternator’. The tradesman next adjusted the ‘fan-belt’ to allow a deflection of a quarter of an inch. The apprentice questioned the tradesman about the reason for the deflection and was told that it was necessary to give the ‘belt’ some slackness because, if the ‘belt’ was too tight, the ‘water pump bearings’ would burn; on the other hand, if the belt was too slack it would not drive the alternator and the ‘battery’ would not be charged. When probed the apprentice explained:

“Although the job seemed small compared to other big jobs like building an engine, there were important points which deserved attention, such as the adjustment of the fan-belt which must be right to avoid burning the water pump bearing and at the same time be able to charge the battery. So it was necessary to look for the main points in the job (in hand) and the main point was how to adjust the ‘fan-belt’”.

The same apprentice giving an account of a ‘critical event’ that he remembered, explained that a few days after he had observed the tradesman fix the ‘fan-belt’, he was sent on a breakdown errand to fix the ‘fan-belt’ in another car. He said that he recalled the procedure step-by-step and fixed the “fan belt”; and when probed, explained how the tradesman’s earlier “demonstration” (as understood in this study) had helped him.

Of much concern to the researcher was whether apprentices had sufficient time to practise the particular skills that they were expected to master. For, unlike at the Vocational Training institutions, where ‘practice time’ is provided for practical work, apprentices in the informal sector did not enjoy such provision; the reason was that all the jobs were on “live vehicles” and were constrained by time, and the tradesmen were compelled by the entrepreneur to do the jobs themselves, thus reducing the ‘practice time’ for apprentices. To quote one apprentice:

“Most of the practice I received in the workplace was to ‘finish a job’ (that is, after the crucial part of the job had been done by the tradesman). I would be asked by the tradesman to ‘return’ the parts that were removed (by the tradesman) in order for him to gain access to the faulty part or component”.

The apprentices themselves were not convinced that the limited amount of ‘practice time’ available was due to the need to service ‘live-vehicles’. In the words of one apprentice:

“There are jobs when we (apprentices) would practise on one part of the job while the tradesman could be working on another part of the job and at the same time supervising us. ‘Brakes overhaul’ was one such job. Since there are four wheels (and four brakes), the tradesman could be working on one wheel (one brake) while the apprentice was allowed to work on another wheel alongside the tradesman, so the tradesman could see what the apprentice was doing”.

4.5.1.2 Learning through problem-solving

There was some evidence that the apprentices were able to solve “non-routine problems” (see Chapter 2). Thus, when giving an account of a critical event, an apprentice described how once he was rectifying a fuel problem in a car, because the fuel was not reaching the ‘fuel lift pump’ and hence the carburettor. His examination of the fuel system had revealed that the ‘fuel filter’ was blocked, thus restricting the fuel from reaching the ‘fuel lift pump’. He said that he could not find a suitable replacement, and that he therefore decided to make a ‘direct connection’ from the ‘fuel tank’ to the ‘lift pump’ by means of a pipe. Theoretically, the principle of “direct connection” was wrong because it allowed the unfiltered fuel to reach the carburettor (and thus to cause a blockage of the ‘fuel line’ and of the carburettor jets), but practically the ‘direct connection’ worked.

There was also some evidence that the apprentices could sometimes devise unorthodox methods of their own when repairing component parts. One example of this was observed when an apprentice was repairing an ‘exhaust piping system’ of a car which was damaged because of the corrosion of the metal. The original exhaust system had had an unusual arrangement of an “expansion chamber” being coupled with a “silencer”, instead of the usual single ‘silencer’. The apprentice realised that the ‘expansion chamber’ was damaged beyond repair, and since he could not find a replacement for it, he decided to fit in another ‘silencer’ instead; this ‘double-silencer’ arrangement worked. When the apprentice was questioned, he said:

“sometimes you know about something and yet you are unable to explain it, other times you can do something and are unable to explain it. Since the exhaust pipe originally had two silencers the big one (the expansion chamber) and the smaller one (the silencer), so I replaced the system with two smaller ‘silencers’; and it worked”.

Such unorthodox methods were sometimes a matter of using one’s ‘common-sense’ (Usher and Bryant, 1989). To give another example, an apprentice when giving an account of a ‘critical event’ at the workplace, said that he was “bleeding” the braking system of a car, after the client had reported a sudden failure of the brakes. As he went through the procedures of diagnosing the fault, he realised that one of the fluid pipes (of the brake system) which connected the ‘wheel cylinder’ to the main ‘brake pipe’ was broken, causing a loss of brake fluid to the ‘wheel cylinder’. The apprentice said that as it was impossible to find a replacement for a “brake pipe”, he decided to use his common sense to improvise a system to allow the client to drive home. He ‘condemned’ the ‘wheel cylinder’ (that is, he stopped the flow of brake fluid) by blocking the “wheel cylinder” with a screw and carried on with the “bleeding” of the brakes. After testing the car to ensure that the brakes were working, he handed the car over to the client with the stern warning that he (the client) must bring the car back to the garage for further repairs in the morning.

Whilst the above examples (of problem-solving) are a concrete evidence of how the apprentices solved problems in their own ways, there was also evidence that the trade itself had developed unorthodox methods for solving technical problems and that the apprentices had learned these. For example (a) ropes were used to

track vehicles ‘toe-in’ or ‘toe-out’ , instead of using a telescopic gauge, and (b) the amount of carbon monoxide content of the gas from exhaust pipes was assessed by smell.

4.5.1.3 Trial and error learning

The apprentices used the trial and error approach for solving problems when they were working alone, especially on ‘breakdown’ errands. One apprentice illustrated this by saying that he was sent on a ‘breakdown’ errand to check a car which was reported to have difficulty starting. On arrival he took the ‘sparking plugs’ out and after cleaning them he reset the ‘electrode gaps’. However, after refitting the ‘plugs’ the car would not start. So, he opened the distributor, took the ‘contact set’ out, cleaned the ‘contact points’ using an ‘emery cloth’, reset the points, and tried again to start the engine but the engine would still not respond. He then decided to check the ‘fuel line’ to see whether the fuel was flowing and reaching the carburettor; so, he opened the carburettor and found that the ‘main jet’ was blocked by cotton wool. He unblocked the main jet, reassembled the carburettor, started the engine, and drove the car to the garage for further adjustments. When questioned the apprentice said that he had had the opportunity to use the trial and error approach. He explained that, because in the car engine everything was inter-connected, the malfunctioning of one component part could affect another component part, and so, by trial and error, one could solve the problem.

4.5.1.4 Monitoring of learning

The evidence from the observational data was that the tradesmen did not monitor systematically and formally the progress of the apprentices. One reason was that some faults were diagnosed at the work place only occasionally, so that once a faulty part had been repaired, it could take a long time before a similar fault was encountered again, thus making the monitoring of apprentices' progress in acquiring practical skills problematic. The following was a case in point. An apprentice giving an account of a 'once only' fault explained how a vehicle came in with a disturbing noise from the 'back axle'. A thorough investigation revealed that the 'differential unit' was faulty. The 'unit' was dismantled and it was found that one of the 'planet gears' was broken. The 'unit' was reassembled, and when the tradesman was checking the 'true-run' of the 'crown wheel' (through the cycle of 360 degrees) with a piece of chalk, the apprentice only saw the tradesman marking the 'pinion' teeth with the chalk. The tradesman never gave him a hint of what he was doing and never explained what he was checking in the first instance. When the apprentice was questioned whether he had learnt anything from the job since it was a 'once only' type of fault, he said:

“Faults like this you only see once in your training so it would have been nice if the Boss had showed me how to solve it properly; especially how to adjust the ‘back lash’ and the ‘pre-loading’ of the pinion. One observation alone will not give you all the skills you wanted to learn about the fault”.

For the apprentices' progress to be monitored, they must be involved in the actual jobs that the tradesmen were undertaking; but the apprentices' interview data

showed that apprentices were not involved in actual jobs. Consequently, the apprentices took it upon themselves to check and monitor their learning privately at the workplace. For example, an apprentice explained (during the account of a 'critical event') how during idle times in the garage, he went into the "scrap area" at the back of the garage and found himself a discarded carburettor. He took the carburettor to the workbench, cleaned it and started to dismantle it in the same way that he had earlier observed the tradesman dismantle another carburettor. He then laid all the component parts on the workbench and cleaned the inside of the carburettor. He explained how he monitored his own learning by testing himself on whether he could identify and differentiate the component parts of the carburettor and, more importantly, reassemble the carburettor in the right order. When probed, he said:

"We don't usually have the chance to practise what we learn at the workplace because the Boss did not trust us to practise on the vehicles. So we have to use the scrap parts and practise on them. By dismantling and reassembling them again, you check whether you can practise what you learn from the Boss".

4.5.2 The learning of theory

"Theory" in educational parlance (within the field of engineering) refers to the principles and concepts underlying the functions and purposes of the component parts (and of assemblies of component parts) of machines. However, it emerged

from the researcher's observations in the motor vehicle garages that "theory" was not understood as such, but was instead understood to be the explanations which the tradesmen gave about the functions and purposes of component parts and assemblies. Thus the learning of 'theory' at the workplace was not facilitated in the way that it is in Vocational Training Centres where theory is formally taught and time-tabled as such, even though proportionately less time is allocated to theory than to practical work in the curriculum. As explained earlier, at the workplace, the tradesmen got on with their own jobs, although they normally tell (without explanation) the apprentices how to assemble component parts and assemblies; and when the apprentices questioned the tradesmen on how the component parts or the assemblies were fitted together, the tradesmen would explain the functions and purposes of the particular "operations" in hand. However, few of the tradesmen tried to explain the 'theories' which underpinned the functions and purposes of the motor vehicle component parts. Moreover, the apprentices themselves did not show a particular interest in theoretical explanations. As one apprentice put it:

"all I wanted is how to repair the motor vehicle and for the Boss to show me how to fix the parts".

It also emerged from the researcher's observations that this lack of apprentices' interest in theory stemmed from the very manner in which the tradesmen occasionally attempted to provide theoretical explanations. For example, when a tradesman tried to explain to an apprentice the purpose of the 'vent hole' which is located on the 'carburettor cover', his explanation did not convey the

fundamental principle which underpins the function of the ‘vent hole’, namely, that as air enters the ‘float chamber’, the pressure inside the carburettor is reduced, and fuel under the influence of atmospheric pressure via the ‘vent hole’ is forced through the ‘main jet’ of the ‘carburettor’ to the ‘combustion chamber’ of the engine. In the formal setting of the Vocational Training institutions an instructor would illustrate this principle by demonstrating the well-known effect of varying the pressure on a liquid in one limb of a ‘U’ tube, while the atmospheric pressure in the other limb remains constant.

But communicating theory clearly was only one factor in bridging the gap between theory and practice; another factor was the apprentices’ perceptions of the role of theory with regard to the work in hand. Thus, when probed about ‘theory’, eight of the ten apprentices interviewed responded in much the same way as in the following extracts from two of them:

- a) “theory was important if I could read and write, whereby I could be able to read the workshop repair books (the workshop manuals) and/or text books to help me in fault finding and in fixing parts”.
- b) “theory did not help me in my every day work because I would normally do my work without thinking about theory”.

As another apprentice remarked, the removing, cleaning and setting of plug gaps did not call for theory. He contended that he would perform this task successfully without thinking about theory.

A further insight into the apprentices' perceptions of the role of theory in their work emerged from observing an apprentice and a tradesman working on a car with persistent engine overheating problems. The 'radiator' was checked and found to be working with no leaks or blockage. The 'fan-belt' was checked for tension and found to be within the prescribed limit. The tradesman then took the 'radiator pressure cap' and placed it in a metal cup full of water. He heated the water to boiling point, and using a thermometer he noted the temperature (which was already stamped on the radiator cap) at which the valve of the radiator pressure cap should open, but the valve failed to open. The 'cap' was replaced and the problem was thus solved. The interesting finding was that when the apprentice was asked what he had learned during the testing of the 'radiator pressure cap', he said, "what the Boss did with the cap was a technique to check whether the 'valve' was working or not"; and when probed he added:

"I watched the Boss as he went about checking the cap, step-by-step. If you did not know the technique you would not be able to check the cap to know whether it was working or not. It was a technique because you had to follow the steps".

Thus, the apprentice saw the tradesman's action as a mere technique, that is, as a well established procedure and made no reference to any underpinning theory.

Yet another factor in linking theory to practice was the sheer complexity of the underpinning theories so that the tradesmen's explanations did not always guarantee the acquisition of the relevant theoretical knowledge. For example, a tradesman was working with an apprentice on a 'brake master cylinder' which

was reported to be leaking. After the ‘cylinder’ was dismantled and the necessary repairs made, the tradesman proceeded to adjust the ‘brake master cylinder’ for ‘free pedal movement’ which the tradesman explained to be the allowance necessary to prevent the binding of the brakes, due to the expansion caused by the heat generated through friction. The apprentice was later probed by the researcher about whether he had grasped the theoretical reasoning behind the tradesman’s action. He had not and his response was:

“the Boss showed me how to adjust the ‘brake master cylinder’ adjusting ‘rod’ so that the pedal will move some distance before actually engaging. Bit I did not see how that small movement could prevent overheating of the brakes”.

And indeed the theory which underpins the ‘free pedal movement’ of brakes would have required a clear explanation on the part of the tradesman. In the formal setting of Vocational Training institutions, the theory would have been explained by drawing the complete braking system and showing how the ‘free pedal’ movement would compensate for the expansion taking place between the ‘brake drums’ and their ‘linings’

4.5.3 Learning through understanding

As explained in Chapter 2, Bloom *et al* (1956) placed knowledge and understanding at the top of their taxonomy of educational objectives for the cognitive domain, and although the taxonomy was not directly concerned with the realities of the learning process at the workplace in the informal sector, its

analysis of knowledge and understanding was used as a basis for researching the learning that takes place at the workplace. The research drew also on other ideas about knowledge and understanding reviewed in Chapter 2, such as Kelly (1989)'s assertion that knowledge and understanding go hand in hand, Maddox's (1970) notion of understanding as the ability to apply one's knowledge in a new situation, and Marton and Saljo's (1984) finding of the difference between a "surface level" approach and a "deep level" approach to learning.

To take the 'surface level' approach to learning (that is, an approach in which there is no intention to understand) a case in point was an apprentice who was working with a tradesman during the adjustment of an engine "tappet clearance", in a Honda car which was brought in for lack of power. The apprentice said that the tradesman asked him to bring over to the car the 'feeler gauge', the 'tappet' adjusting spanner, and a 'flat screw driver'. The apprentice said that during the adjustment of the 'tappet clearance' the tradesman had asked him to rotate the engine, while he (the apprentice) was rotating the engine, and at some particular point, the tradesman would shout "Stop"; he (the apprentice) would then stop and the tradesman would put the feeler gauge between the "valve stem" and the "rocker arm tip" of that particular valve, and adjust the clearance (between the "valve stem" and the "rocker arm tip") to the thickness of the feeler gauge which was 10mm (the recommended tappet clearance for Honda car engines). When the apprentice was probed about why the tappet clearance was adjusted to 10mm, he said: "I don't understand why the valves were set to 10mm (clearance), all I was interested in was how to adjust the valve correctly".

An example of the “deep level” approach to learning that is, an approach which is associated with understanding (as explained in Chapter 2) was given by an apprentice who was working with a tradesman on an engine which had an ‘over flooding carburettor’. He said that the tradesman had asked him to dismantle the carburettor; he did so and after all the component parts were removed and displayed on the workbench, the tradesman inspected the component parts of the carburettor. The apprentice added that as the tradesman went through the routine of inspection, he (the apprentice) questioned him about the names and functions of the component parts. Indeed, although the tradesman’s explanations were rushed and not explicit enough, he (the apprentice) said that he questioned him (the tradesman) further to clarify the points that he did not understand. The apprentice thought that whatever explanations the tradesman gave, they were ‘good’ because they provided an insight into how the carburettor works; besides, he (apprentice) was able to name and identify the component parts of the carburettor and this is what he meant by understanding. He added:

“Knowing the names of the parts helped me to understand how the carburettor works; because it is easier for me to reassemble the carburettor as I will know which part followed which part. So, when the Boss was explaining to me the names of the part and their functions, whatever was not clear to me I will ask the Boss to make that point clear to me until I understand everything”.

He said, furthermore, that during the re-assembling of the component parts, the tradesman gave a ‘running commentary’ on what he did as the job progressed. The cause of the ‘overflowing’ was diagnosed to be a maladjusted carburettor

“needle-valve” and the tradesman went through the routine of rectifying the adjustment of the ‘needle valve’ and testing it to ensure that the ‘petrol level’ in the ‘float chamber’ was constant. The apprentice said that the task had been interesting but added: ‘this was a new job and there is no other job like it to bring past experience to bear; it was hard to understand it properly’.

Explanations were essential at the workplace for understanding information which could not be communicated in any other way and yet as indicated earlier the tradesman did not provide such explanations. Illustrating this point, an apprentice described how the tradesman told him about the ‘four-stroke cycle’ of an engine without explanations. The latter had given him an account of how air enters the engine cylinders (the induction stroke), how air is compressed (the compression stroke), how the spark is introduced to “burn” the compressed air and produce the power (the power stroke), and how gas was expelled from the cylinder (the exhaust stroke). The apprentice reasoned that since all these activities took place inside the engine cylinders, there was no way that the tradesman could demonstrate these activities practically; and so it was essential to listen to what the tradesman said because such verbal communication provided the necessary knowledge and understanding. However, in the formal Vocational Training institutions in order to help understanding, in addition to verbal explanations, students are shown the four stroke cycle in a glass simulated engine.

Another consideration was that, in motor vehicle engineering, understanding how a component functions, means quite often understanding how it relates to other components. For the apprentices such understanding came through observing closely how the tradesmen diagnosed faults. As an example, an apprentice explained how he observed a tradesman diagnosed a clutch fault on a Land Rover vehicle that came in because the clutch was “juddering” (that is, there was excessive vibration during “take-off”). The apprentice said that the tradesman asked him to check that the engine and the gearbox mountings were tight, as well as the transmission shaft bolts and that he (apprentice) must check the rear springs to ensure that they were also properly secured in position. After checking all the component parts as instructed by the tradesman the apprentice reported back that all were tight and in position. The tradesman then told the apprentice that the fault must now be in the clutch pressure plate. The apprentice said that he took the clutch pressure plate out and on inspection two of the pressure springs were broken. When the apprentice was asked how did observing the tradesman diagnose the fault help his understanding, he said:

“As the Boss was finding the fault I could see how the parts of the transmission were related to the clutch, because he first checked the parts of the transmission before finally checking the clutch pressure plate which was faulty”.

The apprentice added:

“The way the Boss was checking the fault was “good”; first he checked all the “easy parts” before going to the difficult part”.

As another example, an apprentice was working with a tradesman on a car which reported persistent ‘misfiring’ at speeds above 60Km/hr (see Appendix 7). The apprentice said that the tradesman’s initial diagnosis covered all the probable component parts likely to cause ‘misfiring’ at a particular range of speeds, such as ‘the distributor’, the ‘spark plugs’, the ‘condenser’ and the ‘high tension lead’. The ‘distributor’ was isolated as the faulty component part and the tradesman then looked at the critical features of the distributor, that is, those parts responsible for a change of ‘firing position’. The ‘retard and advance’ mechanism was finally identified as the component part responsible for the fault. The apprentice said that he understood the approach that the tradesman took in order to diagnose the fault, and when questioned he said:

“I followed the way the tradesman went about to find the fault. The tradesman first looked at all the parts that can cause misfiring, then he decided that the fault must be the distributor. Again, inside the distributor he found out that it was the retard and advance system”.

However, there was some concern among the apprentices that the tradesmen’s explanations were too often directed towards fault finding only and did not go further, that is, towards the interconnectedness of the component parts. As one apprentice put it:

“If we don’t know how the parts are joined together it will be very difficult for us to trace faults properly and this could slow us down, because we would have to look at one part and, if that one is fine, we go to the next until we find the fault”.

In point of fact, the apprentices said that they achieved “understanding” when they could identify and were able to name all the component parts. As one apprentice put it,

“you could not understand a procedure unless you know where and how each part is fitted; then you are able to follow the procedure because you know which part follows which part”.

Making a similar point, another apprentice explained how he was able to “understand” the procedure for repairing a car ‘distributor’ with a cracked housing. He said that the ‘distributor’ was taken out of the car, and that all the component parts were dismantled and assembled on the workbench. The tradesman helped him to identify all the component parts, some of which he (apprentice) knew by name. Subsequently, during the re-assembling of the ‘distributor’, he was able to follow the procedure because the tradesman identified the component parts by name as he re-assembled them. When asked whether he was able to understand the procedure, the apprentice replied ‘I was able to understand the procedure because I knew the names of the parts and was able to see which part followed which part’.

However, eight of the ten apprentices recognised that the word ‘understanding’ was being used in a variety of ways and not only as indicated above. They thought that “understanding” could refer also to grasping the meanings of technical terms, or to the ‘theory’ underpinning a particular operation, or to how to tackle an “operation” (and hence to knowing what was needed at a particular

time and for a particular purpose). And if an apprentice was able to provide an explanation for what he did, he was said to have a “deep understanding”. As one apprentice explained “I am only sure that I understood something when I am able to fix it correctly and later able to explain how I fixed it”.

When the apprentices were questioned about their experience of “understanding” at the workplace, it emerged that “understanding” generated a ‘feeling of satisfaction’: the insights gained replaced the initial confusion (in connection with a particular topic or procedure) and this insight led to appropriate behaviours (such as, being increasingly involved in the job in hand). The feeling of satisfaction derived from a recognition of the meaning and significance of what they learned, and a perception of coherence (in what they learned). In turn this perception led the apprentices to feel confident in what they were doing, and to believe that they could provide a satisfactory explanation of the procedures that they followed when undertaking a task. The apprentices also recognised that such understanding provided them with flexibility in adapting and applying ideas and in using information effectively. As one apprentice explained after working with a tradesman on an engine timing:

“I applied the idea I observed from the tradesman when timing the engine and used all the explanation (information) that the Boss was talking about and timed the ignition. If you understand one technique you could use it in another area”.

4.5.3.1 Recall in learning

There was no evidence of tradesmen checking whether or not the apprentices could recall specific theories, functions, procedures and related facts.

As an example of a missed opportunity for checking recall as evidenced in 'b' above, a tradesman was observed 'tracking the wheel' of a vehicle using a rope. Although the rope was a crude and rudimentary piece of equipment, it actually served the purpose of explaining the procedure for such tracking. 'Tracking' involved measuring the permissible degree of 'toe-in' or 'toe-out' of the front wheels of a vehicle, when the vehicle is stationary and the decision to 'toe-in' or 'toe-out' depends on the drive arrangement of the vehicle. Since this particular vehicle was a 'rear-wheel drive', the front wheels had to be toed-in. Quite exceptionally the tradesman did explain to the apprentice the reason for the 'toe-in' arrangement, which he said was the allowance given to the front wheels (in terms of the angle with the vertical which they are inclined) when the vehicle was in the stationary position in order to compensate for the necessary straight-ahead position when the vehicle was in motion. Using the rope the tradesman measured the distance between the two front wheels and noted it. He then proceeded to measure the 'width' of one front wheel tyre and to calculate the length of the 'toe-in'. The 'track rod' was adjusted until the distance between the front wheels was reduced to the 'toe-in' length. At the end of this job the tradesman took the vehicle for a test drive. There was no evidence, at the time, of the tradesman

checking whether or not the apprentice could recall the specific theory and procedures involved in tracking a vehicle.

The apprentices interviewed explained that it was easier for them to recall procedures (and key facts) when the tradesmen were explaining these at the same time that they (the tradesmen) were engaged in working through the procedures that they were explaining; the reason was that where explanations and demonstrations went hand in hand one could easily see and understand how the explanations related to the demonstrations, and recall was thus enhanced in accordance with the 'dual-coding' hypothesis (see Chapter 2). As an example, an apprentice who had been working with a tradesman on a 'gear box' which had a disintegrated 'selector mechanism' explained, during an interview, that while the tradesman was dismantling the 'gear box', he (the tradesman) was explaining to him (the apprentice) the step-by-step procedures, such as, taking the 'gear box cover' out, removing the 'selector rods' and the 'fork', removing the 'pilot shaft', then the 'main shaft', and finally the 'layshaft'. When all the component parts of the 'gearbox' were out the tradesman went through the routine of inspecting the gearbox to identify the cause of the disintegration of the selector mechanism. The cause was traced down to a broken 'tension spring' which allowed one of the 'selector rods' to jump out of position, thus disintegrating the whole mechanism. Subsequently, during the re-assembling of the 'gearbox', the tradesman went through the procedures with the apprentice, again step-by-step, until the 'gear box' was assembled, mounted in the car, and tested. For the apprentice, the tradesman's explanations combined with his practical demonstrations ensured

that learning was meaningful, because he was able to learn how the component parts were fitted together (and why), and moreover, recalling all the relevant information was made easier.

However, to recall any piece of information that information must first of all have been registered and retained; and, as explained in Chapter 2, the strength of the registration results from the frequency with which the information is processed through practice, through the intensity of the learner's involvement in the task in hand and through his/her exposure to the various aspects of the task. There was evidence that registration was sometimes difficult for the apprentices because the tradesmen's explanations were not given in sufficient detail and their demonstrations were not accompanied by adequate descriptions. Admittedly, during the researcher's periods of observation at the workplace, the researcher could only focus on the explanations and demonstrations which were associated with the particular jobs in hand during those particular periods; and given the probability that a particular job would be undertaken by the tradesman rather infrequently and that it could not be guaranteed that a particular activity would come the way of the apprentice more than once, the researcher's observations were limited to one-off activities. Nevertheless, it was possible for the researcher to observe that the apprentices were not always learning when they were exposed to the complexities of the various activities undertaken at the garage. For example, repairing a 'brake master cylinder' involves a number of complex activities, such as fitting new 'sealing rubbers' and adjusting the 'master cylinder rod' to allow for the expansion of the 'rod' inside the 'cylinder', and this in turn

should correspond with the 'free play' adjustment of the 'brake pad'. The apprentices' attention was not drawn to what they were expected to learn about such complexities because the tradesmen had very tight work schedules and, given the erratic nature of job opportunities, planning ahead demonstrations and explanations was non-existent. The tradesmen did not have enough time to explain in detail the complexities of the tasks and procedures to the apprentices. The result was that their explanations were not always detailed enough for the apprentices to register, retain and recall specific procedures and key functions. Their incoherent answers to the questions that apprentices put to them were all rushed and disorganised; and to repeat, the problem was compounded by the fact the jobs were on "live vehicles" and that the tradesmen's fear of apprentices ruining the clients' vehicles limited the apprentices' opportunities to practise.

There was evidence too that the original registration of information could be so strong that its recall interfered with the learning of new information. As an illustration of this point, during an interview, an apprentice explained that, while working with a tradesman on a 'cylinderhead' with a "burnt valve", the latter explained to him that a fast method of removing the 'valve' was that of the 'shock technique'. This crude and dangerous technique is carried out by applying a force on the 'valve stem' which allows the 'locking cutters' to fly out. Whilst the advantage of the technique is that it can be carried out single-handedly, the disadvantage is that if the necessary precaution is not taken the cutters may fly out and injure oneself or other people around the workstation. The apprentice went on to say that some time later he encountered the same

problem of removing a ‘burnt valve’ from a ‘cylinder head’ but this time he was working with a different tradesman. The latter introduced him to another technique, one that was slow but very safe. The technique comprised the use of two ‘screw drivers’ which were positioned on the ‘valve stem cover’ and pressed down, thus exposing the ‘locking cutters’. These were withdrawn and allowed the ‘valve’ to drop. The apprentice explained that although the ‘screw drivers’ technique was safer than the “shock technique”, he could not unlearn the ‘shock technique’ with all its inherent danger, so that, whenever he was asked to remove valves from cylinder heads, he always used the ‘shock technique’.

Another factor in connection with the process of recalling among the sampled apprentices was that given that they had little access to printed materials, recall was problematic (Van der Molen and Van der Voort, 1997); the reason was that, the majority among them were illiterate and could not therefore write down what the tradesmen’s explanations were or read about these explanations in published manuals and/or text books (as students in Vocational Training institutions might). Instead, the apprentices observed tended to attend to the practical demonstrations because such demonstrations, easily and quickly, provided meaning to what they learned at the workplace, such is the dominance of visual stimulation in learning (Lovell, 1984).

4.5.4 The motivation to learn

As Chapter 2 has indicated, one approach to motivating people is to give them an incentive contingent upon the demonstration of their competence in set tasks. The observational data showed that the apprentices in the informal sector motor

vehicle garages valued competence at work, but that there were no formal procedures for linking incentives to performance. For example, an apprentice deplored the fact that on one occasion the tradesman had asked him to ‘bleed’ the cooling system of a car which was reported to ‘overheat’. He (the apprentice) said that he had followed all the procedures that the tradesman had demonstrated, that is, he had ‘bled’ the system until it was free from air, ‘pressurised’ the system again, started the engine, and allowed it to run for about 15 minutes to check whether the engine was overheating or not. When he was satisfied that the cooling system was working properly he had handed over the car to the tradesman. All that the latter did then was to put the ‘palm’ of his hand on the engine for about one minute to check whether the engine was overheating or not, and when he was satisfied that the engine was not overheating he just drove the car away without even a word of encouragement!

Another apprentice when probed about whether after he had completed a job successfully, the tradesman had encouraged him, said:

“apprentices do not usually receive encouraging words like ‘that was good’ or ‘that was better’. One thing was sure, you would be ‘shouted at’ for doing a bad job”.

The salient finding was that the apprentices’ motivation was ‘intrinsic’, as evidenced in the following example of a “critical event” recounted by an apprentice. He explained that he was sent on a breakdown errand to re-start a diesel engine which had suddenly stopped in the middle of a journey. Initially he thought that it was an ordinary ‘air lock’, and so he ‘bled’ the fuel system.

However, during the “bleeding” of the system he realised that the fuel was not reaching the ‘fuel injector pump’. Therefore, he suspected that the fuel ‘lift pump’ was faulty, took it out and tested it but that too was ‘ok’. Next, he took the main fuel pipe out, blew into it, and the air went through signifying that the pipe was clear. He said that he was lost not knowing where to check again. However, he then decided to drain the fuel in the ‘tank’ to check whether there was any foreign matter blocking the passage of the pipe and this is when, in the drained fuel, he found a big piece of ‘cotton wool’ which floated and blocked the main fuel pipe, thereby starving the whole system of fuel. When the apprentice was questioned as to what motivated him to carry on to the end he said:

“the inner drive to succeed kept me going and secondly it would have been a disgrace to go back to my Boss and told him that I could not solve the problem”.

Another finding was that what motivated apprentices was being able to identify the names of key technical components, such as the ‘differential unit’ and the ‘combustion chamber’, and to label them accurately; and an intriguing question was why did they have such a keen interest in identifying key technical terms, in contrast to their lack of interest in “theory”. When probed, the apprentices said that at times they had to talk to clients (especially on breakdown errands) and if they (the apprentices) did not know the key technical terms they could not impress the clients that they knew what they were doing. As one apprentice put it, “key terms are like the secret of the trade”. Indeed, for another apprentice, “the only way one could show one’s superiority among one’s peers was to boast with the key technical terms – which motivates one to learn them”.

However, both the observational data and the apprentices' interview data showed that often the tradesmen did not use technical terms for the motor vehicle components or used them incorrectly, because the majority among them did not know the terminology. As a matter of fact, they used more French terms than English terms mainly because the majority of tradesmen were trained in Senegal, by Senegalese, in French. However, as one apprentice explained :

“I understand the tradesman's explanation whether it is in English or French or ‘Wollof’ (the predominant urban dialect) but the main thing is that the tradesman does not usually explain the key technical terms properly as the job progressed, the tradesman would explain where to fit the component parts but he would not tell you the names of the parts. One reason for this is because the tradesman dismantled the parts and had them around him, when he was re-assembling the parts. So he did not need to ask for the parts; he just reached for them”.

Yet another finding was that as indicated above there were no formal procedures in place at the workshop for the tradesmen to provide feedback to the apprentices (since positive feedback can be a strong motivator). As one apprentice remarked during an interview:

“tradesmen and garages did not give me the results of my learning : whether I am learning or not. When you are given a job to do, you do the job and the tradesman tests the job. If there was any fault the tradesman would correct the fault without explaining to you”.

Another apprentice said that a car came in for persistent ‘backfiring’ and that the fault was diagnosed as being due to a ‘burnt valve’. The ‘engine cylinder head’

was therefore removed and the 'burnt valve' changed. The tradesman asked the apprentice to reassemble the component parts and to carry out the necessary adjustments which he (the apprentice) did. The tradesman took the car on a road test and after a short while returned the car to the garage for further repairs. The tradesman opened the 'bonnet' of the car and readjusted the 'accelerator linkages' without explaining what he was doing to the apprentice who was standing by and observing. The apprentice said that the tradesman never explained to him his shortcomings, such as what went wrong with the way he had adjusted the 'accelerator linkages'. The apprentice remarked that such an attitude on the part of tradesmen could de-motivate apprentices and frustrate the building up of their self-confidence.

Another instance of feedback not being provided at the workplace was given by an apprentice during an interview. He said that he was working with a tradesman on a propeller (transmission) shaft with damaged 'universal joints'. He said that the tradesman had asked him to remove the damaged 'needle bearing' and 'cups' --- which he did. When it came to re-assembling the propeller shaft, the tradesman himself re-assembled one of the 'universal joints' and then asked him (the apprentice) to re-assemble the other 'universal joint' --- which he also did. However, to the apprentice's surprise, the tradesman took the 'propeller shaft' from the apprentice, inspected the 'universal joint' which he (the apprentice) had re-assembled, took a 'soft hammer' (a copper hammer) and started hitting the 'cups' of the 'universal joint'. When the tradesman was satisfied that the assembly was correct he handed over the 'propeller shaft' back to him (the

apprentice) to fix in the car. When giving this account to the researcher the apprentice complained that the tradesman never explained to him why he was hitting the ‘cups’, and never gave him a feedback about how correct or incorrect his performance had been. To quote the apprentice:

“you just finish watching the Boss fix one joint and the Boss asks you to do the other one, how could you know what is right or wrong? It is the Boss who should look at my job and tell me this is wrong and this is the right way to do it”.

In addition to not providing feedback formally to the apprentices about their performance, the tradesmen did not intervene to motivate learning through guidance: for example, they did not encourage the apprentices to ‘talk’ their way through the jobs (that is, to ask questions and make suggestions and thus become more interested in their jobs).

The observational data showed too that, apprentices paid attention to and were therefore motivated by jobs that they thought were valuable to them, that is, jobs

from which they would learn something new. As one apprentice explained:

“I was fixing a wheel after the tyre was changed and I saw a car come in; when I checked what was wrong with the car the Boss told me that the ‘timing chain’ had slipped. I quickly finished the wheel job and rushed to join the car with the ‘timing chain’ problem. By then the Boss had already called another apprentice to join him, but I forced myself into the job by starting to remove the ‘radiator’. When the Boss saw how committed I was to participate in the job, he allowed me to work”.

When probed he added:

“I think that I will be learning more quickly and easily if I believe that what I was learning will help me in the future, especially when it was a job that you don’t normally have the chance to see in the garage. ‘Engine timing’ is a very important job in the car and we (apprentices) all want to learn how to ‘time’ an engine”.

The apprentices were keen to learn when they were in a state of ‘expectancy’ (see Chapter 2). For example, an apprentice described how a car pulled into the garage with a ‘blocked radiator’. The apprentice said that he was about to remove the radiator when the tradesman stopped him and explained that there was no need to remove the ‘radiator’ because the ‘flushing method’ would be applied to ‘clear the blocked radiator’. The apprentice explained that as he did not know what the ‘flushing method’ was, he was in a state of expectancy and this state of expectancy motivated him. To quote him:

“if you are used to an old technique and you are told by the Boss that he was going to show you a new technique, you are bound to look forward to it, especially when I can clear a blockage of a radiator without removing the radiator from the vehicle”.

A salient finding was that the tradesmen did at times generate such expectancy by helping the apprentices over the initial step in a particular procedure; that is, the tradesman would do most of the work (with the apprentices watching) to begin with, and would then allow the apprentices to complete the job in hand on

their own. By this means the apprentices saw where the steps in the procedure were leading to and what they could expect to achieve on their own.

CHAPTER 5 : THE RESULTS FOR THE TIE-DYE TRADE

AND SUMMARY OF RESEARCH FINDINGS FROM BOTH TRADES

The results for the tie-dye sampled businesses cover the following:

- a) The apprenticeship system in the Tie-dye trade.
- b) A day in a tie-dye business.
- c) Two different apprentices' accounts of critical events (one per apprentice).
- d) Record of an interview with an apprentice.
- e) Record of an interview with an Entrepreneur.
- f) Analysis of results for the Tie-Dye trade.

5.1 The Apprenticeship System in the Tie-Dye trade

The apprenticeship system in the tie-dye trade is the same as in most of the “male dominated trades” such as the motor vehicle trade; in other words, women tend to rely on unpaid family helpers as apprentices, usually daughters, younger sisters, and nieces.

In general, there is no entry or exit point for apprentices in the informal sector; the duration of the training varies from six months to twenty-four months, by which time the apprentice is expected to have mastered the complexities of the different tie-dye patterns, the preparation of the dye-bath solution, and the necessary skills associated with the techniques for the different patterns.

Generally, the apprentices in the tie-dye trade start with an Induction Phase (which lasts between three and four months) during which they are taught the appropriate behaviour for the trade and their honesty is checked; they are made to do menial jobs such as cleaning the work area, fetching water to prepare the cloths (that is to wash away the factory dressings) and the dye bath solution, and running errands. A typical errand during this phase is to go to the local market to buy food stuff for the preparation of the communal lunch at the workplace. The duration of this phase can vary widely, depending on a number of factors, such as the positive attitude of the apprentice (that is, her keenness to learn), and her diligence.

The next phase consists in getting the apprentice to observe the tradeswoman at work, and thus discover the way that different patterns are tied. In this system of apprenticeship, the focus at the workplace is on the work in hand, and usually little theoretical knowledge is brought to bear on

the work. As an apprentice progresses through her apprenticeship she is introduced to more complex tasks (such as the preparation and testing of the dye bath solution).

A tie-dye business can have up to four Senior Apprentices and three Junior Apprentices. The variation in the number of Senior and Junior apprentices depends on a number of factors, for example:

- i) the size of the business
- ii) the volume of work

There is no “graduation ceremony” at the end of the apprenticeship as was the case in the Motor Vehicle trade. Instead, as an apprentice in the tie-dye trade progresses in her learning, she practises her skills at home by buying her own chemicals and cloths. She would tie-dye for friends and relatives such items as table cloths, curtains for doors and windows and T-shirts for the football team in her neighbourhood. Once the apprentice has built her reputation and secured an appropriate client le, she leaves the entrepreneur to start her own business.

Learning about the business aspects of the workplace was rather tentative. This was so because the entrepreneur negotiated with the clients in the confines of her “office”. Since most of the businesses in the tie-dye trade were through contracts for large orders, the entrepreneurs would cost the jobs, advise the clients about the right patterns for the jobs and where necessary help the clients choose the right colours for the dye. So, with the apprentices staying outside, at the workstations, they were hardly able to learn about the business aspects of the trade, since all the business negotiations were carried out in the ‘office’.

5.2 A day in a Tie-Dye Business – “Under a Mango Tree”

Introduction

The heading of this section reflects the informality of the tie-dye business targeted for the purposes of this account. The tradeswomen and the apprentices worked under a mango tree (which was about 30 metres from the entrepreneur’s house), because it was cool there; and because the ground in the shade of the tree provided an appropriately large working area for spreading the cloth on which they worked on the day that the researcher visited the business (see Figure 1).

The hierarchy of the workforce personnel in this particular tie-dye business consisted of:

- a) The entrepreneur (the owner)
- b) Seven tradeswomen
- c) Five Senior Apprentices (who were 12 to 24 months in their apprenticeships) and one Junior apprentice (who was six months in her apprenticeship).

This particular day was chosen for a visit because a previous discussion between the researcher and the entrepreneur had revealed that the entrepreneur had been contracted by a private primary school which was changing the present school uniform made from imported materials to one which would be tie-dyed. The job involved a bale of white cotton materials (about 1500 metres long) to be tie-dyed.

The 'tieing' process involves making different patterns; these are:

- i) Folding
- ii) Binding
- iii) Sewing
- iv) Knotting
- v) Twisting
- vi) Marbling (which involves folding and twisting)

A pattern area is an area in a piece of cotton material where the pattern is developed.

5.2.1 The Account of the Particular Day

The researcher arrived at 8.30am, some half-an-hour earlier than the starting time (for the employees) which was 9.00am, to give himself time to settle in and have a face-to-face dialogue with the entrepreneur about the job for the day; and also to observe the arrival of the tradeswomen and of the apprentices.

The entrepreneur explained to the researcher that the contract was to tie-dye the uniforms in three-metre pieces. The crucial part of the task was to ensure that the school logo was on both the front and the back of the uniform. She said that the way she was going to achieve this was to mark the pattern area for the logo using a wooden stick (which was about 30 centimetres long) and the ‘twisting’ technique. For the colour of the uniform the school had chosen a yellowish-green background with the pattern of the logo standing out from the white background.

The tradeswomen and the apprentices started to report for work about 8.40am; the first to arrive were three tradeswomen, Fatou, Amie and Sally (so named for the purposes of the present study) and three senior

apprentices, Cumba, Ajaratou and Sallah and one junior apprentice Ndey.

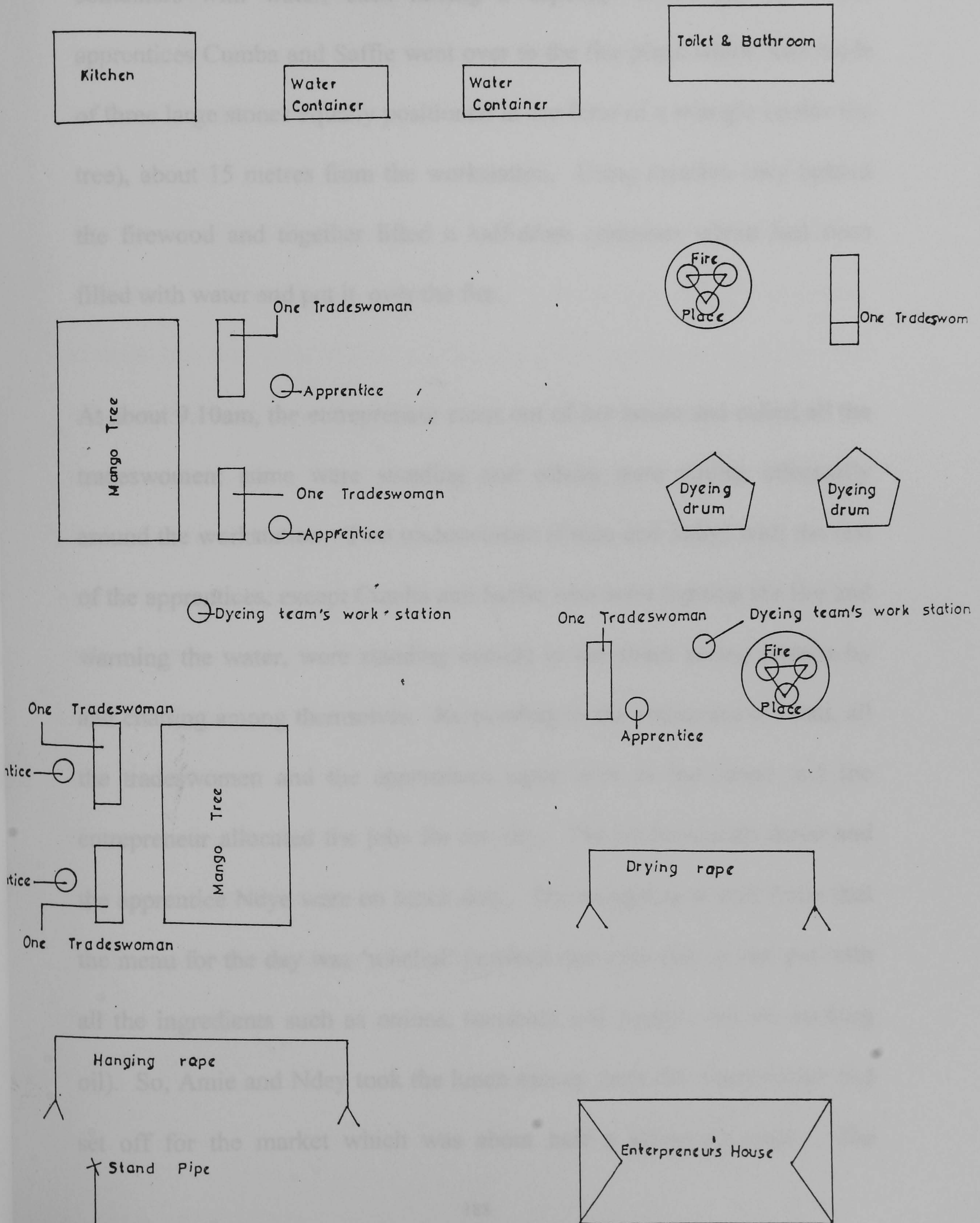
Another two tradeswomen, Sohna and Ida arrived seven minutes later.

At about 8.55am the rest of the workforce arrived, that is, two more tradeswomen, Jahou and Binta and two more senior apprentices, Mariama and Saffie.

As the tradeswomen arrived they entered the entrepreneur's house and shook hands with the entrepreneur and with the other tradeswomen present.

The apprentices courtesied and wished the entrepreneur and the tradeswomen in the room good morning as they arrived, and then left the house to start work at the work station, while the entrepreneur and the tradeswomen stayed in the house to discuss the tasks of the day. It was during this "conference" that the entrepreneur explained the tasks for the day and allocated apprentices to the tradeswomen.

Fig1 Layout of Tie-dye business



The work proper began with the apprentices sweeping the work area under the mango tree with locally made brooms, filling the four storage drum containers with water, each having a capacity of 44 gallons. The apprentices Cumba and Saffie went over to the fire place which was made of three large stones equally positioned in the form of a triangle (under the tree), about 15 metres from the workstation. Using matches they lighted the firewood and together lifted a half-drum container which had been filled with water and put it over the fire.

At about 9.10am, the entrepreneur came out of her house and called all the tradeswomen; some were standing and others were sitting informally around the workstation. Two tradeswomen (Fatou and Sally) with the rest of the apprentices, except Cumba and Saffie who were lighting the fire and warming the water, were standing outside in the street seeing passers-by and chatting among themselves. Responding to the entrepreneur's call, all the tradeswomen and the apprentices came over to the house and the entrepreneur allocated the jobs for the day. The tradeswoman Amie and the apprentice Ndeye were on lunch duty. The entrepreneur told Amie that the menu for the day was 'mbahal' (cooked rice with fish in one pot with all the ingredients such as onions, tomatoes and pepper, but no cooking oil). So, Amie and Ndeye took the lunch money from the entrepreneur and set off for the market which was about half a kilometre away. The

tradeswomen Fatou and Ida, assisted by the apprentice Ajaratou, were to be on the 'dyeing' duty. The tradeswomen Sally, Sohna, Jahou and Binta, assisted respectively by the apprentices Cumba, Mariama, Sallah and Saffie were on the 'tieing' duties. Sally and Cumba were the focus of the researcher's observations.

The entrepreneur called the apprentices to her house (which was also the store for the business) and ordered them to bring out the bales of cotton material that they were to work on that day. The apprentices brought out a wooden box which contained the 'tools' for the job (such as two pairs of scissors, four red colour pencils, three ordinary graphite pencils, a measuring tape, and some leftovers of dye colourings). The apprentices also brought out six mats made of straw and four short benches which were about nine inches high. The apprentices spread the mats in the work area and positioned the benches in a circle. The entrepreneur herself brought two measuring sticks (one measured one metre, the other three metres). Given the fact that the entrepreneur and the tradeswomen could neither read nor write, using a measuring tape to measure the length of materials to tie-dye was problematic; so, the entrepreneur had these measuring sticks made.

The entrepreneur asked the tradeswomen whose duty it was to tie (that is, Sally, Sohna, Jahou and Binta) together with their apprentices Cumba, Mariama, Sallah and Saffie, to open out the bales of cotton material. The entrepreneur instructed the tradeswomen to cut the materials into nine-metre pieces. When all the ten bales of material had been cut into work pieces under the close supervision of the entrepreneur, the latter asked the tradeswomen to start preparing the materials to be tied. Sally and Cumba (the focus of the researcher's observations) took eight of the nine-metre pieces and two three-metre pieces; and the others on the tying duty did similarly. The apprentices Sallah and Saffie washed the half-drum container used for preparing the materials, half-filled it with water and placed it on the fire; later the apprentices Cumba and Mariama went on to light the three charcoal fires (the 'coal pots'). When the 'coal pots' were lighted they placed the locally made 'irons' (for ironing the clothes) on the fire.

Sally asked Cumba to check whether the water was warm enough to wash the materials. Cumba went over to the container on the stones (the 'fire stones') where the fire was lit, dipped her hand in the water and told Sally that the water was warm enough to wash the materials. Together Sally and Cumba held the container and put it down from the 'fire stones' and took it to a place under the mango tree. Cumba dipped all the materials inside the

container and began to wash them one after the other. Sally, observing how Cumba was washing the materials, went over to her and said ‘I have told you on several occasions, you must rub the material properly with your hands (to remove the grease and factory dressing such as starch)’. Sally took one piece of the cotton material, held it between the palms of her hands and rubbed, and she once again said to Cumba, ‘that is how to do it’.

The other tradeswomen and the apprentices who were on tieing duties were also engaged in the same process; some were working under the tree, others were working close to the fire and under the sun!

Meanwhile the tradeswoman Amie and the apprentice Ndey had just returned from the market. They went over to the kitchen (some five metres from the mango tree) and the entrepreneur followed them. About five minutes later the entrepreneur and Ndey emerged from the kitchen heading for the house. Ndey returned later with a bowl (large enough to hold about five kilograms of rice) and took it over to the kitchen.

Whilst the tieing team and the lunch team were engaged in the above activities, the ‘dyeing’ team had heated the water to body temperature for the preparation of the dye-bath solution. The tradeswomen Fatou and Ida brought out the box containing caustic soda and sodium hydro-sulphite and

tubes of yellow and blue colourisers, six of each colour. Fatou took half a table spoonful of sodium hydro-sulphite solution, a quarter of a table spoonful of caustic soda solution, two tea spoonfuls of a yellow colouring substance, and one tea spoonful of a blue colouring substance, put all the chemicals in a small cup and mixed the substances thoroughly. Fatou then dipped an old piece of white cotton material, one foot square, in the solution, left it for about five minutes, then took the material out, and hanged it. When the material was fairly dry, she took it to the entrepreneur for her to confirm that the colour was right. The entrepreneur checked the colour of the material and advised Fatou to add more of the yellow colouring substance to make the yellowish green colour of the background more pronounced. Fatou went back to where the dyeing was done and explained to her colleague Ida and to the apprentice Ajaratou the result of the trial.

Meanwhile, Sally and Cumba (the researcher's targeted subjects) had hung the washed cotton materials and were preparing the 'ironing bed' to iron the washed materials (an aspect of the material preparation process for tieing). The 'ironing bed' consisted of two old woollen blankets spread on the 'straw mat' and on top of the blankets they also spread an old white linen bedspread. With the washed materials almost dry and the 'irons' on the 'coal pots' hot enough, Cumba and the other apprentices on tieing

duties began to iron the washed materials that each had prepared. Once the materials were ironed they were hung on a 'drying wire' so that the materials would remain straight. While the apprentices continued to iron the materials, the researcher moved back to the dyeing team, some ten metres away, to witness the preparation of the dye-bath solution proper (as against the earlier trial).

And indeed, the dyeing team (the two tradeswomen Fatou and Ida and the apprentice Ajaratou) were washing the two 'dyeing containers' (which were also petrol drums cut in half); they then poured some of the warm water into the containers to about three quarters full. Fatou worked alone during the process of preparing the dye-bath solution, while Ida worked with Ajaratou; and for the dyeing process that followed, the researcher concentrated his attention on Ida and Ajaratou. Ida put six table spoonfuls of sodium hydro-sulphite in the warm water in the dyeing container, followed by two-and-a-half spoonfuls of caustic soda. Ida asked Ajaratou to mix the solution properly by stirring it. When the chemicals were thoroughly mixed, Ida poured into the solution the complete contents of four tubes of a yellow colouriser and two tubes of a blue colouriser; she again asked Ajaratou to mix the chemical substances thoroughly, and then tasted the solution.

By then Sally and Cumba had finished the material preparation and consequently the researcher went back to the tying team. Sally asked Cumba to bring over one of the ironed pieces of cloth and when the latter had done so, Sally spread the material on the 'straw mat', took a 'measuring stick' (of one metre in length) and marked the material (which was three metres long) at intervals of one metre using a red pencil. She then went over to the tool box and selected a 'square' piece of plywood, the dimensions of which were about 30 centimetres, and marked out on the materials the pattern areas (two pattern areas per metre). When the markings on all the materials on which they were working were completed, Sally sat on one of the low wooden benches under the tree and Cumba sat opposite Sally on one of the straw mats. Sally picked one of the marked materials which was spread on their own work area, and placed it on her lap. She adjusted the material until one of the marked pattern areas was on top of one of her knees; then, raising and bending her knees slightly she 'pinched' the centre of the marked pattern area on the material and pulled the material upwards. She asked Cumba to pass her a piece of string and about three centimetres from the base of the resultant cone (formed by the material) she tied the thread around the pulled material. Sally said to Cumba as she continued to tie the pattern, 'open your eyes and look at what I am doing', and, continuing, she said 'always hold the material tightly and then pull, watch my fingers'. With the thread firmly tied, Sally twisted the

pulled material, and after some considerable ‘twisting’, she began to tie the thread along the spiral of material so formed. She next rounded the thread several turns at the top of the spiral. At the other end of the work station the other ‘tieing’ teams of tradeswomen and apprentices were also beginning to tie the patterns on the ‘ironed’ materials.

The time was now 1pm and it was time for the one hour lunch break. The tradeswoman Amie (who was in charge of the lunch for the day) informed the entrepreneur that lunch was ready. The entrepreneur asked Ndey (the apprentice who was assisting Amie) to make the announcement that lunch was being served. On hearing the announcement all the tradeswomen and all the apprentices rushed to one of the containers of water and washed their hands. The entrepreneur went over to the kitchen in the compound to witness how Amie was serving the food. She (Amie) dished out one dish for the entrepreneur, one communal dish for the tradeswomen and another communal dish for the apprentices. Ndey took the dish for the entrepreneur and that for the tradeswomen over to the entrepreneur’s house, where the entrepreneur and the tradeswomen ate together; she also took the apprentices’ communal dish to another smaller mango tree (some five metres from the workstation) where the apprentices sat in a circle and ate in silence. The researcher joined the apprentice group to have lunch with them. After eating, the tradeswomen stayed in the house for the remaining

period of the lunch break, except Fatou and Sohna who went out and came back some 10 minutes later.

After eating, the whole group of apprentices also went out and the researcher joined the tradeswomen group in the sitting room in the entrepreneur's house. Some of the tradeswomen were lying on the carpet on the floor, others were sitting informally in a semi-circle on the carpet, and one of them (Binta) was breast feeding her young baby who had been brought over by her maid. After some 20 minutes, the apprentices started to drift back to the workplace, some chewing gum, others chewing 'cola nuts'. As the clock on the wall of the entrepreneur's sitting room chimed two, the entrepreneur clapped her hands and immediately all the tradeswomen sprang to their feet and walked over to their respective work stations; and the apprentices followed.

Thus, each team went back to work and the 'tieing team' continued to tie the patterns. Sally and Cumba (the researcher's subjects) finished tieing all the patterns on one material after some 20 minutes, and Cumba then took the material to the 'dyeing' team. By then the other tradeswomen had also completed the process of tieing on similar pieces of material and had also handed over their materials to the dyeing team. Sally and Cumba and the other tradeswomen and apprentices in the 'tieing team' continued to tie the

remaining ironed materials in their charge. Since the process of tying was the same, the researcher then began to focus his attention on the 'dyeing' team.

As the tied materials were passed over to the 'dyeing' team, Ajaratou (the apprentice) received them and put them in a large used biscuit carton box. Fatou (who was one of the tradeswomen in the dyeing team) took one of the tied pieces of material and put it in the 'dye-bath' solution; she left it there for about seven minutes for the fabric to absorb the dye. The tied material was later taken out of the dye-bath solution by Fatou and the surplus dye solution squeezed out. The dye material was then hung to allow it to oxidise; and when the dyed material was almost dry, it was rinsed in water until the water was colourless (after four washes). The dyed material was then spread out on the hanging rope and Fatou and Ajaratou broke the binding threads. The dyed material was then washed in soapy water and hung again for about 10 minutes. When the material was almost dry, Fatou asked Ajaratou to iron it. After the material had been ironed, Fatou called the entrepreneur who came and inspected the dyed material and told Fatou that it was alright – meaning that the patterns were in the right positions in the material and that the colour too was right (that is, the solution had been of the right concentration). Once the entrepreneur had

signalled her approval, the dyeing team continued to dye the tied materials and the tying team to tie the materials.

At 5.30pm the entrepreneur came over to both the tying team and the dyeing team and asked them to start winding up for the day. The tradeswomen completed the work on the materials that they had started and packed everything away in their respective boxes. The apprentices in the tying team helped with removing the short benches, rolling away the straw mats and sweeping the work areas. The apprentices in the dyeing team emptied the drums which contained water, packed them away and with used pieces of plywood covered the containers which had the dye-bath solution in them. Next, all the apprentices together moved the packed boxes to the entrepreneur's house and then changed their clothes. The tradeswomen too changed into their clean dresses and then bid the entrepreneur goodnight, and left. All the apprentices went together as a group to the house, bid the entrepreneur goodnight and left. The researcher also went to the house, thanked the entrepreneur for allowing him to observe the day's work. Since it was Saturday, the apprentices were not staying on to do some private practice. So, the researcher left the business at 6pm.

5.3 Two apprentices' accounts of Critical Events

5.3.1 The account of a Critical Event in Tieing : learning the 'Folding' technique

Of the ten accounts of critical events from the sampled apprentices, this particular account was chosen because it was well articulated and in addition it was the only one about the 'folding' technique.

The apprentice said that she had observed her Boss 'tie' most of the patterns and that the most puzzling tieing technique to her had been when the Boss had used the 'folding' technique. She said that this technique was important and yet she could not understand how the Boss was able to keep the 'folds' together before she finally tied them. However, she said that after observing the Boss do the technique again, she decided to practise the technique on her own and doing so was a critical event for her.

She explained how she took an old piece of white cotton material and marked a pattern area of about 12 inches square on the material. She sat on a chair and placed the material over her knees; then she positioned the marked area over her left knee and slightly raised and bent her left knee (fully imitating the Boss). She picked the centre of the marked area, and started folding the material into small folds (just like making pleats in a skirt), while at the same time pulling the material upwards and giving the pull a slight twist. The technique was going well until she tried to tie the

folds together. She lost her grip and the folds disintegrated. She said that she sat back and cogitated over her approach to applying the technique and she then realised that when the Boss had done the pattern she had always made each pleat in turn; that is, as one pleat was completed and held in position with two fingers, the next pleat was developed and pressed tightly to the first pleat and held in position with the same two fingers and so on until the whole material in the marked area was folded. She revealed that her mistake was that she had been trying to develop all the folds together (and not one by one).

5.3.2 The account of a Critical Event in Dyeing : learning to prepare the Dye-Bath solution

Another apprentice explained that she had obtained a contract for a private job for a family friend who wanted her to tie-dye the curtains for her windows and doors. The apprentice said that she had prepared, marked, and tied the material using the ‘binding’ technique. She then went on to concentrate on the ‘dye-bath’ because that was for her a critical activity as she normally encountered some difficulties with this activity and had to try again and again to get the colour right. The family friend wanted the background colour to be reddish purple.

The apprentice went on to explain that she lighted the fire and heated the water to body temperature. She poured the water into the mixing container and put two-and-a half table spoonfuls each of caustic soda and sodium hydrosulphite; and then she put in two tablespoonfuls of a red colouring liquid and one-and-a half tablespoonfuls of a blue colouring liquid. She then mixed the chemicals until all the lumps of the substances had dissolved. She said that up to this point she was not sure as to how the dye would look on the material, given that this was her very first attempt to prepare a 'dye-bath' for an actual job. She then took an old cloth, dipped it in the dye-bath solution, left it for about five minutes, took it out, washed it and inspected it. Upon inspection she found that the colour was purple, not reddish purple as her friend had required. She decided to add one more tablespoonful of the red colour liquid and stirred the solution again. She dipped another old piece of material in the solution, left it for about five minutes, took it out, and inspected the material. The material was now reddish purple as required. Next she tasted the dye solution to determine the concentration of the caustic soda and sodium hydro sulphite in the solution (because a high concentration of caustic soda would ruin the material). She thought the solution was a bit salty, an indication that the caustic soda was too much. She said that the critical moment came when she had to decide whether to add more water in order to reduce the 'salt' concentration as this action would definitely alter the background colour.

In the event, she decided to add two litres of water to the solution, stirred it well and tasted it again. The ‘salt’ concentration had been reduced. She again dipped an old cloth in the solution, waited for about five minutes, took the material out and hanged it to dry. When the material was fairly dry she inspected it, and noted that although the colour was still ‘reddish purple’ it was a bit faded. She decided to add one table spoonful of red liquid colouring, stirred the mixture again and tested it. The colour was now just right.

5.4 Records of individual interviews

5.4.1 Record of an interview with an apprentice

The record of this particular interview has been chosen because the apprentice was very articulate and her responses showed some other insights about how apprentices learn at the workplace. Records of interviews with two more apprentices are given in Appendices 12 and 13.

Researcher: Can I ask you your age, how old are you?

Apprentice: I am 24 years old.

Researcher: Did you attend school?

Apprentice: No, I never went to school.

Researcher: What is your nationality?

Apprentice: I am a Gambian.

Probe: What part of the country are you from?

Apprentice: I originated from Brikama in the Western Division.

Researcher: For how many months have you been an apprentice in this business?

Apprentice: This is my 19th month.

Researcher: I saw you 'tieing' a pattern with the tradeswoman. Can you tell me what pattern you were doing?

Apprentice: We were doing the 'knotting' pattern.

Researcher: Now, tell me, were you able to recall the procedures used by the tradeswoman in doing the pattern?

Apprentice: At first it was difficult to follow how the Boss (tradeswoman) was using the technique because she did not explain to me fully how to do it. But as I continued to watch how the Boss was using the technique I was able to recall the procedures.

Researcher: Tell me, did the Boss check whether you could recall the key procedures or not?

Apprentice: Well, the Boss never checked whether I could recall the facts and procedures during the job, but after the job, when I practised, she would ask me some questions to check how I 'tied' the pattern.

Probe: If the Boss did not check you, what methods did you use to recall the procedures?

Apprentice: As I watched the Boss working, I tried to follow the steps that the Boss was taking in my mind and also tried to remember them. When we finish work I will try to practise the technique immediately and see how much I can remember.

Researcher: Can I ask you, when you were working with the tradeswoman, did the tradeswoman explain to you the procedures for 'tieing' the pattern as the job progressed.

Apprentice: The Boss would continue to work and I am required to watch her working. She normally will not explain to me unless I ask questions, which at times, if she was at a crucial stage, she would ignore.

Researcher: Did the Boss actually explain to you the key facts and procedures when tieing the pattern, such as how to 'pinch' the material, how to 'twist' and how to 'tie'?

Apprentice: Not at all; the Boss did not explain such facts to me specifically when she was doing the job but when I practised with an old material she would show me how to 'twist' and 'tie'.

Probe: So, you can remember how to 'twist' and 'tie'.

Apprentice: Yes, but I would need more practice.

Researcher: Did the Boss stress to you the important points you should recall when you are 'tieing' patterns?

Apprentice: Yes, the Boss showed me the points I should look for when she inspected my practised work but not during the job.

Researcher: Now, tell me, do you understand the procedures for 'tieing' the pattern?

Apprentice: Yes, I understood the procedure for tieing the pattern because when the Boss inspected my work she showed me where I went wrong.

Researcher: Can I ask you, if you have a problem in 'tieing' a pattern, how are you going to tackle the problem?

Apprentice: When I am faced with a problem, especially when I am doing my private jobs, I always checked how I was doing the tie and compare it from my recollection of how the Boss did it; and try and do it again and again till I got it right.

Researcher: Can I ask you, what do you mean when you say I understand how to 'tie' the pattern?

Apprentice: You say you understand something when you can do it straightaway. That is, you know how to mark the pattern area, how much material to 'pinch', where to tie the thread and how to twist the material.

Probe: You are saying that you understood how to tie the pattern because you could identify the steps involved in the procedure.

Apprentice: I was able to understand the procedure because I can identify the steps and know which steps follow which steps.

Probe: How do you know that you understood what the Boss was doing?

Apprentice: When I am able to tie the pattern following the right steps. Understanding would mean me doing the job all by myself correctly.

Researcher: Can we look at another issue. If you have to exercise an option between listening to the tradeswoman's explanation and observing the tradeswoman performing a demonstration, which one would you opt for?

Apprentice: I would go for the practical work.

Probe: Can I ask you why?

Apprentice: With practical work you learn how to do the job with your hands. Besides, the Boss does not explain much to me while working. So I would go for what is more practical, that is, watching the Boss work.

Researcher: Can we now move to your attitude: what part of the work interests you the most?

Apprentice: Doing the work is the part I liked best.

Probe: Why does doing the job interest you the most?

Apprentice: My interest is to be able to tie patterns properly.

Probe: How does your interest help you to learn how to ‘tie’ patterns?

Apprentice: You learn a lot more if you are interested in what you are doing; and doing practical work and getting results makes me want to do more.

Researcher: What part does your attitude play in your learning?

Apprentice: You must always like what you are doing; that is, your attitude must be such that you show the Boss that you like the work and that you are keen to learn.

Researcher: Did you receive any reinforcement or encouragement to motivate you at the workplace?

Apprentice: The Boss does not normally reinforce your learning by telling you that this is good, do it this way; but at times you are encouraged to try harder especially for the work done during our private practice time.

Probe: What do you expect from the Boss?

Apprentice: I would expect the Boss to involve me in the actual job she was doing. For example, if she ‘tied’ one pattern she should allow me to ‘tie’ one and then she can check my work and guide me if I made a mistake.

Researcher: Do you receive any feedback from the Boss? did she tell you how you were progressing?

Apprentice: I don't usually receive feedback from the Boss on the job, but when I am doing a private job if I invited the opinion of the Boss then she is always frank with me. There she will tell me how I was doing.

Researcher: Did the Boss tell you of your expected behaviour?

Apprentice: No, the Boss never told me of my expected behaviour at the workplace.

Probe: What is your own expectation at the workplace?

Apprentice: My expectation is to be able to 'tie' all the different types of patterns.

Researcher: Can we now turn to the relevance of theory. How do you see the relevance of theory at the workplace?

Apprentice: What is theory?

Researcher: Theory tells you why things work the way they do. So, are you taught theory at the workplace?

Apprentice: No; the tradeswoman did not explain theory to me at the workplace.

Probe: You mean to tell me that the tradeswoman did not explain to you why you have to twist the tie tightly or why you have to 'pinch' so much material to make the pattern.

Apprentice: The Boss normally explains to you how to tie the pattern but she never explained why you tie it that way.

Probe: What you are saying is that the tradeswoman would explain to you ‘how’ to tie the pattern but not why you tie it that way.

Apprentice: Yes. Besides, my interest is to know how to tie the pattern properly.

Researcher: What do you expect from a demonstration?

Apprentice: In a demonstration you would expect the Boss to show you how to ‘tie’ the pattern slowly, step-by-step, until you know how to ‘tie’ the pattern.

Probe: When you observe the tradeswoman at work, are you disappointed that the tradeswoman does not show you step-by-step how to tie the pattern?

Apprentice: Yes, I am disappointed, because it is difficult to see all the techniques when you only watch the Boss ‘tieing’ the pattern.

Researcher: Now tell me, do you receive enough practice at the workplace, that is, did the tradeswoman allow you to be involved in the job she was doing?

Apprentice: No, I do not receive enough practice at the workplace; all I do is watch the Boss working. The only practice I have is to practise after work privately, and show the Boss later.

Researcher: What do you think was the cause of this limited practice?

Apprentice: Well, I think it is because of the cost of the materials and also because the job is a contract job.

Researcher: Tell me, does the tradeswoman's explanations and demonstrations actually help you (that is, whether the explanations and the demonstrations helped you learn the job)?

Apprentice: The Boss's explanation and demonstration actually helped me to learn the job because when the Boss was working she will at times tell me: look, this is how to do this, check this point and that point. Although this was rare, at times the Boss will explain that way. For demonstration the Boss did not demonstrate, she only carried on with her work; I have to watch what she was doing and learn from that.

Researcher: When the tradeswoman was working, did she show you how to 'tie' the pattern all at one go (that is, the whole technique) or part of the technique, at the time?

Apprentice: The Boss carried on with her job and I watch what she was doing.

Probe: When do you learn the most – the whole skill at once or part of the skill at a time?

Apprentice: I think I will learn more easily if I am showed the skill, small part at a time.

5.4.2 Record of an interview with an Entrepreneur

The record of this particular interview has been chosen because the entrepreneur was very articulate and her responses showed some new insights about how learning is facilitated at the workplace. One more record of an interview with an Entrepreneur is given in Appendix 15.

Researcher: Can I ask you, how old are you?

Entrepreneur: I am 35 years old.

Researcher: Did you go to school?

Entrepreneur: No, I never went to school.

Researcher: What is your nationality?

Entrepreneur: I am a Gambian.

Probe: What part of the country are you from?

Entrepreneur: I am from Serre-Kunda London.

Researcher: Can you tell me, how many years since the business was established?

Entrepreneur: The business is ten years old.

Researcher: Tell me, how do you see your role? are you involved in the training of the apprentices?

Entrepreneur: You know I am not educated, how can I be a trainer. I am only helping the apprentice to learn how to tie and dye, the way I learnt the trade myself.

Probe: Why don't you see yourself as a trainer and yet you are training the apprentice?

Entrepreneur: Training involves teaching the apprentice how to do things, how to remember things and how to solve problems. Here I do not have time for that; all I do is my work and the apprentice learns what she could, by watching what I am doing.

Researcher: I observed you working very closely with the apprentice, when you were working on that material. Tell me, was the apprentice able to remember and recall the specific points and facts in 'tieing' the pattern?

Entrepreneur: As I worked, the apprentice was observing what I was doing. As I tied the pattern I tried to do it slowly so that she could see how it was done. But whether she could remember and recall the main points I am not sure.

Researcher: Did you find out whether she could remember the main points?

Entrepreneur: No, I did not find out.

Researcher: Did you explain to the apprentice the procedure in 'tieing' the pattern?

Entrepreneur: I tried to explain to the apprentice how to tie the pattern, drawing her attention to how to twist the material, where to tie the thread, and above all, the use of the fingers.

Researcher: Did you stress the crucial points that she should remember when tying the pattern?

Entrepreneur: Well, as I worked I tried to show her what to look for, where to pay particular attention; things like how to pick the material from the 'marked area' and how to twist and tie.

Researcher: Can we now look into the apprentice's understanding. Did you make sure that the apprentice understood the procedures for tying the pattern?

Entrepreneur: The apprentices seemed to be understanding when they could join the different activities together. That is, how the material was picked, how the material was initially tied, twisted and pulled and then tied at the end.

Probe: Did you explain to the apprentice the procedures in such a way as to enhance her understanding?

Entrepreneur: As I worked I tried to show the apprentice how to tie patterns and how to prepare the dye-bath and at times I would explain to them how things are done. But the apprentice did not usually ask questions; she only sat there and observed what I was doing.

Researcher: If the apprentice was to exercise an option between listening to your explanation and observing your demonstration which one do you think she would opt for?

Entrepreneur: I think the apprentice would go for observing a demonstration.

Probe: Can I ask you why would the apprentice opt for observing a demonstration?

Entrepreneur: Apprentices, in general, do not like explanations, all they wanted is to see how things are done and they copy from your example. Apprentices like more practicals than explanations.

Researcher: What about the apprentice's attitude towards work? Tell me, what part of the work interests the apprentice most?

Entrepreneur: The practical part of the job interests the apprentices the most because they like to do things with their hands.

Researcher: Did the apprentice's interest on the job help her learning?

Entrepreneur: The apprentice's interest on the job helped her learning a lot because she wants to learn how to tie and dye; so she was always willing to get involved in the job.

Researcher: Did you give feedback to the apprentice to help her check on her progress?

Entrepreneur: I only give the apprentice feedback when she was doing her private practice and she came over to me for my opinion or advice. Then I will tell her how I felt about her work and her progress in general.

Probe: Did the feedback help the apprentice's learning?

Entrepreneur: Of course the feedback helped the apprentice a lot because she could see her mistakes and was able to rectify them next time round.

Researcher: When do you usually give the apprentice the feedback, during the job or after completing the job?

Entrepreneur: As I said earlier, I usually gave the apprentice feedback when she brought over her completed work for me to see. Then I will critically inspect her work and tell her about her errors.

Researcher: Can I ask you, what do you understand by the term 'theory'?

Entrepreneur: I don't know what is 'theory'. You know I cannot read and write in English so anything about your school business is out of my scope.

Researcher: Theory is when one explains why things work as they did as opposed to doing things practically; like, for example, why do you twist the material when tying a pattern? Why do you prepare the materials before dyeing?

Entrepreneur: Oh! I see; that is what you mean by 'theory'. So theory is when you talk to the apprentice about the job like why you must wash the material before dying to remove the factory grease or when you wet the material before dyeing.

Researcher: Now, tell me, how do you see the relevance of theory at the workplace?

Entrepreneur: I don't usually think about theory when I work. I know everything, so, I just do the job without thinking about the 'theory'. Once you know about how to do the job you do not stop to think about why it is done that way.

Probe: Do you use your knowledge of theory to help you solve problems at the workplace?

Entrepreneur: Theory could help you to solve problems. But most of the problems in the workplace could be dealt with, without thinking about theory. Problems like too much salt in the dye bath, you know how to solve it without theory.

Researcher: Can we now turn our attention to the apprentice practising at the workplace. Do you usually demonstrate to the apprentice a procedure to be practised?

Entrepreneur: As I worked, the apprentice watched me and by looking at what I was doing the apprentice was able to learn how to tie and dye.

Probe: Did the apprentice have time to practise her skill?

Entrepreneur: Normally, after work the apprentice used leftovers of the 'dye-bath' to practise what she had learnt during the day. She would tie the pattern and then dye it. When it was dry she would show it to me.

Researcher: How did the apprentice learn to tie a pattern? What I am saying is, did you stop to show the apprentice how to tie a pattern?

Entrepreneur: I don't usually stop to show the apprentice but I normally work slowly for the apprentice to see (and by that to learn) how to tie a pattern. At that time the apprentice would ask me how to do something which she did not understand (by watching me work).

Probe: Did the apprentice have enough practice time at the workplace?

Entrepreneur: As I said earlier, after work they usually stay on to practise and at times they would stay on till late in the evening. So they usually have enough time for practice.

Researcher: What do you think was responsible for the apprentices' limited practice during the day on the job?

Entrepreneur: Well, most of the jobs here are contract jobs and as the Boss (entrepreneur) I would not allow the apprentices to work on the job. So they have to find their own time to practise.

Researcher: Tell me, when you show the apprentice how to tie a pattern or a special technique, do you show her the whole technique at a time or part of the technique at a time?

Entrepreneur: When you start to tie a pattern, you do it from start to finish, there is nothing like bit by bit. So, I usually tie the pattern all at once; the apprentice had to learn the technique all at once.

5.5 The analysis of Results for the Tie-Dye trade

Introduction

The thrust of this present sub-section is to analyse how the tradeswomen in the 'tie-dye' trade facilitated how the apprentices learned at the workplace and how the apprentices acquired their knowledge of 'tie-dye' practice on-site (that is, at the workplaces where they were engaged as apprentices). However, it emerged from the researcher's observations that there were a lot of routine practices at the workplace. Thus, the 'preparation' of cotton materials for 'tie-dyeing' was always done in the same way (except for any special type of 'pattern tying' that the tradeswomen decided to do), and also the procedures for the preparation of the 'dye-bath' solution and for

the dyeing process were always the same. Consequently, the scope for learning was limited.

5.5.1 The learning of practical skills

5.5.1.1 Learning by observing

The analysis focused on how by observing the tradeswomen at work, the apprentices acquired ‘procedural knowledge’ of the trade, that is, the knowledge of procedures for different techniques and patterns, and of the procedures in preparing the ‘dye-bath’ solution. An apprentice said that she was working with a tradeswoman on tie-dyeing ‘window blinds’ (cotton curtains), under a contract for a Government Ministry. The materials were initially prepared (by washing and ironing) and the tradeswoman had set out to mark the pattern areas. She (the apprentice) noted that the tradeswoman had marked four pattern areas in each curtain instead of the usual one or two pattern areas for a similar length of material. When the apprentice enquired from the tradeswoman as to the reason for the increase in the number of pattern areas per curtain material, the latter told her that she intended to use four different techniques for each curtain material. The apprentice said that she was convinced that this was an opportunity for her to learn new tying techniques and also to enhance her knowledge of the techniques to which she had already been exposed. The apprentice said that she sat there and watched as the tradeswoman

proceeded to tie using the different techniques; and that of the four techniques that the tradeswoman was using, she only knew two already – the ‘binding’ and the ‘knotting’ techniques, after her nine months of apprenticeship. The tradeswoman had told her the names of the four different techniques, but had failed to explain the techniques in detail. When the apprentice was asked whether she knew the procedures for using the different techniques, she said:

“I saw what she (the Boss) was doing because I was looking at every movement of her hand, but truly I did not know what she was doing”.

When probed as to what she meant by saying that she did not know what the Boss was doing, she said:

“For me to know what I was doing, and for the technique to make sense to me, the Boss must show me how to tie the technique step-by-step, how to tie the thread, and where to tie the thread; then I will be able to know and do the pattern myself”.

However, another apprentice explained during an interview, how she was able to learn a technique step-by-step and how learning was facilitated by the tradeswoman. The apprentice said that she had bought her own cotton material and had wanted to tie-dye the material after work, with the permission of the tradeswoman and of the entrepreneur, using the leftover of the ‘dye-bath’ solution (a practice which the entrepreneur accepted but controlled). She said that after the preparation of the material (that is, after

washing and ironing it and marking out the pattern areas), she decided to use the ‘folding’ technique to make the pattern. The tradeswoman then walked over to where she was working, asked her to explain what she was doing, and to ‘fold’ a pattern for her to see. The apprentice said that she folded the pattern the way that she thought was right. The tradeswoman then took the material from her, opened it to see the completed pattern, and told her that the amount of “pinched” material was too little and as such would not result in good ‘folds’. The tradeswoman then folded a pattern for her (the apprentice) to see. The apprentice said that it was then that she was able to know the procedures for tying the pattern. When the apprentice was questioned as to what was the difference between what she was doing and what she eventually learned about how the tradeswoman was doing the fold, she said:

“There was a lot of difference between what I was doing and how the Boss did it. First, the amount of material I ‘pinched’ was too little - making my pattern too small. Secondly, my ‘foldings’ were too tight giving my pattern a ‘line, line look’ (meaning parallel lines) in the background”.

When the apprentice was further probed as to whether she knew how to ‘tie’ the technique after the encounter with the tradeswoman, she said:

“I was able to know the technique because the Boss took time to show me, and I was able to follow what the Boss was

doing and compare it with my past experience and see where I went wrong and how to adjust it”.

When the tradeswoman was probed as to why she did not in the first instance take time to show the apprentice the step-by-step procedures for the tieing technique, she said:

“If I have to show the apprentice the step-by-step procedure of ‘tieing’ the technique every time I tie a pattern, the job will never progress and the entrepreneur and client would not be pleased. But if an apprentice attempted something and showed it to me after work or at home, I will have the time to help her”.

It was evident (from the researcher’s observations) that the tradeswomen in the tie-dye trades (like the tradesmen in the Motor Vehicle trade) did not “demonstrate” procedures. The tradeswomen would just carry on with their work and the apprentices were expected to observe them at work and pick the necessary skills through such observations. The apprentices were questioned about whether the tradeswomen actually demonstrated to them how to tie patterns. One apprentice’s reply was unequivocal; she explained:

“We were not shown the step-by-step way to tie patterns. Some Bosses would work slowly for us to see how they were doing the patterns, but generally we have to watch how they were doing the patterns and learn to tie patterns that way”.

Another apprentice said that she was once observing a tradeswoman tying the ‘twisting pattern’ and although the tradeswoman was working slowly, it was still very difficult for her (the apprentice) to discern from the tradeswoman’s manipulations the technique of tying that pattern. When probed as to what accounted for the apparent difficulty, she said:

“The Boss’s hand was somehow covering what she was doing; so, I could not see properly how she was twisting and tying the thread. Unless you are shown step-by-step how to do it, it will be difficult to only look and learn how to tie the pattern properly”.

To complicate matters, it emerged from the interview of another apprentice that the tradeswoman with whom she worked was not consistent in the way that she did the patterns. A vivid example of such inconsistency was given by the same apprentice. She said that in doing a ‘knotting pattern’, the tradeswoman with whom she was working on one occasion had started off by picking the material from the centre of the marked area, and had pulled the material upwards; the tradeswoman had then given the material a slight twist and knotted it before tying it. The apprentice said that she had been following the procedure attentively and internalised the whole procedure in her mind. However, when the tradeswoman started to twist a second pattern, she followed a different procedure altogether; she pulled the material from the marked area and twisted it slightly (as she had done

previously) but on this occasion she tied it before finally knotting the pulled material. The apprentice described her confusion in the following words:

“I was confused because the ways the Boss did the two patterns were different. For me to follow how to tie the pattern, I need to know which was the correct way”.

Another of the study’s findings was that the tradeswomen in the tie-dye trade did not direct the apprentices’ attention to the salient points in the procedures that they followed when they (the tradeswomen) were working.

When questioned, one apprentice remarked:

“The Boss did not show me what to look for when I watched her work. When I asked questions she would only answer me about what I asked for and nothing else. If you did not know how to do things or what to look for, you cannot ask the right question to get the right answer”.

Another apprentice explained that she was once observing a tradeswoman tying a pattern, and although she was very attentive to every action of the tradeswoman, she was still unable to pick the important points in tying the pattern; her reason for this was well expressed in her statement:

“I did not know what was important and what was not, and the Boss did not show them (the important points) to me”.

In formal settings, the Instructors’ lesson plans on pattern tying would include enabling students to list the various steps involved in tying patterns, pin-pointing especially the important steps.

A further insight into the difficulties that the apprentices encountered in relying on observing the tradeswomen at work was obtained from another apprentice. The apprentice described how after she had just finished observing a tradeswoman tying the 'binding' pattern, she immediately set off to practise the technique on some old materials. However, her first attempts were all wrong and so she took the material to the tradeswoman and described to her in some details how she thought the pattern was tied. The tradeswoman listened to her description and then showed her how to tie the "binding" pattern. The apprentice went away and immediately began to practise the technique over and over again until she was able to tie the pattern. The apprentice was probed as to why she was not able to tie the 'binding' pattern by just observing the tradeswoman. The apprentice's own explanation was that:

"By only watching the Boss at work you will not see the points. But when the Boss explains to you how to do it, you will then see how to do it because the Boss will show you the main points".

Yet another finding that emerged from the researcher's observations was that at the workplace the apprentices were not allowed to practise on the actual jobs in hand which the Businesses were contracted to do. The stated reason was that the cost of the chemicals used was high and that the tradeswomen could not therefore risk allowing the apprentices to practise

on actual jobs. However, the apprentices themselves, when interviewed, showed some reservations about this reason; one apprentice said:

“It is true that the materials, soda (caustic soda), salt (sodium hydrogen-sulphite) and colourings were all expensive, but that should not stop the Boss from allowing us to practise on the job. If the Boss is doing six materials, after doing one or two for me to see, she could allow me to do one while she was there checking on me, and if I go wrong she was there to correct me”.

When the apprentices were questioned as to how different was practising on ‘off-cuts’ or “on old materials” from practising on proper on-the-job materials at the workplace, one explained that:

“With ‘off cuts’ you work alone and you only show your work to the Boss when the job was ready. With ‘proper materials’ you work and the Boss was there to check you. The Boss could always stop you and correct you if you are doing anything wrong and by that you learn how to do the pattern properly”.

Another apprentice focused instead on “old materials” whilst confirming the effectiveness of working with “proper materials”; she said:

“When you work on “old materials”, you are not learning a lot because if the Boss did not show you how to correct your work, you will go and do it all wrong again. But with “proper materials”, the Boss was always there to check your movements; any wrong step you take, the Boss will tell you immediately how to do it correctly and you learn from the Boss’s advice”.

The contrast with what obtains in formal settings was again striking. For, in Vocational Training institutions students are provided with ‘full length’ materials on which to practise with different types of patterns which they display to their instructors for comments and advice.

5.5.1.2 Learning through problem solving

As indicated in Chapter 2, problem-solving can be ‘routine’ or ‘non-routine’. Given that the tie-dye procedures were highly routinised, non-routine problem-solving was of particular interest.

An example of non-routine problem-solving was given by an apprentice when she recounted a ‘critical event’. She explained that she was doing the ‘knotting’ pattern, when suddenly she realised that she wanted to change the original pattern but did not know how. However, she was determined to solve the problem. She took the piece of material and marked the pattern area. When she came to doing the pattern, instead of pulling the material and ‘knotting’ it at the middle (which was the standard procedure for the ‘knotting’ pattern), she ‘knotted’ the ‘pulled material’ at the top end and twisted the bottom end very strongly. Then using the thread, she tied the twisted end of the pattern. She said that while the work was in progress she had no idea of what the pattern would look like when completed and added: “I only thought that I should try something new”.

Non-routine problem solving was rare. However, there was example of the trade itself having solved some problems and developed unorthodox methods for solving problems. Such methods enabled the apprentices to learn how to solve problems under the conditions at the workplace in which they found themselves, that is, taking into consideration the resources available and the constraints under which the businesses operated. For example, in eight of the ten sampled businesses, the tradeswomen and hence the apprentices too, used ‘sticks’ and ‘ropes’ to measure the length of cotton materials (when preparing materials, for tie-dying) instead of using a conventional measuring tape (given their level of numeracy and literacy).

Another example of unorthodoxy was that, in the absence of electricity, the tradeswomen in the tie dye trade solved the problem of not being able to iron the cotton materials by resorting to the “primitive method” of ‘beating’ the materials with a specially made wooden ‘club’. This method is known as ‘cold ironing’ or ‘*Tapa*’, and some tradeswomen preferred it to ‘hot ironing’ because, they contended, ‘hot ironing’ ruins the fabric of the material, whereas ‘cold ironing’ does not.

5.5.1.3 Trial and Error Learning

There was evidence that the apprentices depended to some extent on learning by trial and error partly because the procedures used in the trade were based on tradition rather than on any known scientific principles. For example, as already indicated, the apprentices had to rely on the crude, traditional method of testing the strength of a 'dye-bath' solution by tasting it or by seeing its effect on old pieces of cotton material rather than by using a hydrometer.

However, such tradition apart, there was evidence of learning by sheer trial and error. The interview data showed that they could not 'discover' the 'best' way to tie a pattern unless they had a lot of practice, and thus learned through 'trial and error'. As one apprentice explained:

“By watching the Boss it was impossible to pick up the idea, because the Boss was working too fast for me to see how she was actually ‘folding’ and ‘sewing’ the material. You have to find out for yourself how to do it by trying and trying, again and again”.

An apprentice giving an account of a 'critical event' explained that she had purchased a piece of cotton material for tie-dyeing purposes and had turned it into a bedspread sheet for herself. Since she was confident that she had learned the 'knotting' technique (during her 18 months of apprenticeship), she decided to use that technique. In preparing the 'dye bath', she used

one-and-a half tablespoonfuls of ‘caustic soda’ and of ‘sodium hydro sulphite’ respectively. Her chosen colour for the sheet was green and so she used yellow and blue as primary colours to produce the green colour. She tie-dyed the sheet but when she inspected it the colour was not what she had expected – it was too green. So she added more blue colour to the ‘dye-bath’ solution, dipped the sheet again in the solution and after 10 minutes or so, took the material out and inspected it and this time the sheet was of the bluish green – the colour that she originally wanted. She showed the dyed sheet to the tradeswoman who was quite impressed with the outcome.

When the same apprentice was probed as to why she had to get the ‘dye bath’ right through trial and error, her reply was very clear:

“You don’t have an easy way to know if the dye bath is right or wrong. Until you actually dye the material you will not know whether the dye bath is correct or not. If you found out that the concentration of soda was not right you have to keep on trying until you get it right”.

5.5.1.4 Monitoring of Learning

There were no formal procedures for monitoring the progress that the apprentices made in their work at the workplace. Although, as indicated, the majority of the tradeswomen encouraged the apprentices to practise the tie-dye techniques using ‘off-cuts’ and ‘old materials’, and might give

some feedback to the apprentices about their work, they did not use the resulting patterns to monitor the progress of the apprentices. As one apprentice put it:

“When I took my work to the Boss, she only looked at it and would only tell me about the way I made my pattern, such as, the ‘tie’ was too strong or the ‘twist’ was too much. She never commented on my progress compared with my previous work”.

Furthermore, the tradeswomen did not look at the apprentices’ work with a ‘critical eye’ in order to discuss the mistakes and to advise them on ways to improve their work. And as one apprentice put it:

“The Boss (the tradeswoman) opened my work to see the pattern and said ‘ok’. But when I compared my work with her own work, the patterns were different. When I asked her where I went wrong she only told me to tie my patterns properly next time”.

The apprentices’ complaints stemmed from the tradeswomen’s inability to explain properly the causes of the apprentices’ errors, while the tradeswomen’s stance was that the apprentices must learn to practise by themselves because ‘practice makes perfect’. Consequently, the apprentices took it upon themselves to direct and monitor their learning privately at home. For example, an apprentice explained (during an account of a ‘critical event’) how she was moonlighting by ‘tie-dying’ a number of ‘T-shirts’ for a local football team. She said that the team wanted a pattern with the sun on the front of the shirt (in the middle). She

decided that the 'binding' technique would produce a fine 'sun' pattern. As she knew very well the 'binding' technique, tying the pattern posed no problem. Her main concern was rather about the preparation of the 'dye-bath' solution, as she did not know of any scientific method for testing the correctness of the concentration of the 'dye-bath' solution. The main issue for her was to get 'everything correct'. So, for trialling purposes, she put a small amount of each substance (caustic soda, sodium hydro sulphite and a red colour liquid) in a cup. She mixed the substances properly, that is, until all the substances had dissolved. She then dipped a piece of an old white cotton cloth in the 'dye bath' solution, and after some ten minutes she took the cloth out and hanged it to dry. When the material was dry she washed it and inspected it and was quite pleased with the outcome because the red background colour was right and the concentration of the caustic soda was not so high as to ruin the material. She then prepared the 'dye bath' solution proper for the task in hand; she now used two-and-a half tablespoonfuls of 'caustic soda', and 'sodium hydro sulphite' each, and one bottle of red colouring. After stirring the solution she tested the 'dye-bath' by dipping a piece of old cotton material, in the solution. She realised then that the 'red' colour was not strong enough, so she added about one more tablespoonful of the red colour liquid to the solution and tested it again; and the background colour was then finally right.

5.5.2 The learning of “Theory”

The apprentices were asked how did the tradeswomen facilitate the learning of “theory” at the workplace. One apprentice’s reply was:

“The Boss carried on with her work; she would explain to me how to do it but not why to do it that way. At the end, one might know how to do it but not why you are doing it that way”.

Another apprentice explained how a tradeswoman would be tying a pattern, while she (the apprentice) would be observing and listening to her and how all that she could gather from the tradeswoman’s explanations was that “you do it this way, then you do it this way” and absolutely nothing on “why you do it that way”. When interviewed a tradeswoman said that the explanation of theory to the apprentices would be a waste of time and that such time was a commodity the Business did not have. Clarifying this point another tradeswoman put it as follows:

“If you want to explain theory to the apprentices this would waste time as the apprentices would ask more questions and when you answer that question they would ask another question, and this would waste time and here at the workplace one does not have time for such questions”.

But did the apprentices normally think about ‘theory’ as they carried out their every day tasks? When asked this question one apprentice said:

“I don’t usually think about theory when I work, all I think about was how to do the job properly. Some of the work I do at the workplace did not call for theory, so I don’t have to think about theory”.

When the same apprentice was probed as to what type of work she did which did not call for theory, she listed a number of jobs; to quote her:

“Jobs like mixing the ‘dye bath’ to get rid of the lumps, fetching water, ironing materials during the preparation of the material, and washing and ironing the finished products. All these jobs did not call for thinking about theory”.

The following illustration shows the apprentices’ inclination to use techniques as against applying theory. An apprentice was observed practising with an old piece of cloth material. When the researcher asked her what she was doing, she said that she was practising the ‘sewing’ technique. The researcher kept observing her as she went through the process of ‘folding’ and ‘sewing’ the material to form the pattern. When she was through with the task, the researcher asked her whether what she was doing was derived from having learnt a theory or from having learnt a technique. Her answer was:

“I think that was all a matter of a technique, because you have to know what you were doing and doing it that way to get the pattern right”.

When probed as to why she thought she was learning a technique, she said:

“It is a technique because I can imagine what the pattern would look like if I follow the right steps. You do not have to think too much of what you are doing, just follow the steps and you will have it right”.

Importantly, there was no evidence that the tradeswomen explained to the apprentices the scientific theories underlying the various procedures, such as the chemical theory about the miscibility of the substances used – caustic soda, sodium hydro sulphite and the colouring materials – and the chemical reactions between these substances.

5.5.3 Learning Through Understanding

During an interview an apprentice said that she was only able to understand a procedure when it was part of a set of procedures within the tie dye process, that is, when she was actually involved in a task. To quote her, “understanding would mean me doing the job all by myself correctly”.

Other comments by apprentices were:

“How could you understand something by just watching some one working? You have to do it yourself to be able to understand it and know it”.

“You don’t understand much by watching; at times as you watch the Boss working, you say to yourself I understand it now and I can do it. But when it came for you to do it then you realise that you could not do it because you did not understand it in the first place”.

One apprentice recounted during an interview how she thought that after observing a tradeswoman at work, she had understood fully how to tie a ‘marbling pattern’, but realised later that she had not. The apprentice explained how the tradeswoman had spread the material over her lap (having marked the pattern areas), and had picked the amount of material from the centre of the marked areas as was the custom. She (the tradeswoman) then began the tying process with a ‘running commentary’ (that is, by explaining to the apprentice what she was doing as the job progressed). The tie-dying technique seemed so simple and easy to the apprentice, and she thought she had understood everything. However, she said that she came to realise her lack of understanding when she tried to practise the technique on her own in her spare time. When asked about what actually hindered her understanding of the technique, she explained:

“As I watched the Boss ‘fold’ and ‘twist’ the material, I thought that this was all there was to the tying of the pattern. What I failed to see was how the Boss used her fingers to control the ‘folded’ material before the ‘twisting’. Unless you are shown the technique you will never understand it”.

When probed, she explained further:

“When you are watching the Boss working and explaining to you, you are looking at what she was doing and at the same time you are listening to what she was saying. If she points to an important aspect you look at that point immediately. It was up to the Boss to draw my attention to how she was using her fingers to control the ‘folded’ material”.

The present study also showed that apprentices in the tie-dye trade did not probe the tradeswomen enough about the tasks that they were doing. The apprentices' interview data showed that when the apprentices did not "understand" the tradeswomen's explanations and demonstrations, they (apprentices) did not ask questions but were contented to observe the tradeswomen at work with the hope that they would pick the techniques in this way. However, as one apprentice explained:

"At times when you ask too many questions the Boss is cross with you. Another point is, as you ask questions you tend to miss what the Boss is doing. So you keep your mouth shut and open your eyes".

How the tradeswoman dealt with the apprentices' questions was thus an issue, and another apprentice threw more light on this issue. She explained that she was once observing a tradeswoman who was tying the 'marbling' pattern. She (the apprentice) observed that the tradeswoman had picked the material from the centre of the marked area, folded the material, gathered all the folded material together, and twisted the whole lot in the clockwise direction; somehow, the tradeswoman still managed to hold the whole lot of material with the left hand and then began to tie the folded materials. The apprentice said that when she asked the tradeswoman how she managed to hold the folded materials in position before tying the materials, the tradeswoman told her that she must always watch what she was doing

and ask questions when ‘it was hot’, that is, when the job was in progress so that she could show her (the apprentice) practically what she wanted to know. However, when probed, the apprentice went on to explain further the difficulty that she encountered. To quote her:

“The tradeswoman will not stop the job to explain to me, she always said ask your questions after the job. When you asked your questions after the job, she will say ask your questions during the job. So I did not know when to ask questions”.

5.5.3.1 Recall in learning

The apprentices had to concentrate on what the tradeswomen were doing and relied on the visual information that they received from observing the tradeswomen. It emerged from the research data that the apprentices could not store mentally the procedures when tasks were being performed until they were able to discern the steps in the procedures used. The apprentices said that the recognition of what was perceived in this way was more important to them than the mere recall of specifics and related facts such as the precise measurements in tying a pattern. To quote one apprentice:

“When the Boss was working I looked at how she was tying the pattern and checked what I could recognise in the procedure to help me have an idea of what pattern she was tying”.

The apprentices also explained that as they observed the tradeswomen working on a particular pattern they tried to build a mental image of the

procedures involved and to anticipate what the resulting pattern (from the tie) would be, and for them such observation coupled with anticipation was what learning was all about. By way of an example, a tradeswoman was observed preparing a piece of cotton material for tie-dying. She spread the material on a large bamboo mat on the ground under the mango tree, and with a pencil marked the pattern areas on the material where she wanted the pattern. The tradeswoman then sat on the low wooden bench, placed the material on her lap and began the process of tying the pattern in one area and repeated the procedure in the other areas along the length of the material. The tradeswoman then “pinched” with her fingers an amount of material just enough to cover the marked area, pulled it upwards, and tied the necessary thread at the bottom of the “pulled” material (about 2cm from the bottom). She then took the tip of the ‘pulled’ material, twisted it round (about two turns) and then tied the thread again around the ‘pulled’ material to keep it in place; thus, the “twisting technique” was completed. When questioned the apprentice said:

“I watched what the Boss was doing but truly, by only looking I could not tell what pattern she was making. But as I continued to watch her I was able to recognise the pattern, because I saw some of the procedures (such as twisting) that were familiar to me”.

The researcher’s observation was that the tradeswomen did not explain the crucial elements in the task of tying a pattern (for the purpose of

facilitating learning), such as, how wide should the pattern area be, at what distance from the base of the twist should the thread be tied, and how tight should the tie be. In the formal setting of Vocational Training institutions, instructors would use the chalkboard to draw the patterns to aid the students' subsequent visual recall of the patterns. Indeed, interestingly, in order to facilitate the learning of the pattern tying procedures, the instructors normally use tissue paper to demonstrate step-by-step the procedures in tying a pattern; thus, students could open the tissue paper to see the formation of the pattern in detail. Another advantage of using such a visual aid was that the used tissue papers could be discarded if the students were wrong when practising the required patterns.

Apprentices were also able to recall the procedures in preparing a dye-bath solution, as the following extract from an interview shows:

“The tradeswoman always explained that we must mix the dye-bath (solution) to ensure that the ‘soda’ and the ‘salt’ were not too much. Because if the ‘soda’ and the ‘salt’ were too much they would ruin the material”.

The same interviewee also recalled that “the tradeswomen always used the tip of their tongues to test the dye-bath solution” and added

“we are never given the chance to test it ourselves, so we don't know how it should taste like when it is correct”.

In the informal Vocational Training institutions, instructors would explain to students the chemical reaction between caustic soda and sodium hydro-sulphite. Furthermore, in the actual preparation of the dye-bath solution, the instructors would show students how to use the special ‘hydrometer’ to test the strength of the (dye-bath) solution. However, after the correct strength of the solution has been ascertained, some instructors would ask apprentices to “taste” the solution; the point being that these instructors think that this crude way of testing the strength of a dye-bath solution is necessary even in the formal setting, because most students on completing their training would use this technique when they practise privately after their training.

Importantly too, as most of the apprentices were illiterate, they could not make use of printed learning materials or take down notes about technical procedures (as students would in the formal sector), so that the recalling of procedures was problematic.

5.5.4 The motivation to learn

The apprentices were asked what motivated them to learn at the workplace, and one said unequivocally:

“We are motivated to learn in the workplace when we are given work to do, that is, important jobs”.

The apprentices were further asked whether the tradeswomen used any incentives as a stimulus to learning at the workplace, and their responses showed that none was used. Indeed, one of the apprentices was very vocal and explained that:

“If you looked at it (the use of incentives) closely, there was no need to motivate apprentices because we are here to learn the job. The only motivation that would help us is to encourage us to participate in real jobs; that way apprentices will feel that they were important”.

It transpired also that the apprentices did not see the ‘off cuts’ of cloths that the tradeswomen gave them as an incentive because as they argued, ‘off cuts’ could not compensate for what they were missing out from not working on real materials.

Moreover, when the performance of the apprentices was considered to be satisfactory by the tradeswomen, the former did not receive any ‘open encouragement’; instead, as one apprentice put it:

“The tradeswomen would look at our jobs (practical work) and just tell us whether the job was good or bad. But the Boss will not give you any ‘sweet word’ to encourage you. The Boss always says that if you encourage an apprentice too much she becomes proud”.

There was some evidence too that what the apprentices would have found intrinsically motivating was an explanation of what went wrong when their work was unsatisfactory. Thus, another apprentice recounted in some detail what was for her a ‘critical event’. She explained how she once worked on an old bedspread for a friend. It was originally made of white cotton material but over time it had changed to a cream colour. The friend wanted the bedspread to be tie-dyed blue and the apprentice had chosen the ‘moon design’ for the pattern, using the ‘binding pattern’ technique. She took a sample to the tradeswoman at the workplace for her to inspect (since this was the apprentice’s first private job). The tradeswoman commented that the blue colour was too dark and that it was difficult to discern from the pattern that it was that of a ‘moon’. However, the apprentice expected more than that; in her words:

“It is good for the Boss to criticise my work. But what I was expecting was for the Boss to look at my work properly and tell me where I went wrong, especially with the ‘binding’ technique; that is, how I failed to get the ‘moon’ shape. That way I will be able to correct my mistake and have the courage to try by myself again”.

In point of fact, the apprentices were not formally tested (by the tradeswomen) in order to check on their progress and to give them the necessary feedback. In a frank statement, an apprentice explained:

“I was never tested by the Boss, because I was not given real jobs to do and the Boss only has time for real jobs. The Boss does all the jobs; we apprentices just watch. Even when I

work with 'off cuts' and old materials and take it to the Boss to check, the Boss only says 'ok' or that part was not good".

Another consideration is that, arguably, for feedback to be effective as a motivator, models of tie-dye patterns which can be used to show the expected standard of work should be available to the apprentices; the reason is that learning to master a technical skill usually involves the establishment of standards that can be referred to and although tie-dyeing is an art form (and therefore involves some subjectivity), it also involves a number of technical skills. The evidence from the researcher's observations was that the tradeswomen did not formally provide the apprentices with technical standards to follow. The apprentices apparently relied on developing their own subjective, 'internal standards' as reference points as they observed the tradeswomen perform. Yet, as in the formal Vocational Training institutions, they could be asked to verbalise their ideas by describing what they try to do and in this way their perceptions could be identified and, if necessary, they could be helped to adjust the patterns that they produce accordingly.

5.6 SUMMARY OF RESEARCH FINDINGS FROM BOTH TRADES

The aim of the present study was to focus on how apprentices in the informal sector learn at the workplace in The Gambia, and on how such learning was facilitated. The rationale underlying the study was that if the pattern of learning at the workplace in the informal sector was clarified and, if the concept of apprenticeship, the conditions of learning and the learning process were identified, described and analysed, then it would be possible to plan relevant off-the-job training programmes for apprentices.

The analysis of the results in Chapters 4 and 5 have highlighted various aspects of the conditions of learning at the workplace in the informal sector in two trades. Table 10 below lists these aspects and indicates how much evidence there was of their presence at the sampled workplaces in the two trades.

The table below shows that in spite of gender differences and of differences in workshop practice between the two trades, there were similarities in the apprentices' approach to learning at the workplace, in the tradespersons' conceptualisation of the learning process, and in the tension about what the workplace is for: that is, whether it was for industrial production or for

learning about a trade. It was not possible to quantify precisely the evidence in the table because comprehensive data were not available given the limitations of the study. Also, the table gives only an overview of what was observed in the two trades; it does not show for each aspect of learning listed, the differences between workplaces within each trade.

There was little evidence in both case studies of the fundamental goals of education and training being aimed at, since both trades did not address fully the development of apprentices' theoretical knowledge and self confidence. In both case studies there was no evidence of a dialogue (either at the trade level or at the workplace level) about training and learning, between the informal sector community and any external agency (such as, Government, The Gambia Technical Training Institute, or The Gambia Chamber of Commerce). Furthermore, with respect to learning and teaching, both trades were uncritical of the assumptions that they made about the conditions of learning at the workplace and about their approaches to facilitating learning.

Table 10 : The summary data for various aspects of learning at the workplace in the two trades

The aspects of learning itemised below are derived from Chapters 4 and 5.

Key: ✓✓ = much evidence - = no evidence
 ✓ = little evidence * = not applicable

	<i>The aspects of learning at the workplace</i>	<i>How much evidence of these aspects of learning was there from:</i>	
		<i>The Motor Vehicle trade?</i>	<i>The Tie-Dye trade?</i>
1.	THE TENSION ABOUT WHAT THE WORKPLACE IS FOR: INDUSTRIAL PRODUCTION OR LEARNING ABOUT A TRADE.		
a.	The tradespersons did not demonstrate to the apprentices the procedures for the tasks that they were undertaking. (ref: Sections 4.6.1; 5.4.1).	✓✓	✓✓
b.	The apprentices were not allowed to practise on the tasks that the tradespersons were contracted to undertake (ref: Sections 4.6.1; 5.4.1).	✓✓	✓✓
c.	The tradespersons did not monitor the apprentices' progress with the set tasks (ref: Sections 4.7.3; 5.6.3).	✓	✓
d.	The apprentices were engaged in menial tasks (ref: Sections 4.6.1; 5.5).	✓	✓
2.	THE CONCEPTUALISAITON OF THE LEARNING PROCESS		
a.	The tradespersons did not direct the apprentices' attention to salient learning points during demonstrations (ref: Sections 4.6.1; 5.4.1; 5.5.1).	✓	✓✓
b.	The tradespersons did not explain to the apprentices the theories underpinning the procedures (ref: Sections 4.6.3; 5.5).	✓	✓✓
c.	The tradespersons executed hurriedly their tasks, thus making it difficult for the apprentices to follow the procedures and to pick up the salient learning points (ref: Sections 4.6.1; 5.6.1).	✓	✓
d.	The tradespersons did not arrange the tasks in a coherent way so as to make them meaningful for the apprentices (ref: Sections 4.6.1; 4.6.3; 5.4.1).	✓	✓
e.	The tradespersons checked on the apprentices' recall of facts and procedures (ref: Section 4.6.3).	✓	

3	THE APPRENTICES' APPROACH TO LEARNING		
a.	The apprentices picked up ideas and salient points about the procedures by quietly observing the tradespersons (ref: Sections 4.6.1; 4.6.3; 5.4.1).	✓✓	✓✓
b.	The apprentices drew on their previous knowledge and experience of the activities at the workplace to help them work on any new task (ref: Sections 4.7.1; 4.7.4; 5.4.1).	✓✓	✓
c.	For the apprentices the term “theory” referred to technical procedures and to functions of component parts rather than to scientific concepts and principles (ref: Sections 4.7; 4.7.2; 5.5).	✓	-
d.	The apprentices saw “theory” as techniques (ref: Sections 4.7.2; 5.5).	✓	✓
e.	For the apprentices the term “understanding” referred to seeing how component parts are interconnected (ref: Section 4.7.4).	✓	-
f.	The apprentices practise their skills in their leisure time privately either at the work place or at home (ref: Sections 5.4.1; 5.6.1).	*	✓✓
g.	Apprentices showed a keen interest in identifying and naming key technical terms to reassure clients about their competence (ref. Section 4.8).	✓	-
h.	The apprentices saw the meaning and use of technical terms as secrets of the trade (ref: Section 4.8).	✓	-
i.	The apprentices were motivated through participating in tasks that the tradespersons were contracted to undertake (ref: Sections 4.8; 5.7).	✓✓	✓✓
j.	The apprentices were more interested in acquiring practical skills than in learning “theory” (ref: 4.6.3; 4.7.2.1; 5.7).	✓✓	✓✓
k.	The apprentices were motivated by their expectations (of forthcoming tasks) (ref: Section 4.8.3).	✓	-

CHAPTER 6 DISCUSSION AND IMPLICATIONS

6.1 Discussion

The present section discusses a number of issues arising from the empirical data about learning at the workplace in the informal sector, and does so from three different perspectives :

- (a) the apprentices' perspective;
- (b) the tradespersons' perspective;
- (c) the perspective of the two selected trades.

6.1.1 Learning from the apprentices' perspective

For the apprentices in the tie-dye trade learning was largely a matter of trying to memorise the procedures for tie-dyeing through rote learning (a clear evidence of a “surface level approach” to learning). There was no evidence of a “deep level approach” to learning and indeed, given the limited theoretical content of the tasks in the tie-dye trade, the sheer memorising and reproduction of patterns which the tradeswomen had “demonstrated” were probably all that was important. Furthermore, from the researcher's experience, memorising is embedded in the cultural tradition of education in The Gambia. Thus, from an early age Gambian children learn to place considerable value on the ability to memorise information through rote learning. On the other hand, there were indications from the present study that, the motor vehicle apprentices set

out to use a “deep level approach” to learning. However, after trying to understand the complexities of the tasks in hand and making the necessary associative links with their previous knowledge and experiences (see sections 4.7.1 and 4.7.4), they still tried to learn the technical procedures by rote so that they could remember and reproduce, step by step, these procedures when doing jobs on their own. They saw the application of knowledge as the central feature of learning. Their frame of reference was one of practical situations. So, the approach to learning observed among the apprentices in the motor vehicle trade at the workplace in the informal sector, could not be adequately described solely in terms of the “deep level/surface level” dichotomy.

The present study has also shown that from the apprentices’ perspective there were four distinct meanings of the term “understanding”. Within the first meaning of the term, “understanding” was the recognition of the sequence of actions that was necessary to accomplish a given task; within the second meaning of the term “understanding” was the identification of component parts. Whilst within the third meaning “understanding” was the ability to provide an explanation for the way one tackled a task, within the fourth meaning of the term, “understanding” was the ability to recall the relevant facts and procedures. There was evidence of all four meanings of understanding among the apprentices in the motor vehicle trade. Thus,

they were concerned about the relationships between the functions of the component parts of motor vehicles and how these parts were assembled together and they wanted to know what the technical terms used meant (ref: section 4.8). On the other hand, for the apprentices in the tie-dye trade there was only evidence of the fourth meaning of “understanding”. For, as mentioned above, they were concerned with memorising facts and procedures, and wanted in the main only to know how to reproduce patterns. The point though is that, in general, if apprentices are to learn with understanding, such learning needs to be facilitated and there must be an appropriate learning environment; in particular, the environment must be one in which they can ask relevant questions in order to improve their comprehension of the tasks in hand and to investigate the underlying technological phenomena, as evidenced at the workplace in Britain (Dale and Bell, 1999). But the evidence in the tie-dye trade was that the operating environment was not conducive to learning for understanding. Moreover, each workplace in the tie-dye trade (and also in the motor vehicle trade) was a communication zone in which meanings and ways of referring to these meanings had been built up over time and had become part of the culture of the workplace which had developed from a history of the interactions between entrepreneurs, tradespersons and apprentices.

The observed active engagement of the apprentices in routine and non-routine problem-solving activities revealed another key aspect of the learning process, namely, the satisfaction that they experienced when they “made sense” of solutions to problems (that they encountered) and assimilated these solutions to their existing knowledge. Thus their learning was reinforced not only through the tradespersons’ external endorsement of their (the apprentices) actions, and the feedback that they provided, but also through the apprentices themselves finding their work gratifying; and in this way they became increasingly more effective in following procedures and in completing tasks to the standard required by the workplace cultures and practices of their particular trades.

The findings of the present study have also drawn attention to the need for a careful consideration of what exactly are the objectives of learning “theory” and practical skills at the workplace. Thus, whilst the conceptual framework drawn from the respective theories of cognitive development and mastery learning (see Chapter 2) have indicated the importance of integrating theory with practice at the workplace, such integration was questioned by the apprentices (and by the tradesmen too). The main reason was that from their perspective, “theory” is associated with “school learning” and is considered to be the preserve of the educated. The answer to the question of how relevant is “theory” to every day practice at the

workplace, was negative throughout the study (ref sections 4.7; 4.7.2), and casts some doubt about Elliott's (1991) notion of "practical wisdom" as the capacity to discern the right course of action through theory when confronted with complex problems. Instead, what was prevalent at the workplace (in the informal sector) was practice in following an orthodox set of rules that was acknowledged as a "code of practice". Indeed, the word "theory" was misinterpreted at the workplace and taken to be the set of techniques used in practice (see sections 4.7.2; 5.5).

Another point at issue is the very way in which the workplace culture shapes the conceptualisation of knowledge. For, within the culture of motor vehicle garages in the informal sector, knowledge means knowing how a component part of the motor vehicle works and knowing also its purpose and function (see section 4.7.4) and in the tie-dye trade knowing a tie-dye pattern means following the procedure for tie-dyeing the pattern; whereas, within the culture of the professional associations of technologists, knowledge means knowing workshop technology, and knowing about the scientific and technological principles underlying how the component parts of a machine work. Such knowledge can only be acquired through learning "theory" because the increasing complexity of many tasks is requiring a rich conceptual base to be effective in undertaking them (Usher and Bryant, 1989). Consequently, a finding of

considerable interest in the present study was that, although the workplace in the informal sector favoured procedural knowledge over propositional knowledge, the latter was being developed (albeit indirectly and only to a limited extent) through the tradespersons' explanations at the workplace. Such explanations cannot, however, replace the formal learning of the principles and concepts underlying procedures, as such learning is required to develop an understanding of the reasons for following certain procedures (such as those for repairing a car carburettor or those for preparing a dye-bath solution). Without such learning the conceptual knowledge required for understanding remains opaque.

The extent to which apprentices learned through making judgements about how to solve problems (when accomplishing specific job tasks at the workplace) depended, amongst other things, on the way that the job tasks were structured. Thus, in the tie-dye trade, job tasks were organised in such a way that the tradeswomen did all the job themselves, while the apprentices exercised minimal judgement, thereby reducing the amount of learning that could take place. On the other hand, given that fault finding was a common occurrence at the workplace in the motor vehicle trade, there were opportunities for the apprentices to make judgements as to how to diagnose and solve problems, drawing on their previous knowledge and experience.

However, in both trades, when the apprentices realised that they needed help to solve specific problems, they implemented various strategies for obtaining help from the tradespersons. For example, the tie-dye apprentices would provoke the attention and comments of the tradeswomen on their finished practice work by showing the work to them. An interesting finding was that the apprentices in the tie-dye trade tended to seek help from the tradeswomen only when they were practising their skills in private (see section 5.4.1). On the other hand, the apprentices in the motor vehicle trade tended to seek help when they encountered problems during their official working time (since they did not practise their skills privately). Whether this finding points to a gender difference is impossible to say on the evidence of the present study. But what can be said from the researcher's experience of the motor vehicle trade is that, in general, although the preference of the motor vehicle apprentices is to solve the technical problems that they encounter by trial and error rather than by seeking help, they are very good at relating to their tradesmen and to their peers, and, consequently, seeking help from others at the workplace is not construed as evidence of a lack of ability. What can also be said is that there was evidence in both trades that as the apprentices' knowledge and understanding of their respective trades grew, they were better able to monitor and reflect on their performance and determine their need for help.

As Chapter 2 shows, a spectrum of theories about the learning process in the formal sector has been identified and much of the related research has relied on the social model of learning (Billett *et al*, 1993), the reasoning being that the particular context of the workplace, with its particular kind of human interactions, its wide range of tasks and its limited resources, structures the learning process. However, this approach leaves out the issue of how apprentices mentally process their learning, and hence, how they actually acquire knowledge at the workplace. Yet, presumably without describing and analysing this mental process at the workplace, it is impossible to understand the whole process of learning in that context. Consequently, one aspect of the learning process which emerged from the probing interviews in the present study was of particular interest. For the study has shown that although apprentices often sat apparently passively, observing the tradespersons at work, and listening to their explanations, yet they were mentally active as they made associative links with their previous knowledge and experience and rehearsed in their minds the procedures that the tradespersons had used (see sections 4.6.1; 5.4.1). Thus, what can be concluded is that although the mental processes involved in such learning could not be investigated, an important finding was that learning took place through a process which was both culturally and

technically trade-specific, and which was characterised by outwardly passive participation in the on-going, technical activities at the workplace.

6.1.2 Learning from the tradespersons' perspective

Although the workplace had the potential for rich learning outcomes, there were built-in barriers to realising that potential. Underpinning these barriers and the consequent limitations to learning at the workplace was the fact that the workplace, like any other setting, is inherently value-laden, and that its values are inextricably associated with its goals and with the goals of those working there. Furthermore, the workplace is a social system in which the entrepreneur, as well as the tradespersons and the apprentices working there, are all significant actors; and the present study shows that from the point of view of the workplace as a learning milieu, each actor perceived his/her respective role quite differently. Thus, the apprentices were fully aware of their role as learners; the tradespersons saw themselves as employees and not as trainers, whilst the entrepreneurs saw their role as one of running the enterprise through meeting the technical requirements of the clients.

The social system was further complicated by the fact that in this network of roles the actors had expectations of each other, given their respective positions. As a consequence, there was tension in the system.

For example, the tradespersons found themselves to be the focal point of the entrepreneurs' expectation that they (the tradespersons) should concentrate on their jobs, and this expectation in turn differed from what the apprentices expected of the tradespersons, which was that the tradespersons should concentrate on skills training. The crux of the matter was that the notion of the workplace as a learning environment was strongly contested by the tradespersons, who pointed out that learning was only a by-product of production and that at the workplace the learning process was thus overshadowed by the production process; in other words, the workplace was about "production not learning". Indeed, the tradespersons' descriptions of the apprentices' activities at the workplace did not reflect much of a concern (on their part) with the apprentices' learning the skills of their trades; and the apprentices themselves claimed that the initiative to learn was entirely theirs. Understandably, the tradespersons felt that necessarily they had to concentrate on the jobs in hand and claimed that they did not have the time to explain detailed operational procedures to the apprentices while they (tradespersons) were working on their jobs; and they (the tradespersons) argued further that, in any case, apprentices learned by "watching" and sometimes by "questioning".

Yet, a balance has to be struck between production and learning with regard to the relative amount of time allocated to the tradespersons for each of these activities if the apprentices are to progress in their skills development. This balance is specially important as work in the technological context continues to become more complex under the impact of new technologies and of quality requirements for goods and services. Furthermore, on completion of their apprenticeships, the apprentices become in turn tradespersons who are expected to continue to learn (and deliver quality products) and is consistent with the notion of life-long learning (Dewey, 1959; Bennett, 1999). But if the imbalance in favour of production continues, then the tradespersons will go on believing that learning is very much a secondary consideration in relation to production output; and indeed throughout the present study the researcher was confronted with the prevailing “production imperative” which underpinned all activities at the workplace. Yet, this imperative was very much at odds with that of “cognitive apprenticeship” (Brown *et al*, 1989) which posits that learners must be engaged in authentic activities at the workplace in order to enhance their skills development.

Admittedly, such tension between production and learning is also potentially present at the workplace for full-time students in educational institutions who are on placements in industry/commerce/the public services. However, for this category of learners, the tension can be considerably reduced by deliberate educational strategies such as, the regular visits of tutors, the close monitoring of activities at the workplace through the use of log-books (Cole *et al*, 1992), and, crucially, the continuous dialogue between the tradespersons and the tutors about the objectives of the work experience, the progress of the students and the production aim of the enterprise; for learning at the workplace within the context of students' placements is configured by formal training programmes with pre-determined learning outcomes, rather than by production needs. However, arguably, given certain conditions (such as an appropriate allocation of time to tradespersons to facilitate learning), learning at the workplace in the informal sector could be configured by learning experiences that are authentic (in the sense that they involve the apprentices in activities that relate to production) meaningful to the apprentices (because they generate operational procedures that they can apply) and educational (because the experiences relate practice to "theory").

There was another point to consider. For, a consequence of the “production imperative” was that the tradespersons saw the apprentices as a form of cheap labour, and this perspective is in sharp contrast to the perspective of those economists (like Steedman and Green, 1996) who see apprenticeship as a form of investment in human resource development. However, the concept of human resource development at the workplace in the informal sector is problematic for it rather assumes that the tradespersons can undertake such development. Yet, with little to no schooling of their own and having themselves learned the trade from tradespersons who had no schooling either (and yet served as their models of good tradesmanship), the tradespersons in the present study could hardly be expected to facilitate learning differently from the way that they themselves acquired their knowledge and skills (during their periods of apprenticeship). Moreover, such knowledge was characterised by a lack of emphasis on learning the basic scientific theories and technological principles relevant to their respective trades. It should not be surprising then that, given the tradespersons’ own educational background and experience, they paid little attention to the vital learning needs of the apprentices as serious learners who aim to become qualified artisans (such as the need for the apprentices to participate actively in jobs that the tradespersons were contracted to carry out). Nor should it be surprising that the tradespersons did not find it inappropriate that apprentices should be “sitting by Nellie”, performing

continually menial tasks at work (like passing spanners to tradesmen or fetching water for the tradeswomen) (see sections 4.6.1; 5.5), and remaining relatively powerless to advance their learning about their trades. Arguably, menial tasks may be regarded as an essential part of learning basic lessons about the workplace, such as learning the importance of cleaning up after completing a job; however, the continuous use of apprentices to carry out such menial tasks, takes up the time which could be spent on learning more about the trade, through more opportunities to observe the tradespersons at work, to understand their explanations, to acquire the more complex skills evident in the tradespersons' work, and to practise these skills. Seemingly, there has been an assumption in the informal sector that although apprentices are engaged in menial tasks, they still have ample opportunities to observe other aspects of the work environment, and thus profit from such opportunities. However, from the researcher's experience, apprentices are very much rule bound and focus only on the salient aspects of the tasks which the tradespersons undertake at any one time. Consequently, without the apprentices immersing themselves into such tasks, and listening attentively to the tradespersons' careful explanations of the operational procedures, and without the tradespersons structuring adequately the learning environment and the learning experiences, the apprentices are unlikely to make rapid progress in learning.

Another consideration is that, from the researcher's experience, the tradespersons in the informal sector believed that, at least initially, it was right and proper that apprentices should be given what is known colloquially as "a hard time" since they themselves were treated this way when they were apprentices. This socio-cultural practice at the workplace was well rooted in the tradesperson's belief system; and unfortunately, such a belief does not appear to be conducive to creating the right organisational climate for effective skills learning. Instead, fear and anxiety ensue and can, seemingly, over ride the apprentices' wish and courage to question the tradespersons about operational procedures and functions (in order to enhance their understanding). It is difficult to see how the apprentices' motivation for learning and for self-improvement can be maintained in the face of such a belief.

From the tradespersons' perspective there was the concern too that since apprentices were likely to make mistakes, they could not be trusted to practise on jobs that they (the tradespersons) were contracted to do (see sections 4.6.1; 5.4.1). The cost (financial) of mistakes in both the motor vehicle trade and the tie-dye trade could at times be substantial and it is understandable that the informal sector tradespersons could not risk mistakes being made by the apprentices. Yet, a vital component in the

mastery of a skill is continuous, deliberate practice, facilitated by a skilled tradesperson. Indeed, the enthusiasm for work-based learning in education and training is predicated on the notion that competency will be gained through the practice, on-the-job, of the relevant skills (Lave and Wenger, 1991).

Another concern from the tradespersons' perspective, was the very tight time schedules for most of their jobs and the obligation that they had to complete their jobs on time. The relevance of this point was that given the slow rate at which apprentices perform their tasks, the tradespersons reasoned that they could not afford to give too many opportunities to the apprentices to practise. However, this reasoning too was not conducive to effective learning and ran counter to the finding of Cornford and Athanasou (1995) that practice needs to be slow and accurate to permit apprentices to develop into skilled tradespersons who can work on their own after completing their apprenticeships.

6.1.3 Learning from the perspective of the selected trades

From the perspective of the selected trades, an objective of the apprenticeship system (in the informal sector) was to produce the appropriately qualified manpower needed for various trades in sufficient numbers. As indicated in Chapter 4, there was indeed a code of practice for the motor vehicle trade which applied to all the newly qualified tradespersons; the code was a guarantee of high standards of achievement and of each newly qualified tradesperson being “one of us”. But what were the criteria for qualifying in the absence of any Certification and indeed of any formal assessment of competence? The present study has shown that the tradespersons failed to define and assess formally competent performance at the workplace : there was no end-of-apprenticeship assessment for the apprentices in the tie-dye trade, and in the motor vehicle trade, the assessment was *ad hoc*. Yet, a formal, mandatory system of assessment could signal the intention to raise the standard of the apprenticeship programmes and could at the same time enhance the motivation of the apprentices to learn and progress careerwise. Such a mandatory system of assessment could be linked to the proposed re-introduction of the Trade Testing system in The Gambia and could lead to a qualification (at a specified level) within the vocational qualifications framework in the country. The point here is that a Trade Committee was set up for each trade by the Directorate of Technical Education and

Vocational Training (DTEVT, 1989), in The Gambia, with the sole aim of establishing standards of achievement at the workplace. However, one difficult hurdle still faced by these Trade Committees is how to make arrangements for assessing apprentices at the workplace (especially in the informal sector). Yet, as Fletcher (1991) has argued, the assessment of competence guarantees that a person can perform in a real working situation to the standards required by the specific occupational sector in which he/she works, provided, one might add, that such competence-based assessments are criterion-referenced (FEU, 1984) and are both valid and reliable (Benett, 1999). A one-off demonstration of skilful performance in a particular activity (BTEC, 1986) is not sufficient for making a judgement about competent performance and employers need people who can perform in their work role to a consistently and hence, reliably, high standard.

There is another issue too. It is generally acknowledged that the people best qualified to assess the competence of apprentices at the workplace are the tradespersons, as these are the people who have first hand and regular contact with the apprentices at the workplace (FEU, 1986). Yet, in the informal sector, most of them are illiterate. A vexing question is therefore how to resolve this particular problem. One way could be to appoint both internal and external “verifiers” (NCVQ, 1988). The “internal verifier’s” role would be to oversee the tradesperson’s supervision of apprentices at

the workplace and to liaise with the Department of Trade, Industry and Employment, the body which awards the Trade Test Certificate in The Gambia. These “internal verifiers” would be appointed from amongst people who work in the same organisations as the apprentices. In effect, they would guarantee that the evidence collected about the apprentices’ performance at work when judged against the set standards, is of sufficient quantity and quality to infer competence, as Dale and Bell (1999) have observed in the workplace in Britain. The “external verifiers” would be appointed by the Department of Trade, Industry and Employment from people outside the enterprises that employ the apprentices. The role of the externals would be to ensure the comparability of standards nationwide and to encourage the “internal verifiers” to maintain and indeed improve standards within the national system for the accreditation of competence at the workplace.

6.2 The key emerging concepts

What has emerged from this limited study is that, for apprentices in the informal sector, learning at the workplace may be conceptualized as a multi-dimensional process, largely self-motivated and conditioned by the trade culture and by the rigid hierarchical structure of the workplace; and hence, learning is:

- (a) Outwardly passive
- (b) Productivity-driven
- (c) Atheoretical
- (d) Unplanned
- (e) Unstructured
- (f) Facilitated through role modelling (of academically unqualified tradespersons)
- (g) Sustained by self-motivation

The above concepts were derived by grouping together similar data from both trades.

Table 11 below shows the diagrammatic representation of the inter relationship underlying the conceptualisation of learning in the informal sector, as derived from the interview and observational data.

**Table 11: Diagrammatic representation of the inter-relationships
Underlying the conceptualization of learning in the informal sector.**

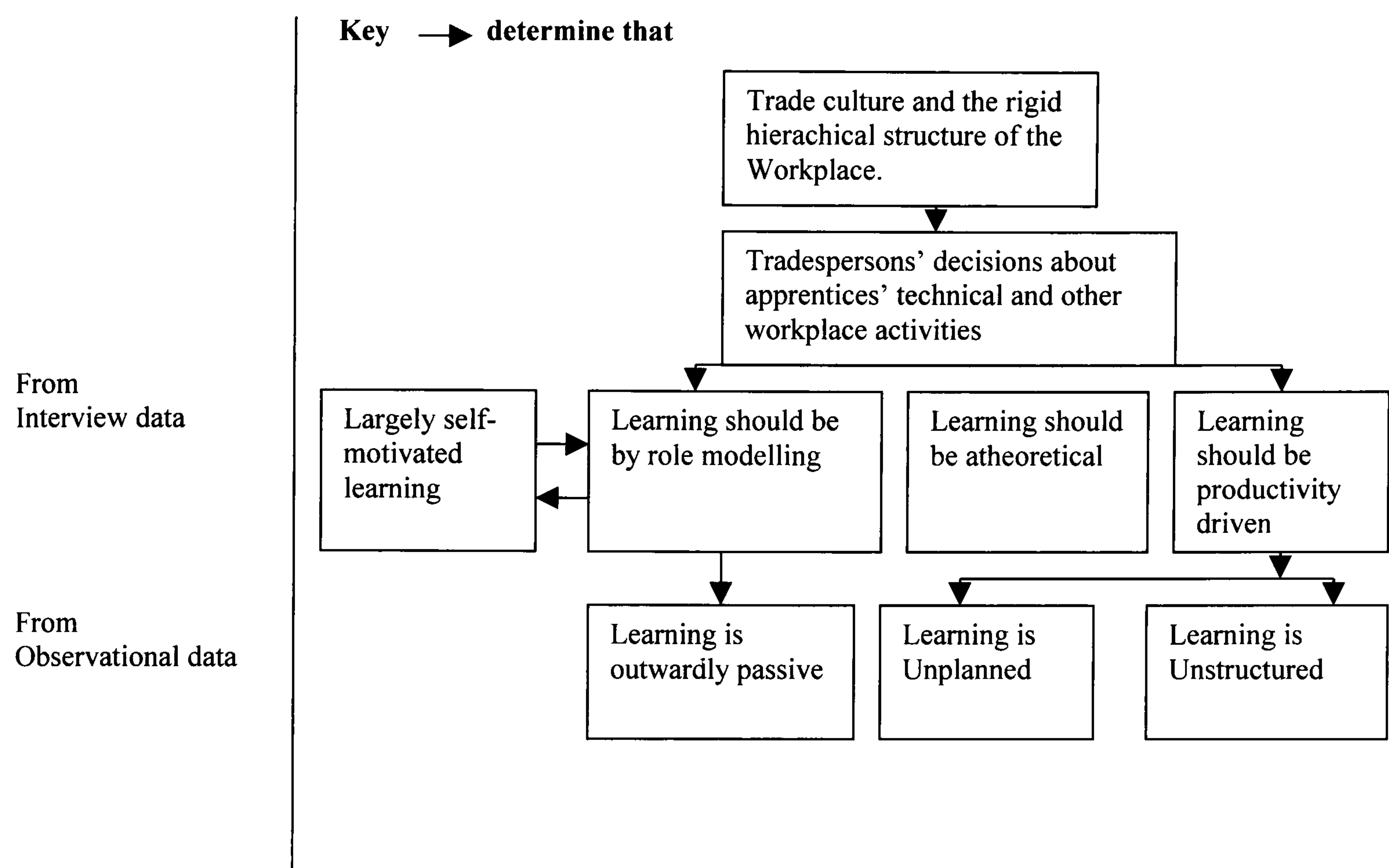


Table 12 below compares the above conceptualisation of learning in the informal section with that which underpins learning and teaching in formal Vocational Training institutions in The Gambia. Importantly, the table shows that the conceptualisation of learning in the informal sector is quite distinct from that which traditionally has been accepted as constituting the basis for teaching in formal technical institutions.

In view of the fore-going, it may be concluded that the emerging concepts, taken together provide, albeit provisionally, a basis on which to build a theory of learning in the informal sector. However, since it is not known whether these concepts are applicable to the other trades in the informal sector in The Gambia, it is not yet possible to derive a theory of learning in the informal sector.

Table 12: Comparison of the concepts of learning which emerged from the study with the traditional concepts of learning and teaching in Training institutions.

The emerging concepts about learning in the informal sector	The traditional concepts about learning in Vocational Training institutions
<i>Learning is:</i>	<i>Learning is:</i>
(a) Outwardly passive	Rooted in active interactions with instructors
(b) Productivity-driven	Qualifications-driven
(c) Atheoretical	Based on an appropriate balance of theory and practice
(d) Unplanned	Planned
(e) Unstructured	Structured
(f) Conditioned by the trades persons' <i>ad hoc</i> decisions about job tasks (given the hierarchical structure and the organizational climate of the workplace)	Conditioned by the governance of the training institutions, the qualifications' requirements and the management of programmes.
(g) Facilitated through the role modelling of academically unqualified tradespersons.	Facilitated through the formal instructions of academically qualified instructors.
(h) Sustained largely by self-motivation alone	Sustained by self-motivation coupled with formal, continuous, motivational, feedback from instructors.

6.3 Implications

A number of implications flow from the above discussion. To mention three, they are:

(a) For Government Policy

The Government of The Gambia should legislate for the training of apprentices in the informal sector of the economy; for example, a government Training Agency should be established (under the aegis of the National Council for Technical Educational and Vocational Training) to formulate appropriate policies and policy strategies. One such policy strategy could be that The Directorate of Technical Education and Vocational Training (DTEVT) in collaboration with the Department of Trade, Industry and Employment would re-introduce Trade tests for all apprentices at the end of their apprenticeships; and arrange for the appointment and training of internal and external verifiers for the assessment of apprentices at the workplace (for Trade Testing purposes).

(b) For the education of Vocational Trainers

Another policy strategy could be that The Gambia Technical Training Institute, in collaboration with the DTEVT, would organize training courses in management (for entrepreneurs) and in supervision (for tradespersons).

(c) For the training of adults in the Informal Sector

A National Co-operative Union (for entrepreneurs in the informal sector) should be established; it could, amongst other things, subsidise a range of economically customized training programmes, focused on identified learning and training needs of the informal sector.

(d) For future research

The Educational Research Network of West and Central Africa (the Gambia Chapter) could use the present study as a spring-board to initiate a nationwide study of learning at the workplace in a wider range of trades, in the informal sector in The Gambia. The study could look at the informal sector in both the urban and the rural areas and could cover the seven administrative areas.

The study could cover the following occupational families and trades in The Gambia:

(a) Technology (the trades associated with Engineering, Construction and Refrigeration).

(b) Tourism (the trades associated with tourism such as Bars, Open-air Restaurants and Tailoring).

(c) Retail and Distribution (the trades associated with market and street retailing).

(d) Transport (trades associated with the transport of workers and of heavy goods).

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`Appendix 1 : Interview Schedule for Motor Vehicle Entrepreneurs

After the observation of the entrepreneur at work with the apprentices, the entrepreneur was taken to a private site in the garage where he was interviewed by the researcher.

1. **Can I ask you, how old are you?**
2. **Did you go to school?**
Probe:
 - If yes, at what class did you finish your education?
3. **What is your Nationality?**
Probe:
 - If a Gambian, what part of the country are you from?
4. **Where did you do your training?**
5. **How many years since the business was established?**
6. **Can I ask you, how do you see your role in respect to the apprentices in the garage, since you are responsible for helping these apprentices to acquire the necessary skills and competence in the trade?**
7. **I observed you working with the apprentice on, can you tell me, was the apprentice able to recall the specific facts and procedures?**
Probe:
 - Did you check to find out whether the apprentice could recall and remember the procedures?
8. **Did you explain tot he apprentice the procedure to dismantle and reassemble the**
Probe:
 - Did you actually explain the key steps to the apprentice?*Probe:*
 - Did you stress to the apprentice the crucial points or component parts the apprentice should remember when reassembling the
9. **Can we now look at how you perceived the apprentice's understanding of how the component parts work?**
Probe:
 - Did you make sure that the apprentice understood the procedure?
 - Did you explain the procedure to him in a way to enhance the apprentice's understanding?
10. **Now tell me, if the apprentice was to exercise an option between listening to your explanation and observing you demonstrate a procedure, which one do you think the apprentice would opt for?**
Probe:
 - Can I ask you the reason for your answer?

11. **Can we now look at the apprentice's attitude to work.**

What part of the work interests the apprentice the most?

Probe:

- Can you explain the reason for your answer?
- How does the apprentice interest helped his learning?
- Does the right attitude at work make the apprentice learn quicker and easier?

12. **Do you give any incentive to motivate the apprentice learning at the workplace?**

Do you give feedback to the apprentice to help him check on his progress?

Probe:

- Did the feedback help his learning.
- When do you usually give the apprentice the feedback
 - i) during the progress of the job
 - ii) after the completion of the job?

13. **Can I ask you, what do you understand by the term "theory"?**

Probe:

- How do you see the relevance of theory at the workplace?
- Do you always think about theory when you are working?
- Do you use your knowledge of theory to solve problems at the workplace?

14. **Can we now turn our attention to practice at the workplace.**

Do you actually demonstrate a procedure to the apprentice during a task?

Probe:

- If not, how do you expect the apprentice to learn the task?

15. **Did the apprentice have enough practice time at the workplace?**

If not, what was responsible for the limited practice?

Prompt:

- Don't you think that it is because the vehicles that come to the workshops were 'live vehicles' and you would not risk the apprentices working on them.

16. **When you show an apprentice a particular skill, do you show him the whole skill at once or part of the skill at a time?**

Probe:

- Which method do you think will help the apprentice the most – whole or part method?
- In your opinion when does the apprentice learning the most, when you show them the whole skill at once or part of the skill at a time?

Appendix 2 : Interview Schedule For The Motor Vehicle Apprentices

After the observation the apprentice was taken to a private area in the garage, where the researcher interviewed the apprentice about the way he went about his learning during the task.

1. **Can I ask you, how old are you?**
2. **Did you go to school?**
Probe:
 - If yes, at what class did you complete your education?
3. **What is your nationality?**
Probe:
 - If a Gambian, what part of the country are you from?
4. **Number of years of apprenticeship?**
5. **Can I ask you, were you able to recall the procedure used by the tradesman to diagnose the fault?**
Probe:
 - Were you able to remember the steps involved?
6. **Now, tell me, did the tradesman check to find out whether you could recall and remember the procedure.**
Probe:
 - If the Boss did not check you what method did you use to recall the procedure?
7. **Can I ask you, when you were working with the tradesman on the job, did the tradesman explain to you the procedures for dismantling?**
Probe:
 - Did the Boss actually explain to you the key facts; such as ?
 - Can you remember how to dismantle them?
 - Did the Boss stress to you the crucial or important points or component parts you should remember when you are assembling the ?
Probe:
 - On technical points, such as: How to set so and so: How do you know so and so is correct; and How to adjust so and so?
8. **Now, can we look at another issue, that is understanding – can you tell me, do you understand the functions and principles underlying the working of the ?**
Probe:
 - Did the tradesman explain to you how the works?
 - Do you understand how the works?

9. **Can I ask you, what do you mean when you say I understood what the tradesman was doing?**
Probe:
 - Do you mean to say that since you could identify the parts so you understood how the parts work?
 - How do you know that you understood what the tradesman was explaining?
10. **Now tell me, if you have to exercise an option between listening to the tradesman's explanation and observing the tradesman perform a demonstration, which one would you opt for?**
Probe:
 - Can I ask you the reason for your answer?
11. **Can we now move to your attitude, that is your general "feeling" at work.**
Can we begin by looking at, what part of the work interests you the most?
Probe:
 - Can you explain why?
 - How does your interest help your learning?
12. **Now tell me about your attitude at the workplace, what part does attitude play in your learning?**
Probe:
 - Does the right attitude make you learn quicker and easier?
13. **Did you receive any incentive, such as reinforcement or reward to motivate you as you learn at the workplace?**
Probe:
 - What type of incentive did you receive?
 - What type of incentive or motivation did you expect?
14. **I observed that you were very keen on identifying and naming the key technical term. Can I ask you why were you so keen?**
Probe:
 - Did the tradesman always explain the key terms to you?
15. **Did you receive any feedback from the tradesman, that is, did the Boss tell you how your learning was progressing?**
Probe:
 - Did the feedback you received from the Boss help you with your learning?
 - Were the feedback given to you during the progress of the job or at the end of the job?
 - At what time would you prefer a feedback?
 - i) During the progress of a job?
 - ii) At the end of a job?
16. **Can I ask you, what do you understand by the term "theory"?**
Probe:
 - How do you see the relevance of theory learning at the workplace?

- When you are working do you always think about theory?
17. **Tell me, what do you think, when the Boss was solving the Problem, did the Boss apply theory to solve the problem?**
Probe:
- Don't you think that his knowledge of how the component parts work helped him to solve the problem?
18. **Do you think about theory, that is, how component parts work, when you are faced with a problem?**
19. **Can we turn our attention to the actual practice at the workplace.**
20. **Did the tradesman actually demonstrate to you the procedure to repair ?**
Probe:
- If not, what were you expecting from the demonstration?
 - Are you disappointed that the tradesman did not demonstrate as such? That is showing you the step-by-step procedure of how to fix the ?
21. **Now tell me, do you have enough practice time in the garage. This is, do you have time to practice the skills you learn at the workplace?**
Probe:
- If No, what do you think was responsible for the limited practice time at the workplace?
- Prompt:**
- Don't you think that it is because most of the vehicles that came into the garages were 'in-service' vehicles and the Boss would not risk you working on them.
22. **Can I ask you, did the explanations and demonstrations by the Boss teach you anything. What I meant was do you learn anything from the explanations and demonstrations from the Boss?**
23. **When the tradesman was showing you a skill, did he show you the whole skill at once or part of the skill at a time?**
Probe:
- Which one do you think will help your learning – whole or part method?
- When do you learn the most, when the Boss showed you the whole skill at once or part of the skill at a time?

Appendix 3 – Interview Schedule for Tie-Dye Entrepreneurs

After the observation the tradeswoman was taken to a private site in the workplace where she was interviewed by the researcher.

1. **Can I ask you your age – How old are you?**
2. **Did you go to school?**
Probe:
 - If yes, at what class did you stop/finish your education?
3. **Nationality?**
Probe:
 - If a Gambian, what part of the country are you from?
4. **Where did you do your apprenticeship training?**
5. **How many years since the business was established?**
6. **Can I ask you, how do you see your role in respect to the apprentice since you are responsible for helping the apprentices to acquire the necessary skills and competence in the trade?**
7. **I observed you working with the apprentice tying a pattern, tell me, was the apprentice able to recall the procedures in tying the pattern?**
Probe:
 - Did you check to find out whether the apprentice could remember and recall the procedure?
 - Did you actually explain the key steps to the apprentice?
8. **Did you stress to the apprentice the crucial points she should remember when tying the pattern?**
9. **Can we now look at how you perceived the apprentice's understanding of how to tie a pattern?**
Probe:
 - Did you explain the procedure to the apprentice in a way to enhance the apprentice's understanding?
 - Did you make sure that the apprentice understood the procedure?
10. **Now tell me, if the apprentice was to exercise an option between listening to your explanations and observing you demonstrate a procedure, which one do you think the apprentice would opt for?**
Probe:
 - Can I ask you the reason for your answer?
11. **Can we now look at the apprentice attitude to work. What part of the work interests the apprentice the most?**
Probe:
 - Can you explain the reason for your answer?

12. **How does the apprentice interest helped his learning?**
Does the right attitude to work make the apprentice learn quicker and easier?
13. Do you give any incentive to motivate the apprentice learning at the workplace?
14. **Do you give feedback to the apprentice to help her check on her progress?**
Probe:
- Did the feedback help her learning?
 - When do you usually give the apprentice the feedback
 - i) During the progress of the job?
 - ii) After the completion of the job?
15. **Can I ask you, what do you understanding by the term “theory”?**
Probe:
- How do you see the relevance of theory at the workplace?
 - Do you always think about theory when you are working?
 - Do you use your knowledge of theory to solve problems at the workplace?
16. **Can we now turn our attention to practice at the workplace. Do you usually demonstrate a procedure to the apprentices during a task?**
Probe:
- If not, how do you show the apprentice how to do the task?
17. **Did the apprentice have enough practice time at the workplace?**
Probe:
- If not, what was responsible for the limited practice time at the workplace?
18. **When you show an apprentice a particular skill, do you show her the whole skills at once or part of the skill at a time?**
Probe:
- Which method do you think will help the apprentice the most – whole or part method?
19. **In your opinion when does the apprentices learn the most, when you show them the whole skill at once or part of the skill at a time?**

Appendix 4 : Interview Schedule for Tie-Dye Apprentices

After observing the apprentice at work, the apprentice was taken to a quiet area in the workplace and interviewed.

4. **Can I ask you your age – How old are you?**
4. **Did you go to school?**
Probe:
 - If yes, at what class did you stop or finish your education?
4. **Nationality?**
Probe:
 - If a Gambian, what part of the country are you from?
4. **Number of months of apprenticeship?**
5. **Can I ask you, were you able to recall the procedure followed by the tradeswoman in tying the pattern?**
Probe:
 - Were you able to remember the steps involved?
6. **Did the tradeswoman check to find out whether you could recall and remember the steps involved in the procedure?**
Probe:
 - If the tradeswoman did not check your recall of the procedure, what method did you use to recall the procedure?
7. **When you were working with the tradeswoman on the job, did the tradeswoman explain to you the procedures for tying the pattern?**
Probe:
 - Did the tradeswoman actually explain to you the key facts?
 - Can you remember the key facts?
 - Did the tradeswoman stress to you the crucial points you should remember and recall in tying a pattern?
8. **Now can we look at another issue, that is understanding.**
Can you tell me, do you understand the procedures underpinning the tying of a pattern?
Probe:
 - Do you understand the explanation of the tradeswoman in tying the pattern?
9. **What do you mean when you say you understood what the tradeswoman was doing?**
Probe:
 - How do you know that you understood what the tradeswomen was explaining?
10. **Now tell me, if you have to exercise an option between listening to the tradeswomen's explanation and observing the tradeswoman perform a demonstration, which one would you opt for?**

Probe:

- Can I ask you the reason for your answer?

11. Can we now move to your attitude about learning at the workplace. That is your general feeling at work.

12. Can we begin by looking at what part of the work interests you the most?

Probe:

- Can you explain why?
- How does your interest help your learning?

13. What part does attitude play in your learning?

Probe:

- Does the right attitude make you learn quicker and easier?

14. Did you receive any incentive, such as reinforcement or reward to motivate you as you learn at the workplace?

Probe:

- What type of incentive did you receive?
- What type of incentive or motivation did you expect?

15. I observed that you were very keen on identifying and naming the different patterns. Can I ask you why you were so keen?

16. Did the tradeswoman always explain the names of the patterns to you?

17. Did you receive any feedback from the tradeswoman, that is, did the tradeswoman tell you how your learning was progressing?

Probe:

- Did the feedback you receive from the tradeswoman help you with your learning?
- Was the feedback given to you during the progress of the job or at the end of the job?
- At what time would you prefer a feedback?
 - i) during the progress of a job
 - ii) at the end of a job

18. Can I ask you, what do you understand by the term “theory”?

Probe:

- How do you see the relevance of theory learning at the workplace?
- Do you think about theory when you are working?

19. Can we now turn our attention to actual practice at the workplace.

Did the tradeswoman actually demonstrate to you the procedure in tying a pattern or mixing a dye-bath?

Probe:

- If not, what were you expecting from a demonstration?
- Are you disappointed that the tradeswoman did not demonstrate to you the procedures, that is, showing you the step-by-step procedure in tying a pattern or mixing a dye-bath?

20. Tell me, do you have enough practice time at the workplace, that is, do you have time to practice the skills you learn at the workplace?

Probe:

- If no, what do you think was responsible for the limited practice time at the workplace?

21. Can I ask you, did the explanations and demonstrations by the tradeswoman help your learning? What I mean was do you learn anything from the explanations and demonstrations?

22. When the tradeswoman was showing you a skill, did she show you the whole skill at once or part of the skill at a time?

Probe:

- Which method do you think will help your learning – whole or part method?
- When do you learn the most, when the tradeswoman showed you the whole skill at once or part of the skill at a time?

Appendix 5 : Observation Schedule

The researcher having identified his target, positioned himself in a prominent place in the work place and observed the activities taking place between the tradespersons and the apprentices while asking himself the following questions:

1. What is the tradesperson doing?
2. What is the tradesperson saying to the apprentice?
3. Was the tradesperson telling the apprentice or explaining to the apprentice?
4. How is the apprentices reacting to the tradesperson in relation to the task?
5. Is the apprentice eager/keen/curious/interested?
6. What were the verbal and non-verbal gestures employed by the apprentice?
7. Did the tradesperson meaningfully engage the apprentice in the task?
8. While working was the tradesperson actually demonstrating or showing the apprentice the steps involved in the procedures?
9. While the tradesperson was working what was the apprentice doing – standing and observing or sitting and observing?
10. Did the tradesperson check whether the apprentice could recall the procedures?
11. Did the apprentice ask the tradesperson any questions?
12. Did the tradesperson ask the apprentice any questions to check whether he/she was learning?
13. Did the tradesperson check whether the apprentice understood the procedure?
14. While working was the tradesperson telling or explaining the theory underpinning the particular task?
15. Was the apprentice interested in theory?
16. Was the tradesperson showing any sign of applying theory to solve the problems at the workplace?
17. Was the tradesperson giving the apprentice any feedback at all?
18. At what point during the task did the tradesperson give the apprentice the feedback (if at all).
19. Was the apprentice given practice opportunity at the workplace.

Appendix 6 : Tie-Dye Crash Course Notes

Tie-Dye Trade

(a) Fabric

- Natural Fabrics absorb dye better, such as, cotton, wool, silk and linen the most common used one is cotton.
- Synthetic Materials are poor for tie-dyeing.

(b) Preparation of Material

1. **Wash Materials - to get rid of grease and factory dressing such as starch, to help with the penetration of the dye.**
2. Iron Material
3. Mark out the pattern using one of the following techniques:
 - (i) Folding
 - (ii) Binding
 - (iii) Marbling
 - (iv) Sewing
 - (v) Knotting
 - (vi) Twisting
4. Wet cloth/material before dyeing (wet fabric absorbs dye more evenly).

(c) Preparation of Dye Solution

1. Warm water to body temperature.
2. Pour warm water in container.
3. Apply caustic soda and hydro-sulphite in warm water.
(To help fix the dye to the material, stir well to get the solution freed from lumps, and to ensure that the mixture is completely dissolved).

NOTE: Quantity of dye bath will depend on quantity of material.

(d) Dyeing Process

- (i) Dip material in dye solution and leave for 5 minutes in dye-solution for the fabric to absorb the dye.
- (ii) Take material out of the dye bath and squeeze out surplus dye.
- (iii) Hang or spread material to allow it to oxide – till almost dry.
- (iv) Rinse the material until water is clear.
- (v) Break binding cords.
- (vi) Wash material in soap water.
- (vii) Iron material.

(e) Colours

- (i) Primary colours:
Blue, Red, Yellow
- (ii) Secondary Colours:

50:50	Yellow + Blue	= Green
Mixture	Red + Yellow	= Orange
	Blue + Red	= Purple

Secondary colours would depend on the percentage of one primary colour against the other:-

Example, for greenish yellow the percentage of yellow must be greater than the blue; and vice versa for greenish blue.

Appendix 7 – Record of an observation of an apprentice at work

A client reported to the tradesman that his car, a Toyota ran smoothly at speeds between 30-60 Km/Hr, but began to misfire at any speed above 60 Km/hr. The tradesman took the car on a test drive and confirmed the problem identified by the client. The tradesman called the apprentice and asked him to fetch the tool box. The latter asked the tradesman what the fault was; the tradesman replied that he believed that the distributor was faulty, but that they would have to check.

The tradesman then asked the apprentice to check the tappets clearance for any loose adjusting nuts. The apprentice checked and said that all the tappets were tight and that the clearance for each tappet was within the permissible range. The tradesman then opened the distributor, checked the contact points setting and decided that the setting was alright. The tradesman asked the apprentice to remove the distributor. When the apprentice had done so he handed it over to the tradesman, who took the distributor over to the workbench and dismantled it. He (the tradesman) removed the 'contact set' and also the distributor base plate which exposed the advance and retard mechanism. The tradesman found that this mechanism was disintegrated. Upon inspection he also found that one of the springs in the mechanism was broken. He carefully removed all the disintegrated parts and displayed all of them on the workbench.

Next, the tradesman showed the apprentice the disintegrated advance and retard mechanism and told to the apprentice that this was the reason why the engine misfired at speeds above 60 Km/hr. The apprentice asked him why was the engine misfiring at that range of speeds. The tradesman told him that the distributor was timed at one particular

speed and that this technique was known in the trade as “static timing” but that since the speed of the engine varied from high to low, the advance and retard mechanism automatically advances and retards the distributor in relation to the varied speed range.

During the reassembling of the component parts of the distributor, the tradesman stressed the importance of the apprentice checking the springs which connected the two fly weights of the advance/retard mechanism. The tradesman told him that the lighter of the two springs retards the mechanism while the heavier of the two springs advances the mechanism. When the tradesman had completely reassembled the distributor, it was timed to the engine and the high tension cables were connected. The car was then road tested by the tradesman (with the apprentice sitting beside him) and later passed out as ‘OK’.

Appendix 8 – Observation of an apprentice during the dyeing of a bedspread cotton material.

The tradeswoman and apprentice were to “dye” a set of cotton bedspread materials ‘tied’ by other tradeswomen in the same business. The background colour for the ‘dye’ was to be green.

The tradeswoman asked the apprentice to light the fire (which was made of three stones equally placed to form a triangle with fire woods placed in each of the three openings), and filled the ‘dyeing containers’ with water and placed on the fire. The tradeswoman asked the apprentice to light the ‘coal pot’ and placed three ‘irons’ on the fire. When the water was warm (about body temperature), the tradeswoman together with the apprentice took the “dyeing container” from the fire and put the container down. The tradeswoman took a steel cup measuring about one and half table-spoons from a wooden box, and put three cups full of caustic soda, three cups full of sodium hydro sulphite, two cups full of yellow and blue colouring liquid each. She then asked the apprentice to mix the solution to get rid of the lumps. When the solution was thoroughly mixed the tradeswoman tasted the solution, she asked the apprentice about her reaction to the solution. The apprentice (who was in her seventh month) replied that the soda was a bit too much, the tradeswoman agreed with the apprentice and later asked the apprentice to add two bottles (about one litre each) of water to the solution. The apprentice did as instructed and after which she tasted it and told the tradeswoman that the solution was alright now. The tradeswoman tasted the solution again and agreed with the apprentice that the solution was alright.

With the ‘dye bath’ prepared, the tradeswoman asked the apprentice to submerge the ‘tied’ materials and to leave them in the ‘bath’ for five minutes to allow the fabric to absorb the

‘dye’. After five minutes the ‘dyed’ materials were taken out of the ‘dye bath’ and spread out on the rope to allow the ‘dye’ to oxide. When the materials were almost dried, the tradeswoman asked the apprentice to rinse the dyed material until the water was clear and this process took about five washes. After the wash the tradeswoman and apprentice opened each bedspread material in turn on the straw mat and together they break the binding threads. After all the binding threads were removed, the apprentice washed the materials in soapy water and hung the materials to dry. When the materials were completely dried the apprentice ironed them, folded them and packed them in a box ready for delivery to the market.

Appendix 9 – Record of an observation of an apprentice at work – during the tying of a bedspread cotton material

The entrepreneur had bought some cotton materials to be tie-dyed into bedspread for the tourist industry (to be sold in one of the tourist outlets). The Entrepreneur had given the tradeswoman and apprentice (under observation) four bedspreads material to be ‘tie-dyed’.

The tradeswoman brought the cotton bedspread materials out. She asked the apprentice to pour some warm water in the container (this was an old petrol drum cut in half and used to prepare the material before tying). The apprentice using the warm water in the container, washed the bedspread materials to remove the factory grease and starch; when the materials were thoroughly washed the apprentice hung them to dry. While the materials were hung to dry, the apprentice prepared the ‘iron bed’ on the ground using straw mat, blankets and old bedspreads. When the materials were fairly dry, the apprentice open them out on the ‘iron bed’ and ironed them; as each material is ironed the apprentice passed it on to the tradeswoman who hangs them on a rope above the work station. When the apprentice had finished ironing the material she cleared the ‘iron bed’. She then took the straw mat and spread it on the ground, directly opposite the tradesman’s’ workbench’ (a short wooden bench about six inches in height). When the tradeswoman was seated, the apprentice passed her one of the bedspread material to be tie and the apprentice sat on the mat (informally) in front of the tradeswoman.

The tradeswoman took the bedspread material and opened it on the mat. She (tradeswoman) then took a stick measuring one metre and divided the bedspread material in to four equal divisions each measuring one metre. She then took an other ‘measuring stick’ (measuring about six inches) and marked out the pattern areas. She marked all the

pattern areas of the remaining three bedspread materials all by herself with the apprentice observing. Throughout the process so far the apprentice did not ask any question, nor did the tradeswoman offered any explanation. The tradeswoman asked the apprentice to pull out the rolls of thread from the wooden box, and the tradeswoman herself took one of the bedspread material from the rope where the ironed bedspread materials were hung.

The tradeswoman sat on the 'short' wooden bench, took the material, slightly bending her left knee, placed the marked area to be tied upon her knee and started the tying process. The apprentice sat on the straw mat in front of the tradeswoman. The tradeswoman 'pinched' an amount of material from the middle of the marked area, pulled the material upward, when the material was fully pulled upward the tradeswoman twisted the pulled material four times, still holding the tip of the pulled material, she took an already 'prepared' thread by the apprentice (the thread is prepared by doubling the thread and knotting one end). She tied the knotted end at the base of the pulled material, still holding the tip of the pulled material she tied the thread along the length of the pulled material and finally tying the thread around the end of the pulled material several times before the final tie.

The apprentice was very attentive observing every movement and action of the tradeswoman without asking any question. At the end of the pattern tying the researcher asked the apprentice what technique was the tradeswoman using. Without hesitation the apprentice answered that it was the "binding" technique and this was confirmed by the tradeswoman. The tradeswoman revealed that the apprentice had been around for about 18 months and had seen nearly all the pattern techniques one time or another. The researcher asked the tradeswoman as to why she did not explain the process to the apprentice as the

job progressed. The tradeswoman replied that the best way for the apprentice to learn the trades was to “open her eyes” and observe what she was doing. The tradeswoman continued the process and tied the rest of the remaining pattern areas in the material and the remaining three bedspread materials. The apprentice sat in the same position observing the tradeswoman. When all the materials were tied the apprentice took them to the dyeing team for the materials to be dyed.

Appendix 10 : A Record Of Another Motor Vehicle Apprentice's Interview.

After observing the tradesman and apprentice repair a faulty clutch system of a vehicle, the apprentice was taken to a quiet place in the garage where he was interviewed by the researcher.

Researcher: Can I ask you, how old are you?

Apprentice: I am 22 years old.

Researcher: Did you go to school?

Apprentice: Yes, I attended the Malfa primary school.

Probe: At what class did you complete your education?

Apprentice: I completed by schooling at primary two.

Researcher: What is your nationality?

Apprentice: I am a Gambian.

Probe: What part of the country are you from?

Apprentice: I am from Banjul – born and bred.

Researcher: How many years have you been an apprentice in this garage?

Apprentice: This is my fourth year going to my fifth.

Researcher: Can I ask you, were you able to recall the procedure used by the tradesman to diagnose the fault?

Apprentice: I was able to follow the way the Boss was finding the fault but I am not sure I would be able to recall the steps taken because the Boss was inside the vehicle while I was standing outside.

Researcher: Did the tradesman check to find out whether you could recall and remember the procedure?

Apprentice: No.

Probe: If the Boss did not check to find out, did you check the Boss to find out how he diagnosed the fault?

Apprentice: No, I did not check the Boss.

Researcher: Why didn't you check the Boss to explain to you how he diagnosed the fault?

- Apprentice: At time when you are not involved in the job you can not ask questions, and here I was not involved in the job it was between the Client and the Boss I was there getting the tools ready for the job.
- Researcher: Now, tell me, when you were working with the tradesman on the clutch, did the tradesman explain to you the procedures for dismantling the clutch?
- Apprentice: The Boss was explaining to me as he dismantled the clutch but I was more interested in following how he was doing the job rather than listening to what he was saying.
- Probe:** Did the tradesman explain to you the key terms such as friction disc, toggle levers, and pressure plate?
- Apprentice: The Boss did not explain the key terms to me but he showed me the main parts of the clutch and what to look for when you are checking them (meaning inspection).
- Researcher: Can you remember the procedure for dismantling the clutch?
- Apprentice: Yes I can remember the main points.
- Researcher: Can you tell me the main points?
- Apprentice: You slacken the bell housing nuts, then you jack the engine, you remove the bell housing nuts, remove the gearbox then you slack the pressure plate bolts, remove the bolts then you pull out the pressure plate and disc.
- Researcher: Did the Boss stress to you any crucial point you must remember when you are assembling the clutch?
- Apprentice: The Boss showed me some important points that I must always remember when I am working on the clutch such as the order in which to tighten the pressure plate.
- Researcher: I saw the Boss showing you how to test the toggle lever, can you recall the procedure?
- Apprentice: He said I must always make sure that the toggle levers are level (same height).
- Researcher: What would happen if the toggle levers were not in the same height or level?
- Apprentice: I don't know the Boss did not explain that to me.
- Researcher: Can we now look at another issue. Tell me do you understand the functions and principles underlying the working of the clutch?

- Apprentice: The Boss showed me all the main parts of the clutch but I don't know how the clutch works, because I was even surprised when the Boss told me the disc was responsible for the fault.
- Probe:** Did the Boss explain to you how the clutch works when he was dismantling and reassembling the clutch?
- Apprentice: No, the Boss did not explain, even if the Boss explained to me while he was doing the work (clutch) I will not listen to his explanation because I will be busy looking at what he was doing and trying to learn how to do it.
- Researcher: Tell me, do you understand how the clutch works?
- Apprentice: Truly I don't understand how the clutch works because the Boss did not explain to me how the clutch works. He only showed me how to fit the parts.
- Researcher: If you have to exercise an option between listening to an explanation and observing a demonstration from the Boss, which one would you go for?
- Apprentice: I would go for the practical (meaning demonstration).
- Researcher: Can I ask you, why did you choose practical?
- Apprentice: For practical you are involved in the job, because the Boss show you and you see exactly how to do it, you see what the Boss was doing, if you don't understand you asked the Boss.
- Researcher: But tell me, how do you know that you really understood what the Boss was demonstrating?
- Apprentice: I think I can say I understood what the Boss was showing me when I was able to do it the way the Boss showed me, all by myself.
- Researcher: what part of the work interests you the most?
- Apprentice: The practical part of the job interests me the most.
- Probe:** Why is it that practical part interest you the most?
- Apprentice: By practice you learn the work quickly and if you are enjoying what you are doing your interest will grow and you learn more.
- Researcher: How does your interest help you to learn at the workplace?
- Apprentice: If you have interest in what you are doing you will always want to do more and as you're wanting to do more you learn on the way.
- Researcher: What part does attitude play in your learning?

- Apprentice: Your attitude to the job is very important, especially when you are finding fault. If you don't have the right attitude you will never be able to find fault because fault finding is patience; you try here if it does not work you try there; all is attitude.
- Researcher: Tell me, did you receive any motivation from the tradesman?
- Apprentice: Generally the Boss will try to encourage me as I work. But the type of encouragement I want and what the Boss will give me are two different things.
- Probe:** What type of encouragement or motivation are you looking for?
- Apprentice: I would like the Boss to guide me through the problem and where I fail he should show me until I understand it.
- Researcher: I observed that you were very keen when you were working on the clutch to identify the key technical terms. Why are you so keen about the technical terms?
- Apprentice: Knowing the technical terms are like knowing the secret of the trade. If you don't know the right names of the parts you cannot communicate and discuss with other people about the job.
- Probe:** Does the Boss always explain the technical terms to you?
- Apprentice: At times the Boss would try to tell me the terms in Wolof or French but I always like it when he tells them to me in Creole.
- Researcher: Did you receive any feedback from the Boss?
- Apprentice: Sometime after you do a job the Boss will tell you how you are progressing especially with that job, at another time the Boss will not tell you anything.
- Probe:** Do you usually enquire from the Boss about your progress?
- Apprentice: No.
- Researcher: Why not?
- Apprentice: I thought the Boss should tell me if he thought it was necessary.
- Researcher: When the Boss was giving you feedback was it at the end of the job or during the job?
- Apprentice: In most cases it was during the job to help you make less mistakes.
- Probe:** Tell me, at what time would you prefer the feedback, as the job progressed or at the end of the job?

- Apprentice: I would prefer it at both times, during the job to help me with my mistake and at the end to check on how I was doing.
- Researcher: How do you see the relevance of theory learning in the workshop?
- Apprentice: Theory is good and useful if you could understand what the Boss was saying. But here in the workplace we are not too concerned with theory because the work we are engaged in did not usually ask for theory. Don't get me wrong theory is good if you can use it.
- Researcher: Tell me, when you are working, do you think about theory as the job progresses?
- Apprentice: The work I do is usually to complete the job the Boss started so I don't need to think about theory when I work.
- Researcher: When the Boss was solving the clutch problem did the Boss apply theory to help him solve the problem?
- Apprentice: I don't know, but I think the Boss was applying his experience to solve the problem. Because the Boss had faced all these types of problems before so he could easily know where the fault was.
- Probe:** True, the experience of the Boss helped him, but still don't you think that his knowledge of theory also helped him?
- Apprentice: I think so but I think it is more of experience and technique.
- Researcher: Let me ask you, don't you think or apply theory when you work?
- Apprentice: As I told you, with the work I do, I don't usually apply theory, most of what I do required the use of technique and technique you gain by experience in the job.
- Researcher: Can we now turn our attention to the actual practice in the garage.
- Did the tradesman demonstrate to you the procedure for dismantling and re-assembling the clutch?
- Apprentice: The tradesman showed me how to remove the disc and how to return the disc.
- Probe:** Did the tradesman show you the steps involved in dismantling and re-assembling the clutch?
- Apprentice: No, the Boss did not show me the step-by-step procedure but I followed the steps as he removed the disc and how he checked the disc and assembled it all again.

- Researcher: Are you disappointed that the tradesman did not show you the step-by-step procedure in assembling the clutch?
- Apprentice: Yes I am a bit disappointed because the Boss was more interested in the job than in me learning because at times before I could see and check something the Boss had passed that point.
- Researcher: Why did you not stop him and ask questions?
- Apprentice: At times you ask questions the Boss will answer you but the procedure or step had already past.
- Researcher: Do you have enough practice time in the garage? That is, were you given enough time to practice the skills you learn at the workplace?
- Apprentice: I watched many jobs in the garage but I did not actually do a lot myself. Most of the jobs I did in the garage was to return component parts at times the Boss would ask me to dismantle parts.
- Probe:** What do you think was responsible for the limited practice?
- Apprentice: I think that may be the Boss did not trust me or because I am slow.
- Probe: Don't you think that because most the vehicles that come into the garage were 'in-service' vehicles and the Boss could not risk you working on them?
- Apprentice: Maybe, but there are jobs that the Boss could give me to do while he was watching me; like changing plugs there are four plugs if the Boss does one he could allow me to do the rest while he was watching and checking me.
- Researcher: Tell me, did the Boss's explanation and demonstration actually help you to learn anything in the garage?
- Apprentice: The Boss was more interested in getting the job done so all his explanation was about the job and his demonstration was to fix the parts and not to show me how to do it. I learnt by watching the Boss do the job.
- Researcher: When the Boss was showing you a skill, did he show you the whole skill at once or part of the skill at a time?
- Apprentice: The Boss usually carried on with his job and it was up to me to pick what he was doing either whole or part at a time. I would prefer the Boss to show me the skill part at a time. That way you learn how to fix parts "point at a time" before you assemble the whole lot.

Appendix 11 – Record of yet another motor vehicle apprentice’s interview

Researcher: Can I ask you your age – how old are you?

Apprentice: I am 23 years old.

Researcher: Did you go to school?

Apprentice: Yes, I attended the St’ Mary’s Primary school.

Probe: At what class did you complete your schooling?

Apprentice: I finished at primary two.

Researcher: What is your nationality?

Apprentice: I am a Gambian.

Probe: What part of the country are you from?

Apprentice: I was born in Banjul.

Researcher: How long have you been an apprentice in this garage?

Apprentice: This is my fourth year going to my fifth.

Researcher: Were you able to recall the procedures followed by the tradesman in adjusting the tappet clearance.

Apprentice: At first it was difficult for me to see what the Boss was doing, because I was rotating the engine while the Boss was setting the valve to the right position and then adjust the tappet. But later after asking the Boss some few questions I was able to follow how the Boss was doing it.

Probe: Did the tradesman check to find out whether you could recall and remember the steps involved in setting the tappets clearance?

Apprentice: No, the Boss did not check to find out.

Researcher: When you were working with the tradesman on the job, did he explain to you the procedures?

Apprentice: First the Boss did not explain to me how to do it, but after I asked him some questions he explain to me.

Researcher: Tell me, do you understand the procedures underpinning the adjustment of the tappet clearance?

- Apprentice: It was not easy to understand what the Boss was doing because I was turning the engine and the Boss was checking the position of the valve and would tell me stop or turn so it was not easy to understand at first.
- Probe:** Did you understand the explanations of the tradesman?
- Apprentice: Yes, when the Boss is explaining and at the same time showing me I understood everything.
- Probe:** What do you mean when you say I understand the procedures?
- Apprentice: You understand something when you can do it by yourself. If I can set the valve to the right position and adjust the tappet clearance to the right gap then I can say I understood the procedure.
- Researcher: Tell me, if you have to exercise an option between listening to the tradesman's explanation and observing the tradesman work, which one would you opt for?
- Apprentice: First I will go for watching the Boss work, but at times you would need the explanation too.
- Researcher: Can we now move to your attitude to learning at the workplace. What part of the work interests you the most?
- Apprentice; All I am interested in is practical work.
- Probe:** Can I ask you the reason for your answer?
- Apprentice: You learn more by doing things with your hands. So by working, that is doing the practical work you learn more.
- Probe:** How does your interest help your learning?
- Apprentice; If you are interested in something you put all your mind to it so you learn easily.
- Researcher: I observed that you were very keen in identifying and naming the component parts. Can I ask you, why were you so keen?
- Apprentice: Knowing the names and also be able to identify the parts helped you to plan the job in your mind, because you can always arrange the job in your mind part after part.
- Researcher: Did the tradesman always name the parts for you when he was working?
- Apprentice: The Boss don't usually identifying the parts as he worked, because most of the parts are around him so he just reached for them when he was working.
- Researcher: Did you receive any feedback from the tradesman?

- Apprentice: The Boss don't usually give me feedback about the job or about how I am doing, but he was quick to shout if I made an error, may be you could call that a feedback.
- Researcher: Can I ask you what do you understand by the term "theory"?
- Apprentice: Theory is about learning how the car works.
- Probe:** Do you think about theory when you work?
- Apprentice: With the jobs I do in the garage, I don't need to think about theory.
- Researcher: Do you have enough practice time in the garage?
- Apprentice: I do my own part of the jobs in the garage like fixing some jobs, but I am not involved in the serious jobs because the Boss would not let me. At times I go alone to do break down jobs there I practice the things I learn from the Boss.
- Researcher: When the Boss was showing you a skill, did he should you the whole skill at once or part of the skill at a time?
- Apprentice: I don't know, the Boss just work and I watch and hope to learn from it.
- Probe:** Well, if you were to choose which one would you choose – the whole or part method?
- Apprentice: I will choose the part method.

Appendix 12 : A Record of Another Tie-Dye Apprentice Interview

After observing the entrepreneur and apprentice tie the ‘twisting’ pattern on a material, the apprentice was taken to a quiet place in the workplace where she was interviewed by the researcher.

Researcher: Can I ask you your age – how old are you?

Apprentice: I am 22 years old.

Researcher: Did you happened to attend school?

Apprentice: No, I never attended school.

Researcher: What is your nationality?

Apprentice: I am a Gambian.

Probe: What part of the country are you from?

Apprentice: I cam from SerreKunda German.

Researcher: How many months have you been in your apprenticeship?

Apprentice: I have been here for 20 months.

Researcher: Can I ask you, were you able to recall the procedures followed by the tradeswoman in tieing the pattern?

Apprentice: It was difficult at first, but as the tradeswoman continued to tie t'l'e patterns I began to follow the steps and was able to recall the procedures.

Probe: Did the tradeswoman check whether you could recall the procedures or not?

Apprentice: No, the Boss never checked whether I could recall or not.

Researcher: When you were working with the tradeswoman, did the tradeswoman explain to you the procedures for tieing the pattern as the job progressed?

Apprentice: The tradeswoman did not explain to me how to tie the pattern. The Boss would just carry on with her work and it was up to me to watch how she was tieing the pattern and learn from it.

Researcher: Did the tradeswoman explain to you the key steps you should remember when you tie the pattern?

Apprentice: During the job the Boss did not explain to me the important steps, but when I took my practise work to her she would advise me about the important steps.

- Researcher: Now, tell me, do you understand the procedures for tying the pattern?
- Apprentice: I cannot say I understood all the procedures but I think I can tie the pattern now but not as good as that of the Boss.
- Researcher: How do you know you understood what the Boss was doing?
- Apprentice: I can say I understood the way to tie the pattern when I can do it all by myself like how the Boss did it.
- Researcher: If you have to exercise an option between listening to the tradeswoman's explanation and observing the tradeswoman working, which one would you opt for?
- Apprentice: I would go for observing the tradeswoman work.
- Probe:** Can I ask you the reason for your answer?
- Apprentice: When you watch the Boss working you see how to tie the pattern, but when the Boss explains to you, you only listen to what she was saying without seeing how to do it.
- Researcher: Can we now move to your attitude: what part of the work interests you the most?
- Apprentice: Involving in the job interests me the most.
- Probe:** How does your interest help you learn the trade?
- Apprentice: When you are interested in something, you put more work into it and as you put more work into it you learn more.
- Researcher: What part does your attitude play in your learning?
- Apprentice: Attitude plays a big part in my learning because I have to be patient with the Boss and take everything that she throws at me because it is I who wants to learn the trade.
- Researcher: Do you receive any feedback from the tradeswoman? Did the Boss tell you how you were progressing?
- Apprentice: No, I did not receive any feedback from the Boss during the job, but when I practise on my own and took it to the Boss she would look at the work and then advise me about my error and how to rectify it.
- Probe:** At what time would you prefer a feedback?
- i) during the progress of a job, or
 - ii) at the end of a job.

- Apprentice: If it is possible I would prefer the feedback during the progress of a job so that the Boss could tell me where I am going wrong and how to remedy the mistake.
- Researcher: Can we now turn to the relevance of theory. How do you see the relevance of theory at the workplace?
- Apprentice: Theory is about school learning and is not very useful in our every day activities at the workplace.
- Probe:** But, did the tradeswoman explain the theory underpinning the tying of the pattern?
- Apprentice: The Boss would show you how to tie the pattern but not the theory; and besides I am not particularly interested in theory.
- Researcher: Now, tell me, do you receive enough practice at the workplace, that is, did the tradeswoman allow you to be involved in the job she was doing?
- Apprentice: As far as the actual job is concerned, I do not receive enough practice at the workplace; all I do is to watch the Boss working. The Boss did not trust me to practice on the job.
- Researcher: What do you think was the cause of this limited practice?
- Apprentice: Firstly, I think it is because of cost of material. Secondly, the tradeswoman did not want to spoil the name of the business because if apprentices spoil people's material everybody will know about it and that is not good for the name of the business.
- Researcher: When the tradeswoman was working, did she show you how to tie the pattern all at once or part of the technique at a time?
- Apprentice: The Boss just carried on with her work and I have to watch what she was doing.
- Probe:** When do you think you will learn the most – the whole technique at once or part of the technique at a time?
- Apprentice: I think I will learn more quickly if I am showed the technique small part at a time.

Appendix 13 – Record of yet another tie-dye apprentice interview

Researcher: Can I ask you your age – how old are you?

Apprentice: I am 21 years old.

Researcher: Did you go to school?

Apprentice: No, I never went to school.

Probe: What part of the country are you from?

Apprentice: I am from Serre-Kunda – Serre-Kunda German.

Researcher: How long have you been an apprentice in this business?

Apprentice: I will be completing my twentieth month in two months time.

Researcher: Can I ask you, were you able to recall the procedures followed by the tradeswoman in preparing the dye-bath solution?

Apprentice: Well some points I can catch, others were not so easy to follow, but I have some ideas as to how to mix the dye-bath solution.

Probe: Did the tradeswoman check to find out whether you could recall and remember the steps involved in the procedure?

Apprentice: No, the tradeswoman did not check whether I could recall the procedures or not.

Probe: If the tradeswoman did not check your recall of the procedures, what method did you use to recall the procedures.

Apprentice: As I watched the Boss working I tried to keep everything in n.y head and when I am practising I tried to remember the points.

Researcher: When you were working with the tradeswoman on the job, did she explain to you the procedures for mixing the dye-bath solution?

Apprentice: She did tell me about some points, but mainly she carried on with her work and I was standing there watching as she prepared the solution.

Probe: The tradeswoman did explain to you a bit, did her action also tell you anything to look for and remember when you are mixing the solution?

Apprentice: Yes, the way she was adding the 'salt' and 'soda' and tasting the mixture tells me how to carefully add 'salt and soda' while mixing the solution.

- Researcher: Can we now look at another issue – that is understanding? Tell me, do you understand the procedures underpinning the preparation of the dye-bath?
- Apprentice: I don't understand everything by watching the Boss work, I understand things better when I am working on my own, because I can see how things are moving.
- Probe:** Did you understand the explanations of the tradeswoman when preparing the dye-bath?
- Apprentice: Mostly the explanation is not clear and straight forward but if you put your mind to it you can understand what the Boss was explaining.
- Researcher: What do you mean when you say you understand what the tradeswoman was doing?
- Apprentice: I can say I understand something when I am able to do the job all by myself first time.
- Researcher: Now tell me, if you have to exercise an option between listening to the tradeswoman's explanation and observing the tradeswoman perform a demonstration, which one would you opt for?
- Apprentice: I will go for watching the Boss do the job for me to see how she was doing it.
- Probe:** Can I ask you the reason for your answer?
- Apprentice: It is easier for me to learn by watching how the Boss was doing the job than listening to her explanations.
- Researcher: Can we now move to your attitude to learning at the workplace. What part of the work interests you the most?
- Apprentice: I am interested in doing the practical work.
- Probe:** Can you explain the reason for your answer?
- Apprentice: You learn more by doing the job with your hands, not by listening to what the Boss is saying.
- Probe:** Tell me, how does your interest help your learning?
- Apprentice: If you are interested in whatever you are doing you learn more because all you see is your future.
- Researcher: I observed that you were very keen on identifying and naming the different elements used in preparing the dye-bath solution, can I ask you why were you so keen?

- Apprentice: Well, you have to know the names of the elements because if you don't know the names how can you know what the Boss is saying when she is explaining.
- Researcher: Did the tradeswoman always explain the names of the elements to you when she was working?
- Apprentice: The Boss would explain the names of the elements as she worked but mostly in Wollof and I always like to know the names in English so that I can impress my friends and clients.
- Researcher: Did you receive any feedback from the tradeswoman?
- Apprentice: Yes, after my private work I will take it over to the Boss and the Boss would check it and tell me how I was doing.
- Probe:** Did the feedback help your learning?
- Apprentice: In a way the feedback is always useful because when you take your work to the Boss the Boss will tell you where you went wrong and how to fix it.
- Researcher: Can I ask you, what do you understand by the term "theory".
- Apprentice: As I understand theory, theory is when the Boss is explaining to you the way things are and why you have to do it that way.
- Probe:** Do you think about theory when you are working?
- Apprentice: No, I don't think about theory when I am working because when you are mixing the solution you just put the soda, the salt and the right colour and you mix all if the colour is not right you add more colour.
- Researcher: Tell me, do you have enough practice time at the workplace?
- Apprentice: We don't have enough practice time because the Boss would not allow us to work on the actual material.
- Probe:** What do you think was the reason for this?
- Apprentice: Well the materials are costly and if we ruin them the Boss would have to pay for them.
- Researcher: When the Boss was showing you a particular skill, did she show you the whole skill at once or part of the skill at a time?
- Apprentice: The Boss would carry on with her job and I would just watch what she was doing and learn.
- Probe:** If you were to choose a method to enhance your learning, which method would you choose – whole or part method?

Apprentice: I think the part method would be more helpful for my learning.

Appendix 14 : A record of another interview with a motor vehicle entrepreneur.

After observing the entrepreneur and apprentice repair a faulty clutch system, the entrepreneur was taken to a quiet place in the garage where he was interviewed by the researcher.

Researcher: Can I ask you, how old are you?

Entrepreneur: I am 44 years old.

Researcher: Did you go to school?

Entrepreneur: No, I never attended school.

Researcher: What is your nationality?

Entrepreneur: I am a Gambian.

Probe: What part of the country are you from?

Entrepreneur: I am from Brikama, in the Western Division.

Researcher: Where did you do your training?

Entrepreneur: I did my training at my late uncle's garage.

Researcher: Tell me, how many years since this garage was established?

Entrepreneur: This is the tenth year.

Researcher: Can I ask you, how do you see your role in respect to the apprentices in the garage, since you are responsible for helping these apprentices to acquire the necessary skills and competence in the trade?

Entrepreneur: Well it is difficult to say, because the garage is a business to make money at the same time you want to help the boys (the apprentices) to learn the trade. All one can do is to encourage them to work with the tradesmen and it is up to them to observe the tradesmen at work and pick the idea as the job progresses. Learning a trade in a garage is difficult, this I know from experience, because at times you look and you can't see all that is taking place, and the Boss cannot stop all the time to show you. So it is up to the boys to open their eyes and ask questions if they fail to pick the point.

Researcher: I observed you working with the apprentice on the clutch system. Can you tell me, was the apprentice able to recall the specific facts and procedures in withdrawing the clutch out of the vehicle?

Entrepreneur: I am not sure.

- Probe:** Did you check to find out whether the apprentice could recall the procedures?
- Entrepreneur: No, I did not find out whether he could recall the procedures or not because the procedures were straight forward and if he watched me closely as I worked he should be able to remember everything.
- Researcher: Now tell me, did you explain to the apprentice the procedures to dismantle the clutch?
- Entrepreneur: No, I did not explain to him procedures but I worked slowly for him to follow the steps.
- Probe:** Did you stress to the apprentice the crucial points or component parts that the apprentice should remember when dismantling and re-assembling the clutch?
- Entrepreneur: As I worked I would tell and point to the main parts that the apprentice must always look for and check when dismantling and assembling a clutch. Parts like the toggle lever, centralising the 'diskette' (disc).
- Researcher: Can we now look at how you perceived the apprentice's understanding of how the clutch works.
- Tell me, did you make sure that the apprentice understood how the clutch works?
- Entrepreneur: Yes, as I carried on with the job, I explained to the apprentice how the clutch works, especially how the 'diskette' (disc) connect (engage) and disconnect (disengage) the drive.
- Researcher: Now tell me, if the apprentice was to exercise an option between listening to your explanation and observing you demonstrate a procedure, which one do you think the apprentice would opt for?
- Entrepreneur: The apprentice would opt for the practical work (demonstration).
- Probe:** Can I ask you the reason for your answer?
- Entrepreneur: Well, apprentices like to be involved in the actual jobs and besides they do not usually pay attention to explanation; they are more interested in practical work.
- Researcher: Can we now look at the apprentice attitude to work.
- What part of the work interests the apprentice the most?
- Entrepreneur: Doing practical work interests the apprentice the most.
- Probe:** How does the apprentice interest help his learning?

- Entrepreneur: When they are happy in what they were doing they will get more involved and as they get more involved they will learn more.
- Probe:** Does the right attitude at work make the apprentice learn quicker and easier?
- Entrepreneur: Attitude at work is very important especially at the garage where tension could be very high. If the apprentice has a “short fuse” and become reluctant every time a Boss shouts at him he will not learn quickly and life could be hard for him in the garage.
- Researcher: Do you give feedback to apprentice to help him on his progress?
- Entrepreneur: Sometime you tell apprentice how he was doing at the garage, especially when you gave him something to do and he does it well.
- Probe:** Do you think feedback usually helped or encouraged the apprentice?
- Entrepreneur: Feedback usually helped apprentices, more so if you correct their mistakes and tell them the reasons for their mistakes.
- Researcher: When do you usually give the apprentice the feedback; during the progress of the job or after the completion of the job?
- Entrepreneur: For me, the best time to give a feedback is during the progress of the job because you can correct the apprentice’s mistake immediately before it ruins the job.
- Researcher: Can I ask you, what do you understand by the term “theory”?
- Entrepreneur: Theory is about reading about the car.
- Researcher: You are right to a point, but theory is more about why things happen the way that they happen. Example why air must mix with petrol for complete combustion.
- Researcher: How do you see the relevance of theory at the workplace?
- Entrepreneur: From what you explain about what is theory, I don’t think that theory is important to us at the workplace.
- Probe:** Do you think about theory when you are working or carrying out a job?
- Entrepreneur: With my experience I don’t need to think about theory when I worked because when a vehicle comes in I checked out the fault (diagnose) immediately I will know where to look to fix it.
- Probe:** Don’t you think that, when you “look” that is theory to help you solve problems?

- Entrepreneur: You can call it theory because you people always try to bring book knowledge into the workplace; but we called that “look” technique and experience.
- Researcher: Can we now turn our attention to practice at the workplace. Do you actually demonstrate a particular procedure to the apprentice during a task?
- Entrepreneur: As I said earlier, as I worked it is up to the apprentice to look at how I am doing things and pick the main points from it.
- Probe:** If you do not actually demonstrate to the apprentice how do you expect the apprentice to learn the job?
- Entrepreneur: The apprentice learn by watching what I am doing and at times asking questions to clear any problems they might have.
- Researcher: Did the apprentice have enough practice time at the workplace?
- Entrepreneur: Well the apprentices are normally with us tradesmen at the garage throughout the day. They are involved in whatever we were doing.
- Probe:** What I meant was, do the apprentice have time to practise the skills they acquire alone in the garage?
- Entrepreneur: As you know, all the cars that come to the garage are ‘running cars’ (live vehicles) and it is risky to give them to the apprentices to work on because any mistake would cost the garage and “spoil our name” (jeopardise the reputation of the garage).
- Researcher: When you show an apprentice a particular skill do you show him the whole skill at once or part of the skill at a time?
- Entrepreneur: When I work I don’t think about how the apprentice learn but working on a car is all about system, step-by-step. For example you remove the plugs, then the contact set, then you check the valves, then to reassemble is the reverse and that is the system that the apprentice would have to copy if he wants to be a good tradesman.

Appendix 15 : A Record of Another Interview with a Tie-Dye Entrepreneur

After observing the entrepreneur and apprentice tie the ‘twisting’ pattern, the entrepreneur was taken to a quiet place in the business premise where she was interviewed by the researcher.

Researcher: Can I ask you age – how old are you?

Entrepreneur: I am 43 years old.

Researcher: Did you go to school?

Entrepreneur: No, I never went to school.

Researcher: What is your nationality?

Entrepreneur: I am a Gambian.

Probe: What part of the country are you from?

Entrepreneur: I originated from Soma in the Lower River Division.

Researcher: Can you tell me, how many years since the business was established?

Entrepreneur: The business is eight years old.

Researcher: Can I ask you, how do you see your role in respect to the apprentice, since you are responsible for helping the apprentice to acquire the necessary skills and competence in the trade?

Entrepreneur: I am the owner of the business and I took on the girls (the apprentices) to help them learn about the trade.

Probe: But, tell me how do you help them to learn the trade?

Entrepreneur: The apprentices are fix (attached) to a tradeswoman and they work together. It is the duty of the apprentice to watch what the tradeswoman was doing, how she was tying a pattern and learn from that.

Probe: But tell me, did you tell the tradeswoman to slow down as they worked so that the apprentice would be able to see better how to tie a pattern?

Entrepreneur: As you know the business is about making money and most of our work are on contract and contract is all about time. So, the tradeswoman cannot slow down for the sake of the apprentice, it is up to the apprentice to open her eyes and heart (mind) to the job.

Researcher: I observed you working with the apprentice tying a pattern, tell me, was the apprentice able to recall the procedures in tying the pattern?

Entrepreneur: I could not tell whether or not the apprentice was able to recall the procedures, but I think she should be able to recall because she was very attentive.

Probe: Did you check to find out whether she could recall and remember the procedures?

Entrepreneur: No, I did not.

Probe: Why not?

Entrepreneur: You don't go on after every tying to ask the apprentice whether she could remember or not. I will be able to check her when she practises the pattern and brought it over to me for advise.

Researcher: Did you actually explain the key steps to the apprentice?

Entrepreneur: I did not explain the steps to her but I worked a bit slowly for her to see what I was doing.

Probe: Don't you think that it was important that you stress the crucial steps she should remember and recall?

Entrepreneur: I don't need to stress the key steps to the apprentice because if the apprentice is watching properly she would notice the stress I put on certain steps as I tied the pattern.

Researcher: Can we now look at how you perceived the apprentice's understanding of how to tie a pattern. Now well me, did you explain or carried on with the job in a way to enhance the apprentice's understanding?

Entrepreneur: The way you learn the trade here is for you to watch what the Boss is doing, and you work it out in your mind if a point is not clear you ask the Boss.

Probe: Did you make sure that the apprentice understood the procedures?

Entrepreneur: The way you make sure or check the apprentice understanding was to look at their practise work and there you would know whether she understood or not.

Researcher: If the apprentice was to exercise an option between listening to your explanation and observing you demonstrate a procedure, which one do you think the apprentice would opt for?

Entrepreneur: The apprentice would opt for the observation.

Probe: Can I ask you the reason for your answer?

- Entrepreneur: The apprentice always like to be involved in the job, sitting and observing me work so that they can see how it was done and practice it later.
- Researcher: Can we look at the apprentice attitude to work. What part of the work interests the apprentice the most?
- Entrepreneur: Apprentice working on their own work interests them the most. They are usually interested as long as they are tying a pattern on their own.
- Probe:** How does the apprentice interest help her learning?
- Entrepreneur: I think since they are doing a pattern, bringing it over for advise and doing it again they are learning.
- Researcher: Do you give feedback to the apprentice to help her check on her progress?
- Entrepreneur: Yes, I do give them feedback when they brought their work over to me for advise.
- Probe:** Did the feedback help her learning?
- Entrepreneur: I think so, because in most cases after my advise they always got it right.
- Researcher: Can I ask you, what do you mean by the term “theory”?
- Entrepreneur: What do you mean by “theory”?
- Researcher: Theory is why you tie the pattern that way and not that way. Now tell me then, how do you see the relevance of theory at the workplace?
- Entrepreneur: When I was learning the trade I learnt all about tying the different patterns, now I do not see why I should think about why the pattern was tied that way.
- Probe:** Do you always think about theory when you are working?
- Entrepreneur: I don’t think about theory when I worked because I knew all the technique for tying the patterns, I just carried on with the job off my head.
- Researcher: Can we turn our attention to actual practice at the workplace. Did the apprentice have enough practice time at the workplace?
- Entrepreneur: The apprentice normally stayed on after work to practise with left over of the dye-bath solution and off-cuts from the materials so they have enough practice on their own if they are up to it.
- Probe:** Why can’t the apprentice practice on the actual materials that you are working on?

Entrepreneur: Most of our jobs are contract jobs and, it would be very risky to give it to the apprentice to practice on because if they ruin it I would have to pay for it which could be very expensive at times.

Appendix 16 : The Backgrounds Of The Garage Apprentices : Their Age, Level Of Formal Education, Number Of Years Of Apprenticeship And Place Of Birth

Garage Code No.	No. of App. Per Garage	Apprentice Age					Level of Formal Education					No. of Years of Apprenticeship					Birth Place In The Gambia				
		10 to 15	16 to 20	21 to 25	26+	0	1-2	3-4	5-6	1-2 Yrs	3-4 Yrs	5-6 Yrs	7+ Yrs	Banjul	WD	LRD	NBD	CRD	URD	Urban Area	Rural Areas
1	4	1	2	1	-	-	1	3	-	1	2	1	-	3	1	-	-	-	-	3	
2	5	-	2	3	-	1	1	2	-	-	3	1	1	1	1	2	1	-	-	1	
3	4	-	4	-	-	-	2	2	-	-	3	1	-	3	-	-	1	-	-	3	
4	4	-	3	1	-	-	1	3	-	-	2	2	-	3	1	-	-	-	-	3	
5	4	1	1	2	-	-	1	3	-	-	3	1	-	2	1	-	1	-	-	2	
6	4	-	4	-	-	-	2	1	1	1	2	1	-	3	1	-	-	-	-	3	
7	5	1	3	1	-	-	2	3	-	1	3	1	-	2	3	1	-	-	-	2	
8	4	1	3	-	-	-	2	2	-	-	2	2	-	2	1	1	-	-	-	2	
9	3	1	-	2	-	-	1	2	-	-	2	1	-	3	-	-	-	-	-	3	
10	4	1	2	1	-	-	2	1	1	1	2	1	-	2	-	1	-	-	-	2	
Total	41	6	24	11	-	1	15	22	2	4	24	12	1	24	9	5	3	-	-	24	

Key:

App. = Apprentice Yrs Years

WD Western Division

LRD Lower River Division

NBD North Bank Division

CRD Central River Division

URD Upper River Division

Appendix 17 : The Backgrounds Of The Tradesmen : Their Age, Level Of Formal Education, Training and Place Of Birth

Garage Code No.		No. of t/men Per Garage Inc. Entre's	Tradesmen's Age					Level of Formal Education											Tradesmen's Training		Birth Place In The Gambia									
			No. of Yrs of Primary Education					No. of Yrs of Secondary Education			Urban Area	Rural Areas						Others												
20 to 30	31 to 40	41 to 50	50 +	0	1-2	3-4	5-6	1-2	3	4-5	Informal Appren-ticeship	Vocational Training	G/ Banjul	W/D	CRD	NBD	URD	LRD	SEN	MAL	GH									
1	4	1	2	1	-	3	-	1	-	-	-	4	-	2	-	-	-	-	-	2	-	-								
2	5	-	3	1	1	2	2	1	-	-	-	5	-	3	-	-	-	-	1	1	-	-								
3	5	2	1	1	1	2	3	-	-	-	-	5	-	1	-	-	-	-	-	2	2	-								
4	3	-	3	-	-	-	2	1	-	-	-	3	-	-	1	-	-	-	-	2	-	-								
5	3	1	2	-	-	2	1	-	-	-	-	3	-	1	-	-	-	-	-	1	-	-								
6	4	2	1	1	-	2	-	1	-	1	-	3	1	2	-	-	1	-	-	-	-	-								
7	5	2	1	2	-	3	2	-	-	-	-	5	-	2	-	1	-	-	1	-	1	1								
8	5	1	2	1	1	3	1	1	-	-	-	5	-	1	-	-	1	-	1	1	1	-								
9	4	1	2	1	-	2	-	-	-	-	-	4	-	1	1	-	1	-	1	-	-	-								
10	4	2	1	1	-	4	-	-	-	-	-	4	-	1	2	-	-	-	-	1	-	-								
Total	42	12	18	9	3	23	11	5	2	-	1	-	41	1	14	5	1	3	-	3	11	4	1							
Grand Total	42	42						41				41	1	26						16										

Key:

T/men	= Tradesmen	W/D	Western Division	CRD	Central River Division	SEN	Senegal
Entre's	= Entrepreneurs	LRD	Lower River Division	URD	Upper River Division	MAL	Mali
Yrs	= Years	NB	North Bank Division	G/Banjul	Greater Banjul	GH	Ghana

The none Gambian Tradesmen had their apprenticeship in their own country – Senegal, Mali and Ghana.

Appendix 18 : The Backgrounds Of The Tie-Dye Apprentices : Their Age, Level Of Formal Education, Number Of Years Of Apprenticeship And Place Of Birth

Business Code No.	No. of App. Per Business	Apprentice Age						Level of Formal Education				No. of Months of Apprenticeship			Birth Place In The Gambia					
		10 to 15	16 to 20	21 to 25	26+	0	1-2	3-4	5-6	Less than 12 months	12-18 months	19-24* months	G/ Banjul	W/D	LRD	NB	CRD	URD	Urban Area	Rural Areas
1	5	-	3	2	-	3	2	-	-	1	2	2	1	4	-	-	-	-		
2	5	-	3	2	-	4	1	-	-	2	1	2	3	1	-	1	-	-		
3	4	-	1	3	-	3	1	-	-	-	2	2	1	3	-	-	-	-		
4	6	1	1	3	1	3	3	-	-	1	4	1	4	1	-	1	-	-		
5	7	2	2	3	-	5	2	-	-	2	3	2	5	2	-	-	-	-		
6	6	1	2	2	1	5	1	-	-	4	1	1	3	2	-	1	-	-		
7	4	-	1	3	-	3	1	-	-	1	2	1	1	3	-	-	-	-		
8	8	1	6	1	-	6	2	-	-	3	4	1	2	6	-	-	-	-		
9	8	1	5	2	-	5	3	-	-	3	5	-	4	-	-	4	-	-		
10	10	1	4	4	1	6	3	1	-	3	5	2	6	3	-	1	-	-		
Total	63	7	28	25	3	43	19	1	-	20	29	14	30	25	-	8	-	-		

Key:

App. = Apprentice
Prim. = Primary
Sch. = School

Edu. = Education
LRD = Lower River Division
NB = North Bank Division

W/D = Western Division
URD = Upper River Division
G/Banjul = Greater Banjul

CRD = Central River Division
* = Usually not more than 24 months.

Appendix 19 : The Backgrounds Of The Entrepreneurs and Tradeswomen : Their Age, Level Of Formal Education, Training and Place Of Birth

Business Code No.	No. of t/women Per Business Inc. Entre's	Tradeswomen's Age						Level of Formal Education				Tradeswomen's Training			Birth Place In The Gambia						
												Informal Apprentice- ship	Vocational Training	G/ Banjul	W/D	LRD	NBD	CRD	URD	Urban Area	Rural Areas
		20 to 30	31 to 40	41 to 50	50+	0	1-2	3-4	5-6												
1	6	1	2	2	1	5	1	-	-	6	-			2	1	2	1	-	-		
2	5	2	2	1	-	3	1	1	-	5	-			3	-	2	-	-	-		
3	7	2	3	2	-	6	-	1	-	7	-			5	1	1	-	-	-		
4	8	2	2	3	1	4	2	-	2	8	-			4	1	1	2	-	-		
5	9	3	3	1	2	6	2	1	-	9	-			9	-	-	-	-	-		
6	9	1	4	3	1	7	2	-	-	9	-			6	1	1	1	-	-		
7	6	2	2	1	1	5	-	1	-	6	-			5	-	-	1	-	-		
8	8	2	3	2	1	6	1	1	-	8	-			3	2	1	1	1	-		
9	8	1	2	3	2	5	2	1	-	8	-			4	1	1	2	-	-		
10	9	2	1	3	3	8	1	-	-	9	-			7	-	1	1	-	-		
Total	75	18	24	21	12	55	12	6	2	75	-			48	7	10	9	1	-		

Key:

T/women = Tradeswomen
Entre's = Entrepreneurs
NBD North Bank Division

W/D Western Division
LRD Lower River Division
G/Banjul Greater Banjul

CRD Central River Division
URD Upper River Division
* None had secondary school education.