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LEARNING AT WORK: AN ETHNOGRAPHIC STUDY OF

EXPERIENTIAL LEARNING IN THE WORK PLACE

presented by

Richard Elliott Cunningham

has been accepted towards fulfillment of the requirements for

Ph.D. degree in Education

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LEARNING AT WORK: AN ETHNOGRAPHIC STUDY OF EXPERIENTIAL LEARNING IN THE WORK PLACE

By

Richard Elliott Cunningham

A DISSERTATION

Submitted to Michigan State University in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Department of Teacher Education

ABSTRACT

LEARNING AT WORK: AN ETHNOGRAPHIC STUDY OF EXPERIENTIAL LEARNING IN THE WORK PLACE

By

Richard Elliott Cunningham

The purpose of this study was to investigate learning in the work place and to generate some assertions grounded in ethnographic data about the nature of that learning.

The research took place on three sites: 1) a janitor service and training facility, 2) a sign shop and 3) a grocery store. The janitor service facility was the primary site. The other two were chosen for their diversity within the scope of the study for the purpose of broadening the applicable range of the findings.

The study was framed initially by five research questions: 1) who learns at work?, 2) what is learned at work?, 3) why are things learned at work?, 4) how do people learn at work? and 5) how do workers organize what they learn? Data were gathered on the research sites as observational field notes, interview notes and written statements by the subjects. The material was analyzed in terms of the initial research questions and assertions were drawn from the data in response to those questions.

It was found that everyone learned at work, that new employees learned the most and that more experienced workers provided the guidelines. The workers learn tasks and how to organize them into procedures to solve working problems.

People at work learn in order to meet the needs of immediate production and to retain their knowledge for future use. The learning is practical and takes place through work related activities.

The material is organized by the workers into two kinds of concepts. The first is a serial concept. This is a simple, linear, step-by-step procedure that, when followed, results in the solution of the standard problem it is designed for. The second is a comprehensive concept. This also is a step-by-step procedure. However, it is augmented by the provision of options at one or more of the steps that provide alternative choices of action to meet a potential range of variation in the problem to be solved. The applicable range of the solution is thusly broadened.

Information for the augmentation of existing concepts and the formation of new ones comes from the experiential bank which is an open or unpatterned organization of the worker's stock of knowledge. copyright by

Richard Elliott Cunningham

ACKNOWLEDGMENTS

Thanks are in order to the people who helped make this study a reality. To my advisor, Dr. Arden Moon, to the other members of my doctoral committee, Professor Noah Alonso, Dr. Robert Hatfield and Dr. Peggy Riethmiller, to my typist, Linda Johnson, and to my friends and family who have been so supportive, thank you very much.

TABLE OF CONTENTS

Chapter		Page
I	INTRODUCTION	1
	Statement of the Problem	1
	Need for the Study	2
	Limitations	2
	Delimitations	3
	Definition of Terms	4
	Rationale of the Research Questions .	5
	Research Questions	6
	Dissertation Chapters	7
II	REVIEW OF LITERATURE	9
	Apperception and Cybernetics	11
	Field Experience	12
	Task Specific Information	13
	Folk Learning	14
	Craft Knowledge	16
	Summary	19
III	METHODOLOGY.	21
	The Method.	21
		25
IV	DESCRIPTION AND DISCUSSION	28
	Overview of the Area	28
	The Northtown Project	32
	The Project	33
	The Workers	34
	The Clients	37
	The Work	38
	Materials and Equipment	41
	Who Learns at N.T.P.?.	42
	What Do They Learn?	46
	mide bo riter bedenite	

Chapter

Simple Tasks	•	• •	46 48 51
Recognizing Comparable Problems Recognizing New Problems Summary	•	•	54 56 60
Why Do They Learn?	•	•	61
Providing for the Future Immediate Production Emergencies Independence	• • •	• • •	62 63 64 66
How Do They Learn?	•	•	68
Vicarious Learning Practical Learning Responsive Engagement . Directed Activity Rehearsal Trial and Error	• • • •	• • • •	68 71 71 72 73 75
How Do They Organize What The Learn?	• •	•	80
Serial Concepts Comprehensive Concepts. Closure	• • •	• • •	80 81 82 83
Summary of Learning at N.T.P.	•	•	84
The Sign Shop	•	•	86
The Shop	• • •	• • •	86 87 90 90 96
Simple Tasks Procedures Recognizing Old Problems Recognizing Comparable	•	• •	96 97 97
Problems	•	•	98 99

Page

Chapter

Why Do They Learn? 100 100 Immediate Production. . . Providing for the Future. . 101 102 How Do They Learn? 103 Responsive Engagement . . . Rehearsal 104 . . Directed Experience . . . 105 106 Vicarious Experience. . . . How Do They Organize What They Learn? 108 Serial Concepts 108 Comprehensive Concepts. . . 109 Closure 110 • • 110 Open Organization Summary of Learning at the Sign 111 112 The Market 113 The Workers. . . . 114 • . . The Work 116 Who Learns at Work?. . 117 • 118 What Do They Learn?. . . . Simple Tasks. 118 Procedures. 119 Recognizing Old Problems. . 120 Recognizing Comparable Problems. 121 Recognizing New Problems. . 122 Why Do They Learn? 123 123 Immediate Production. . . 124 Providing for the Future. . How Do They Learn? 125 Responsive Engagement . . . 125 125 Rehearsal Directed Experience . . . 126 126 Vicarious Experience. . . .

Page

Chapter

je

			How	Do Do	Th€	ey (Drga	aniz	ze	Wha	t :	F he	Y		127
			•	Cur	11.	••	• •	••	•	• •	•	•	•	•	127
				B B	aggi aggi	ing ina	as as	a S a C	Ser Com	ial pre	Co her	onc nsi	ep ve)t	127
					Cor	ncer	ot.		•						128
				С	lose	ed a	and	Ορε	en (Con	cer	ots			128
				0	pen	Org	gani	izat	io	n.	•	•	•	•	129
			Sum	mar	v of	FLA	arr	ninc	ı a	+ B	hud	' c			130
									, u				•	•	100
		Qual	itat	ive	Sin	nila	arit	ties	s a	nd	Dif	tte	er-	•	
		en	ices	in	the	Res	sear	cch	51	tes	٠	•	•	•	131
			Sin	nila	rit	ies	• •	•	•	• •	•	•	•	•	131
			Dif	fer	ence	es.	• •	• •	•	•••	•	•	•	•	132
v	SUMMA	RY,	FINI	DING	S AN	ND F	RECO	OMME	END	ATI	ONS	5.	•	•	134
		Who	Lear	ns	at W	Norl	< . .	•	•		•	•	•	•	135
		What	: The	ev L	ear	.						•		•	135
		Why	They	√ Le	arn						•	•		•	135
		How	They	/ Le	arn.				•		•	•	•	•	136
		How	Do	Thev	Ord	iani	ize	Wha	at '	The	v	Lea	rn		137
		Find	linas								· ·				140
		Impl	icat	ion	sf	or s	Scho	, ools	3.					•	141
		Reco	ommer	ndat	ions	s fo	or E	furt	he	r R	ese	ear	ch	•	145
VI	CHANG	SES:	THE	E EM	ERGE	ENT	STU	JDY	•	•••	•	•	•	•	147
		The	Topi	ic.		•		•						•	147
		The	Pilo	ot.					•		•				147
		The	Site	es .											148
		Expe	ectat	ion	sar	nd I	Find	linc	15						150
		Deal	ina	Wit	h Di	sco	on fi	rmi	inα	Ev	ide	anc	e		154
		Char	nes	in	the	Oue	sti	one							156
		What	Con	nes	Next	:?.	• •	•	•	•••	•	•	•	•	157
APPENDICH	ES														
	Appen	dix	A:	LET	TER	OF	INI	ROI	DUC	TIO	N.	•	•	•	159
	Apper	dix	В:	cov	ER I	LETI	ſER	то	BU	D'S	•	•	•	•	160
	Appen	dix	С:	SIT	E AC	CCES	5S 1	INFO	DRM	ATI	ON	•	•	•	162
	Appen	dix	D:	CON	SENT	r fo	DRM.	•	•		•	•	•	•	164
															166
KELEKENCI	• • Crù	• •	• •	• •	• •	•	• •	•	•	• •	•	•	•	•	100

LIST OF FIGURES

Figure		Page
1.	Working Relationships at N.T.P	38
2.	Working Relationships at the Sign Shop	90
3.	Working Relationships at Bud's	116
4.	Factors of Responsive Engagement	137
5.	Organization of a Serial Concept	138
6.	Organization of a Comprehensive Concept	139
7.	The Experiential Banking of Tasks	139

Chapter I

INTRODUCTION

A lot of students who did not do well in school are successful in their post high school work life. Based on their high school records, one would not expect this. Somehow, they have acquired the skills and abilities that they need. Apparently, what they have not learned at school, they have learned at work.

Historically, we have looked to our schools for opportunity. With an education we could succeed. Without one, our possibilities were seriously limited. We have expanded our educational system to broaden our opportunities. Yet, we have a successful, productive segment of the population whose educational needs were not met by the schools but were met later in their work life. This situation warrants investigation.

Statement of the Problem

This study is concerned with the identification of some specific qualities of experiential learning on work sites. The purpose of the study is to generate assertions grounded in observational data in explanation of those qualities of experiential learning.

Need for the Study

A major goal of our schools is universal public education. We encourage students to not drop out and we attempt to provide for all of them. However, we have a part of the population who does not do well in school but is successful on the job. They learn at work.

The question is, why are they able to learn at work when they are not successful at school learning? Is there a way that school could meet their needs? The qualities of experiential learning at work that are the concern of this study may well provide some answers to these questions.

If the results of the study demonstrate that learning at work is qualitatively different than learning at school, the findings will be useful in making curriculum decisions to benefit these people. Others who are already successful in school could be expected to gain through the augmentation of their program.

Another potential benefit lies in the generation of hypotheses for further study by ethnographic or quantitative means.

Limitations

This section is concerned with the replicability and generalization in ethnographic research. Because this kind of research takes place in a natural setting instead of a controlled setting, the same conditions cannot be repeated.

The same piece of research then cannot be duplicated. However, the same set of research questions that guide a given research project can be used to guide another project on a different site. In this way, other sites can be studied, and the findings will be related to each other through the common questions. Similar findings become areas of generalization across those specific sites, but not necessarily across other sites. The focus becomes one of where the findings apply rather than whether or not they are generalizable.

Delimitations

This research is delimited to field observations carried out on three sites. The first is a funded, nonprofit project that trains janitors on the job. The second is a sign shop that specializes in custom designed, hand carved wooden signs. The third is a supermarket. It is one of a chain that serves a large, sparsely populated rural area.

The janitorial training site is the primary site. The other two sites were selected for their diversity and serve to corroborate the findings from the primary site. They also serve to broaden the applicable range of the findings.

Definition of Terms

For the purpose of this study, the following definitions will be used:

<u>Craft</u>, n. An occupation requiring special skill. The term craft can refer to many things including the expressive crafts which are primarily esthetic in intent. Examples of these are the craft of the singer, the potter and the painter. In these, an acknowledgement of the difference between art and craft becomes relevant. For the purposes of this paper, however, it is the non-esthetic aspects of craft that are being studied. The topic at hand is craft for productive purposes.

<u>Craft knowledge</u>. The enabling qualities in the practice of a special skill. There is a difference between knowing how a craft is done and being able to do it. Howard (1982) suggests this when he calls knowing how to perform a craft a practitioner's knowledge. Knowing about a craft can be taught, but the actual practice is learned by doing; by experience. It is within this practitioner's knowledge that the enabling qualities of a skill lie. These qualities are termed craft knowledge in this paper.

Experiential learning. Learning by doing. This term describes the experience by which a practitioner's knowl-edge is acquired.

Learning event. An occurrence in which knowledge or skill is acquired.

<u>Procedure</u>. An organization of actions to achieve an end.

<u>Task</u>. A single or basic action to achieve an end. In doing a particular job, usually a number of things have to be done to complete it. In this paper, these simple things are termed tasks and their organization to do the job is termed a procedure.

Rationale of the Research Questions

The ethnographer does not start out with specific hypotheses. Borg and Gall (1983) see this as an advantage that reduces the tendency to overlook things that do not fit initial expectations.

Rather than an hypothesis, the ethnographer starts with a set of loosely drawn research questions. These questions serve as an advance organizer for initial entry to the site. They establish a mental set to focus the early stages of the research. As the research progresses, the lead of the data may, in analysis, suggest new areas of inquiry for the study. Bogden and Biklen (1982) recommend that after entry into the field, the research questions be re-assessed to see which are useful and which need to be reformulated. Williamson, Karp and Dalphin (1977) state that collected data may reinforce the value of some questions, indicate that others be rejected and demonstrate the need to formulate some new questions. They caution against

holding so strongly to a given set of questions that important events not related to those questions go unheeded.

Research Questions

The major and subsidiary research questions that serve as the initial framing of this study are as follows.

- I. Who learns at work?
 - A. Is learning on the job mainly restricted to workers or are managers also learning?
 - B. Is learning at work mostly a focus of new and inexperienced employees or are more experienced people involved too?
- II. What is learned at work?
 - A. Is the learning restricted to simple tasks and operations?
 - B. Do workers learn reasons for doing things or just how to do them?
- III. Why do people learn on the job?
 - A. Do they learn only in order to meet present needs?
 - B. Do they learn in order to meet projected future needs?
 - C. Is pride in their ability a reason for learning at work?
 - IV. How do people learn on the job?
 - A. Do they learn by imitating?
 - B. What part does watching play in learning?

- C. Do they learn by doing or is the learning more or less finished by the time they reach the doing stage?
- V. How do the workers organize what they learn?
 - A. Do they learn operations and simply repeat them as isolated bits of knowledge?
 - B. Do they remember things as a series of events that are acted out in sequence?
 - C. Do they critically examine and conceptualize the materials they learn?

Dissertation Chapters

This dissertation consists of six chapters.

Chapter One introduces the need for the study and the application of observational field research as the method. The research problem is stated and terms are defined and discussed. The significance of the study and its delimitations are presented and the research questions are listed. A rationale of the questions is included.

Chapter Two is a review of literature providing the academic context of this study. It is a synthesis of thought on experiential learning including field experience, craft knowledge and folk learning.

Chapter Three discusses the methodology of observational field research, the use of research questions in the focusing of field notes and the procedure of continuing

analysis of the data. The relationship of this analysis and the emergent nature of the study are discussed.

Chapter Four is a description and of the data. It contains a general overview of the area. Each site is discussed separately. Assertions addressing the research questions are made and supported with examples from the field notes taken at the research site.

Chapter Five summarizes the project and presents the findings in the form of assertions. The implications of the assertions are presented as 1) implications for schools and 2) recommendations for further research.

Chapter Six is an intellectual autobiography of this project. Ethnography is not a research method that can be clearly mapped out beforehand. As data are organized, new directions are suggested by the interim findings as avenues for investigation on the site. This chapter is a case study of the emergent nature of the research, documenting how my thinking changed and developed during the course of the study.

The appendices include documents of consent and entry to the research sites.

Chapter II REVIEW OF LITERATURE

The purpose of this review of literature is to provide an academic context for field research on experiential learning. In writing such a review, the researcher must keep in mind its potential as a source of bias in an ethnographic study. One must take care to not write a synthesis of current thought on the topic which becomes a point of view that focuses the gathering of field evidence in its support. For the above reason, this chapter is not meant to be an exhaustive review, but rather an introduction to the areas of learning that are the focus of this study.

The main points covered are: 1) Dewey's concept of the continuity of experience, its relationship to the Kolb model of experiential learning and the role of vicarious experience, 2) the role of apperceptions and cybernetics, 3) field experience, 4) task specific information, 5) folk learning, 6) craft knowledge and 7) motivation.

The ideas of Dewey (1938) on the continuity of experience are basic to this discussion. He holds that education is growth and that growth is the result of experience. The learner is changed by experience and that change determines the understanding of successive experience. In turn, each

successive experience causes further change in a cyclical continuity of growth.

David Kolb (1971) expands upon this concept in the development of his model of experiential learning. He explains his theory of experiential learning in terms of a four stage cycle, starting with concrete experience. The second stage of the cycle is the observation and reflection of the meaning of that experience. The third stage is one of conceptualizing and generalizing on the basis of those reflections. The fourth stage is the use of the generalizations in determining a course of action for new active experimentation. At this point, the cycle continues into its next phase.

He sees two dimensions within this cycle. The first of these is a concrete-abstract polarity. Practical experience is at one end of this line and conceptualization of that experience at the other. It represents the relationship of practice to its theoretical base. The second dimension is the polarity of reflection and active experimentation. This line represents the process of analysis and verification of the meaning of experience.

Albert Bandura (1969) cites research demonstrating that observers of modeled behavior are able to formulate new patterns of behavior based on their observations. The observers abstract information and formulate conceptual generalizations from their vicarious experience. This is

consistent with the pattern described by Kolb in his model of experiential learning.

Dewey lays out the idea of growth as the result of a continuing cycle of the interrelationship of experience and change. Kolb examines this interrelationship in terms of reflective observation, concept formation and verification within the cycle. These contributions have concrete experience as their base. The work of Bandura indicates that observed or vicarious experience can play the same part in the learning cycle as concrete experience.

Apperception and Cybernetics

Apperception is the understanding of things in terms of previous experience. Jung (1971) discusses it in two phases. The first is the perception of the object and the second is the assimilation of it into a pre-existing concept by which it is understood. This understanding in terms of pre-existing knowledge is similar to Dewey's concept of the continuity of experience in which each event modifies the experiential base and changes the way in which subsequent events are understood (Dewey, 1938).

The concepts of apperception and the continuity of experience also relate to the field of cybernetics. Cybernetics is the study of control mechanisms with feedback theory as a major consideration. Norbert Wiener (1954) who coined the term cybernetics, describes control as the sending of messages which change the behavior of the recipient.

In feedback theory, the result of a behavior is monitored and the message received by the monitor affects subsequent behavior. Functional control by feedback is critical to self-regulating systems. Behavior affects results which in turn affect behavior through a feedback of information. The feedback describes actual performance rather than expected performance. That is, it does not just indicate an outgoing message for a performance to take place, it indicates the state of the performance itself.

The concepts of the continuity of experience, of apperception and the field of cybernetics all depend on past experience as the experiential base for current function. In each realm, feedback from what has gone before has provided the material for interpretation of the current scene.

Field Experience

Practice in a field adds a fullness of understanding that is not provided by academic contact alone.

In a paper examining the relationship of field studies to traditional academic goals, Hursh and Borzak (1979) discuss a field program in community service. They found that after participation in the program, the interns had learned that reality is much more complex than they had realized from their classwork and that there are no single "right" answers to problems.

Field experience in the form of an internship is a traditional part of professional education. Dinham and Stritter (1986) explain that, in general, professional curricula include three categories of educational experience. They include a basic arts or sciences program, courses in the professional area and a practicum in the professional field. The practicum is seen as the link between theory and practice and is considered to be the distinguishing feature of professional education.

Guided experience in field practice bridges between the outlook of the student and that of the practitioner. Interns find that practice is less clear than theory and that it requires a broader approach.

Task Specific Information

According to many authorities, performance is not based on general knowledge. They find that the ability to perform lies in the possession of task specific information.

Berger and Luckman (1967) explain that the social stock of knowledge defines the individual's sense of reality by degrees of familiarity. The most specific information is held about the things that one deals with the most.

Hirsch (1988) states that human skills are task specific and that when elements of past problems are presented in new ones, that there is a transferral of skills. Further, he states that it is the presence of task specific information that distinguishes good readers from poor ones.

In addition, good readers integrate what they know with what they read. Differences in what they know result in different constructs and meaning in what they read, the Commission on Reading (1984).

The point to be gained here is that if specific information defines the individual's sense of reality and specific information about context in reading bears directly on reading skill and construct of meaning, then task specific information might well be the determining factor in other performances as well.

Folk Learning

Anything that can be learned by direct experience, according to Bandura (1967), can be learned vicariously through observation. This idea helps to explain the continuity of folk learning in which traditional ways of doing things are passed from generation to generation, with little thought given to the actual teaching of these ways. The learning is based on a matter of fact, day-to-day growing up with doing things. People learn to cut a piecrust top the way their mother did and to build a fireplace the way their grandfather did when they helped him carry the stone. Factors are adapted to conditions and materials by local custom rather than by a conscious process of design.

In a study of synthesis of form in architecture, Christopher Alexander (1964) discusses how form making is

learned in folk cultures. These kinds of cultures have been called variously, folk, closed, primitive and anonymous, depending on the purpose of the writers. Alexander chooses to call them unselfconscious to emphasize their lack of thought about design as such. They simply are making things. Learning a craft in these cultures depends on gradual exposure to traditional ways and an imitation of what is seen.

This is the kind of learning that Ladislas Segy (1958) refers to in his discussion of African sculpture. The apprenticeship starts in childhood. The apprentice carver learns tribal styles and the nature of the tools and materials so completely that the work is automatic. The carving is not consciously designed and executed. It is more the product of a motor activity. Rules that have not been formulated in words are followed without conscious thought.

Lanier Meaders, a north Georgia folk potter documented by the Smithsonian Institution (Rinzler and Sayers, 1980) is the last in a family line of country craftsmen. He works in the same nineteenth century ways as his forebearers. Although looked upon as a folk artist, he sees himself as simply practicing a trade that he grew up in.

As a child he played and worked in the pottery shop. As he grew older, his skills and responsibilities increased

and at age seventeen his first full kiln load of ware was fired.

His apprenticeship consisted of growing up in the shop and learning the traditional ways by immediate contact rather than by reason and rule.

His productive career started at a time when the ware was used to supply local utilitarian needs. It is these same traditional shapes that are now looked upon as folk art.

The indigenous builder, the African carver and Lanier Meaders all share some common factors. Their craft was not learned formally. They learned by growing up in contact with practitioners of the crafts. They work with local materials for local needs. Their craft, as they know it, does not have a set of verbalized principles that they consciously follow and they are not intentionally expressive in their work. They follow cultural tradition and their emphasis is on the product itself, not on the ideas behind it.

Craft Knowledge

Craft knowledge is a working knowledge. The skills are in part physical and are learned in the doing. They are, however, more than a simple knowledge of procedure.

In his study on the work of artists, V. A. Howard (1982) calls the knowledge of craft a practitioners knowledge. It is the knowledge of how to perform an activity that will have a specific desired result. This is a productive activity that includes judgment. However, the development of judgment in a craft is not in itself taught. It comes with experience.

Learning from experience increases the accuracy of ones beliefs about patterns in experience and increases the effectiveness of ones actions (Torbert, 1972). This is the experiential basis for the development of judgment in the practice of a craft.

In order to learn from experience Torbert holds that individuals must be aware of a complex of changing relationships. These relationships include the environment, the process of attending to the environment and the individual's cognitive-emotional-sensory self.

Reflection on the awareness of environment, attention and self is an abstract thought process. Differences in this awareness may account for differences in the development of judgment in the practice of a craft.

Howard Gardner (1984) believes that the idea of general intelligence is not correct. He has developed a theory of multiple intelligences that includes seven ways of dealing with the world. The first two, linguistic and logicalmathematical are what are usually tested as measures of general intelligence. The remaining five are spatial, musical, bodily-kinesthetic, interpersonal and intrapersonal. Each of these is marked by certain core abilities. The abilities lie at the heart of each of the ways of understanding.

Motor control and skilled use of the body are factors in bodily-kinesthetic intelligence. Gardner holds that there is a point of change in bodily-kinesthetic intelligence that takes place in the Piagetian stage of formal operations. At this stage, the development of the abilities of symbolic and abstract thought enable one to state goals and criticize performance directed toward those goals. It is Gardner's position that the abilities of goal setting and criticism of performance apply to the development of bodily-kinesthetic skills.

This critical awareness is in keeping with Torbert's model in which awareness of the interrelationships of environment, attention to the environment and the cognitive-emotional-sensory self are necessary to learning from experience.

In relating a craft activity to Torbert's model, the environment includes tools and materials. Awareness of attending to the environment is the abstraction of thinking about thought. The cognitive-emotional-sensory self includes Gardner's personal intelligences, and whatever spatial, musical and bodily-kinesthetic intelligences that are a part of the craft in question. Gardner points out the desirability of this sort of combining of intelligences in the practice of advanced bodily-kinesthetic activities.

These activities are included in the physical aspects of craft knowledge.

Craft knowledge is a knowledge learned in practice. It is not knowing about something, but rather it is knowing how to do something that will result in a desired end. It involves a bodily-kinesthetic knowledge of a goal directed activity and a critical awareness necessary to the development of skill and judgment in the management of that activity. The product of craft can be as fleeting as a song or as lasting as a piece of stoneware, but the knowledge of a craft is inherent in its performance.

Summary

The Deweyan concept of education as the continuity of experience is that the individual, changed by experience, sees each new experience in a new light in an ever expanding progression. Jung's discussion of apperception and Wiener's feedback theory are in keeping with this. Kolb expands on the idea with his four stage cycle of experiential learning. The first stage is concrete experience, the second is reflection on that experience, the third is generalizations from the experience and the fourth is experimentation based on the generalizations.

The findings of Bandura indicate that vicarious experience can replace concrete experiences as material for generalizations.

Field experience provides a richness that augments theory-based understanding and task specific information is a major factor in that understanding. Folk learning is built entirely on field experience and includes both active and vicarious aspects in the acquisition of knowledge.

The working knowledge of craft is a practitioner's knowledge that is inherent in the craft activity. It involves partly the realm of bodily-kinesthetic intelligence described by Gardner and partly a critical awareness that enables improvement and judgment in practice.

Chapter III

METHODOLOGY

This chapter contains two major parts. The first is a brief discussion of ethnographic methods in general and the second is the methodology of this study.

The Method

Ethnography is not a clearly defined methodological approach. Rather, it is a broad category of approaches with many options. This discussion represents one path through those options.

Schatzman and Strauss (1973) use "field method" as a generic term for the study of events in a natural setting. Erickson (1987) uses the term "interpretive research" to describe the same method. He calls it the family of approaches to participant observation.

In planning an ethnographic study, the topic and the site are decided and research questions are framed to guide the gathering of data. However, these questions are not inflexible. They may change in response to events in the field, or in response to changes in the researcher's understanding of the events (Erickson, 1987).

Early observations on the site focus on the context of the research site. The physical structure is investigated

for patterns of activity and the social structure is studied to find patterns of influence. A continuing analysis of the data results in a series of decisions about who and what to observe and at what locations in order to best gather data that is pertinent to the study. Erickson (1987) refers to this as a process of progressive problemsolving. These decisions about where to be, who to watch and what to watch are emergent according to the lead of the data collected.

As the study progresses and the data are organized, analysis suggests answers to the research questions. These answers are framed as assertions rather than conclusions. They are supported by evidence from the field observations as recorded in the notes.

Research questions in observational field work serve as an advanced organizer for the researcher. Bogdan and Biklen (1982) suggest that the questions be specific to the research setting. Their purpose is to provide an initial framework to focus on particular events pertinent to the study.

The field notes are records of the events on the research site that pertain to the research questions. The notes should be accurately descriptive and concrete. The setting, the events and the people should be covered in detail. Conversations should be accurately quoted.

Impressions and possible explanations that come to the researcher are an important part of the field notes because of where they might lead in the analysis procedure. However, they should be clearly distinguished from the concrete recording of observations.

Often, it is not practical to record field notes on the site. Sometimes note taking will substantially affect the events. Other times, there is simply too much going on to be able to observe and record at the same time. However, it is important to record the information as soon as possible. Hammersley and Atkinson (1983) point out that although field workers train themselves to improve recall, the passage of time decreases the quality of their notes.

The properties of field research do not lend themselves to extensive prefabrication; natural fields and research foci and objectives are much too diverse for such an undertaking.

Qualitative analysts do not often enjoy the operational advantages of their quantitative cousins in being able to predict their own analytic processes; consequently, they cannot refine and order their raw data by operations built initially into the design of Qualitative data are exceedingly comthe research. plex, and not readily convertible into standard measurable units of objects seen and heard; they vary in level of abstraction, in frequency of occurrence, in relevance to central questions in the research. Also, they vary in the source or ground from which they are experienced. Of course, data also differ according to substance, and, coupled with the ways data are gathered and the forms in which they are apprehended, may lend themselves to different sorts of operations. Little wonder, then, that field researchers cannot predesign their analytic operations with exactness; probably most do not even try. (Schatzman and Strauss, 1973)
There are two distinct types of analysis in the proceedings of an ethnographic study. The first is a continuing analysis of the field notes that guides the emergent nature of the study. As the investigation unfolds, some research questions do not prove to be relevant and are changed or dropped. Others may emerge from the researcher's developing understanding of field events.

Secondly, the collected data are analyzed to develop the findings of the study.

The first step in this analysis will be to categorize the data. Some of the categories are provided by the research questions. Others emerge from the lead of the data. The categories are then examined for what Schatzman and Strauss (1973) refer to as key linkages. Those linkages are relationships that form patterns of meaning that provide assertions in explanation of the situations being investigated.

The results of a field study at one research site will not necessarily be the same as those from another site. This is essentially a case study method and the findings are in explanation of behavior in a given case. Generalization in ethnography is a cumulative matter in which the more cases that support an explanation, the more one can expect that explanation to fit future cases.

Bogdan and Biklen (1982) explain that some researchers clearly state that they do not mean to imply generalizability beyond a specific setting. Others are concerned with what settings their findings are generalizable to rather than the breadth of generalization possible. Another viewpoint is that the findings are a contribution to the body of knowledge about a topic and that generalizability is a matter for further research by other methods.

Williamson, Karp and Dalphin (1977) point out that because there is no set procedure in field research, it is not possible to replicate the findings of a specific study. Bogdan and Biklen (1982) discuss the same problem. They explain that because of differences in background and interest, two researchers on the same setting will collect different types of data and draw different conclusions. However, they hold that both studies can be considered reliable as long as the data supporting the conclusions accurately fits occurrences in the setting. Reliability of the studies would be in question only if the results were in conflict.

The Study

This study was designed to examine learning at work. It is framed by the research questions discussed in Chapter One. Who, what, why an how are questions basic to any inquiry, and with reference to learning at work, they became the major research questions. The subsidiary

questions were designed to focus the field work on more specific material for analysis. Three sites were observed: 1) a janitor service and training facility, 2) a sign shop and 3) a grocery store.

The field research was carried out over a four month period from April through July of 1988. One hundred eighty-eight pages of notes were taken, representing thirty-eight hours of on-site observation. The number of visits totaled thirty-four. The population of the study included twenty-seven people, eighteen males and nine females.

It is important in taking field notes that concrete observations be kept separate from the researcher's commentary, speculations and suggestions for further inquiry. In order to keep this separation, I ruled a line vertically down the center of my eight and one-half by eleven note pad. To the left of the line I kept my field notes and on the right, I made a running commentary of hunches, possible interpretations, suggestions for follow-ups and anything else that came to mind after the note taking process. The notes were dated and the time of the observations were noted.

In the ongoing formative analysis of the notes that helped guide the continuing direction of the study, I read and re-read the entire collection of notes from the site I

was working on. As meanings and possibilities came to mind, I noted them in the right hand column.

For the summative analysis, I made photocopies of the notes. As I read through them, I cut them into separate units of meaning and glued each one onto an index card. The cards were sorted into categories determined by the research questions. Then, I went through the categories looking for key linkages and relationships that formed patterns of meaning (see Schatzman and Strauss, 1973). These patterns were the basis of assertions in explanation of learning at work. These assertions were supported by vignettes drawn from the field notes.

The findings from each of the sites were written up as separate studies. A discussion of qualitative similarities and differences is included.

The question of generalizability is addressed by making this a multi-case study. The janitorial site is the primary study. The others, less intense than the first one, are included because generalization in ethnography is an accumulative matter. They broaden the range of potential application of the findings.

Chapter IV

DESCRIPTION AND DISCUSSION

This study was framed by a set of research questions that guided the taking of field notes on the research sites. The major questions are as follows.

- 1. Who learns at work?
- 2. What do they learn?
- 3. Why do they learn?
- 4. How do they learn?
- 5. How do they organize what they learn?

In this chapter, assertions are drawn from the field notes in response to the research questions.

The Northtown Project is the primary research site and the findings from that site will be discussed first. The Sign Shop and Bud's Market are secondary sites and their studies are less intense than the first one. They are presented to provide corroborative material and to broaden the applicable range of this research.

Overview of the Area

The sites for this research project are located in the northern part of a midwestern industrial state. This overview of the area is included to give the reader a general

idea of the historical, economic and cultural factors behind the setting.

In the last century, this was an area of vast forests of mixed hardwood and pine. There were very few settlers here before the Civil War. Development came in the eighteen-seventies as a part of the westward movement after the Civil War.

The first settlers came to farm but the real future of the area was in the exploitation of the forests. Both Northtown and Lakeview City developed in areas that had rivers emptying into natural harbors.

Early logging operations were done in the winter. The logs were skidded on ice-glazed roads to banking grounds at rivers edge where they were stored until the spring thaw. They were then floated down the river to the mills where they were sawn into lumber, loaded on ships and taken to market.

Two things changed the timber industry to a year around operation. The first was the invention of the "Big Wheels." This was a cart that looked like a wagon tongue and axle on two huge wheels, twelve feet in diameter. A team could pull three or four logs out of the woods on the Big Wheels any time of the year. The other factor was the introduction of the narrow gauge railroad. The engines, cars and tracks were small, comparatively cheap and could be considered temporary. Timber could be hauled to the

mills without need for the seasonally swollen rivers. Logging could go on throughout the entire year and the area boomed.

Soon after the turn of the century, five lumber mills lined the waterfront of Lakeview City. There was a chemical plant that produced wood alcohol and charcoal from the native hardwood. The charcoal was consumed by an iron foundry located across the road. Other industries included a brickyard and a tannery that used hemlock bark from the forest to process imported hides into shoe leather.

By the middle nineteen-twenties, the forests were cleared and the economy collapsed. They had originally thought that once the trees were cleared, it would become a broad area of farms. The railroads owned much of the land and during better days, they and the state as well had advertised for immigrants. People came from the eastern United States, from Germany, Poland, Bohemia, Wales and the Scandinavian countries to work in the woods and mills and to farm the land when the forests were gone.

They found that, with a few minor exceptions, the land was unsuited for farming. Underneath a thin layer of top soil that was soon exhausted, there was nothing but sand. The land was mainly unsuited to grow anything but trees.

Within a generation, the majority of the population drifted to the manufacturing centers of the southern part of the state. They left behind depopulated towns and country crossroads with local names like German Settlement Road, Dutchman's Bay and the Bohemian Settlement.

The people who stayed behind did their best. New chemical processes made forest products unnecessary for the tanning industry, and the tannery survived. There was a small piano factory. The rivers and waterfront brought in a few tourists. A few small patches of ground supported marginal subsistence farms on a small scale.

Following World War II the area started growing again. After the years of war time deprivation, people were traveling again and tourism became a major industry. Significant numbers of retired people were attracted to the area. These were all people who did not depend on the local economy for an income, but their spending added to the local economy.

In addition, over the past thirty years, a base of small manufacturing has developed. Wages are somewhat lower than in the downstate manufacturing centers, and it is to the advantage of major manufacturers to buy components from these concerns rather than to make them in their own plants.

A long-time resident of Northtown said that when they came to the area in nineteen forty-seven there was "nothing here but one small cement plant." Her husband found employment designing for a local fishing lure company. The

company had a very small foundry as part of its manufacturing operation that they offered to sell to him.

He bought the foundry and gradually expanded the business with contracts to supply parts to other manufacturers. It became a rather large operation that he ultimately sold to one of the concerns that he supplied.

This story parallels the development and expansion of other industries in the area. These industries include plastics, metal fabrication, electronics and an emerging wood products industry based on second growth forests.

Recovery and expansion has been slow and wages do not reach downstate levels. Because of the influence of the tourist industry, there is still a great deal of seasonal unemployment. The people still have to be thrifty and resourceful to make a living.

The Northtown Project

Northtown is a community of six thousand people. Its economy is based on light manufacturing and tourism. It is the county seat and serves as the commerical and financial center for the surrounding area. It is also a retail center for the sales and service of major household items such as automobiles and appliances. This is the location for the Northtown Project.

The Project

The Northtown Project (N.T.P.) is a private, non-profit corporation formed to teach occupational skills to physically or mentally impaired people. The Northtown office is one of four branch operations. The main facility is eighty miles away in a larger town with a population of about sixteen thousand. N.T.P. was formed in 1975 to provide services for developmentally disabled people and has grown to cover a seven county area. The Northtown branch provides vocational training, employment and rehabilitation services to people with any disability.

The major services are work training and job placement. N.T.P. operates a commercial janitorial service in Northtown which serves as a training facility. It also provides extended sheltered employment for some of the clients.

The project has several sources of financial support. Some comes from case service fees and contracts with Community Mental Health boards, State Rehabilitation Services (a branch of the State Department of Education), and several Intermediate School Districts. Revenue is earned from production work such as the janitorial business and other businesses they operate at other sites. Community service organizations, state and federal grants and private donations are additional sources of money.

The Northtown offices of N.T.P. are located on the ground floor of the Pioneer Lumber Building. This building

was constructed in 1909 to house the Pioneer Lumber Company. It was recently purchased by a developer and remodeled into several suites of offices. The historical character of the brick exterior has been preserved and the interior has been completely re-done. The plumbing and wiring are new and the new interior partitions are substantially built. The inside doors and trim are of oak, designed to be in keeping with the historical spirit of the building. The building is about seventy feet square with three stories above ground and one below. It is a very successful conversion giving an effect of both historical continuity and contemporary prosperity.

N.T.P. holds the cleaning contract for this building. They are responsible for cleaning the halls, restrooms and offices on the ground, first and second floors twice a week, on Monday and Thursday nights. The entire third floor is leased to Physician's Referral Corporation. N.T.P. is under a separate contract to clean this floor every night.

This building is the site of my research on how clients of the Northtown Project learn at work.

The Workers

There are seven people who work at N.T.P. They are 1) the Program Director, 2) the Production Manager and 3) five clients who are learning to do janitorial work.

Al is the Program Director. He is thirty-five years old and holds a teaching certificate in elementary education. He is three credits short of a Master's Degree in school social work. He has worked as an elementary teacher and as a caseworker for the Department of Social Services before his position at N.T.P.

He has been with N.T.P. for two years and is the Director who opened this branch operation. He is responsible for managing the janitorial operation as a business as well as for the vocational services provided to his clients.

His responsibilities for the janitorial operation include bringing in new cleaning contracts with local businesses and buying the equipment and supplies needed to service those contracts. He plans the cleaning procedures and operations for each contract and lays out his clientworker's schedules. Sometimes, when he cannot find a substitute, he has to fill in for a missing worker. He also is responsible for keeping the financial records for the operations.

His vocational responsibilities include bringing in new clients and training them. Most of them are sent to him by agencies such as State Rehabilitation Services. Their training involves explaining what to do and how to do it, showing them how and guiding them. All is the only person here responsible for the training. He also is responsible for placement and guidance of clients who are ready to work

in the community. This includes follow-up and counseling services during the transition to a non-sheltered work environment.

Don is the Production Supervisor. He is fifty-five years old. He has worked as a handyman for a carpenter, a dishwasher, a short-order cook and a janitor in the past. Three years ago he was badly burned working as the clean-up man in a local fast food restaurant. He was draining the deep fryer into a plastic bucket when the bucket melted and the hot grease spilled over the floor. He reached over it to turn off the fryer and slipped in the grease. He fell forward and landed palms and forearms downward. His hands, arms and lower torso were badly burned in the accident. He spent a month in the hospital and underwent a long course of physical therapy afterward. He now has sixty percent use of his left hand and forty percent use of his right hand.

Don was referred to N.T.P. by State Rehabilitation Services for help in overcoming the effects of his physical impairment from this accident. After his subsidized training was completed, Al hired him as a full-time employee with the title of Production Supervisor. He is responsible for carrying out Al's directions on work assignments and scheduling for the client-workers. He checks on them as

they work and makes minor decisions about who works in what area at a given time. He also has cleaning duties as a major part of his job.

The Clients

N.T.P. currently has five clients in training at this site. Four of these trainees are men and the fifth is a woman.

John is twenty years old. He was referred to N.T.P. by his Intermediate School District which pays twenty percent of the case service fees. The remaining eighty percent is paid by State Rehabilitation Services. He is a high school special education student who is documented as emotionally impaired. He lives in a foster home and has been with the program for five months.

Dave is thirty years old. He was referred by his Department of Social Services caseworker through State Rehabilitation Services which pays the fees. Dave is documented as emotionally impaired. He has been with the program for eighteen months. He has his own apartment under the supervision of his caseworker.

Steve is twenty-five years old. He was referred through his Intermediate School District in cooperation with State Rehabilitation Services. Steve is documented as developmentally disabled and mentally impaired. He has cerebral palsy. His physical symptoms are mild and would

go unnoticed in most situations. He has been in the program for twenty months and lives in a sheltered foster home.

Rick is thirty-five years old. He was recommended by Community Mental Health Services through State Rehabilitation Services. He has a physical impairment of one arm and leg due to cerebral palsy. He also has a seizure disorder that is reliably controlled by medication. He lives with his parents and has been in the program for two months.

Norma is seventeen years old. She is a high school special education student and was referred by her school through State Rehabilitation Services. She is documented as being mentally impaired. She lives with her parents and has been in the program for five months (see Figure 1).



Figure 1. Working Relationships at N.T.P.

The Work

The clients at N.T.P. learn four operations. The first is trashing, the second is dusting and the third is running the vacuum cleaner. The operations are done in that order in a given room. The fourth operation is cleaning the restrooms.

Trashing includes emptying the wastebaskets and replacing the liners. The person doing the trashing also empties and polishes the ashtrays and cleans out the coffee makers that are in some of the offices.

The duster dusts all of the furniture and cleans off any fingerprints or smudges that are on any of the walls, doors, furnishings or equipment in the room.

The worker operating the vacuum cleaner is responsible for cleaning the floors and upholstered furniture.

All of these operations are started at the point furthest from the door and the trainees progressively work their way out of the room so that nothing is missed. They work as a team cleaning the offices.

The restrooms are cleaned by a single worker.

First the room is trashed. Then toilet paper and paper towels are replaced. The soap dispensers are filled. Next the floor is mopped and the toilet bowl cleaned. The sink, the mirror and the towel dispensers are polished last. The routine is followed in this order each time to avoid forgetting anything.

The following procedure sheet is posted and its contents are taught to each of the trainees:

N.T.P. Project

General Procedures for all Janitorial Contracts

- Always complete all cleaning tasks listed on each contract sheet.
- Always report any problems noted during the cleaning of each contract.
 - A. Make note of anything unusual: doors unlocked, lights not working, windows broken, noticeable stains on carpets.
 - B. Always note if something is found broken or damaged at contract upon arrival which was not caused by our workers.
 - C. Always report if any of our workers breaks or damages anything while at contract.
- 3. Always do work up to company standards. Don't be afraid to take a few extra minutes to do a good job, not just an acceptable one.
- Always make sure you leave with all company equipment and cleaning supplies.
- 5. Make sure all required lights are shut off before leaving. If there are regular night lights left on at contract DON'T SHUT THEM OFF when leaving.

- 6. MAKE SURE ALL NECESSARY DOORS ARE LOCKED BEFORE LEAVING, DON'T BE AFRAID TO DOUBLE CHECK. IT IS BETTER TO BE SAFE THAN SORRY.
- When driving company van make sure all passengers are wearing seat belts.
- Always be careful when loading and unloading van to avoid damaging equipment.
- 9. If there are major problems or if you have any important questions call Al at home or office.

Materials and Equipment

Materials and supplies are carried to the work site on a janitor's cart. This cart is about four feet long, two feet wide and three and one-half feet high. The base of the cart is a rectangle with three-inch pivoting casters under the front end and ten-inch wheels in the back. The back wall of the cart is a vertical shelving unit with provision for holding cleaning materials and supplies. There is a bar handle across the back of this unit for pushing the cart. The front side of the shelving unit is a frame that holds a large plastic bag to hold trash. In front of the trash bag is a bucket with a mop in it. The mop bucket is a rectangular fiberglass container with a squeeze-type wringer that rests inside, at one end, even with the top. With the wringer at rest, its handle leans out two feet beyond the side of the cart. The mop handle stands about five feet in the air out of the bucket.

The following list is posted on the door of the supply closet:

Supplies - Janitor Cart

2 packages hand towels 8 rolls toilet paper 1 toilet bowl set-up 1 roll paper towels 1 spray bottle blue glass cleaner 1 spray bottle pink cleaner 1 handsoap refill 2 urinal deodorant blocks 1 package lightbulbs 3 large plastic bags 10 - 12 medium plastic bags 1 broom 1 dustpan Mop and bucket

They also regularly use a large, commercial, upright vacuum cleaner and a feather duster.

Who Learns at N.T.P.?

N.T.P. was established to teach handicapped people how to be janitors. Teaching is the main purpose of the operation and it is the worker-clients who do most of the learning on the site. When I started observing on this site, Norma was the newest worker-client and she received most of the instruction. She was dusting the day I met her. Al noticed that she had missed a few things and he reviewed the procedure with her.

"Where do you start? "Back there." "That's right, you start furthest from the door and work your way out." He spent some time with her showing and telling her how to do various operations. He demonstrated and explained how to use a feather duster on a cluttered desk, and how to dust the top of a picture without the risk of breaking it. He explained more to her this time than he did at any subsequent visits. As she became more experienced, she needed less direct teaching.

Dave and Steve continue to require a lot of attention. Although Dave has been with the program for a year and a half, he continues to have problems cleaning the restroom. I watched Al show him how. He explained that water marks have to be polished off the drain plug and the faucet. As he explained, he gestured with his hands, demonstrating the movements to be used. He showed how to wash the sink bowl with pink cleaner by actually doing the job. Then he explained and gestured how to clean the towel dispenser and the mirror. Dave told me later that, "The sink is the hardest part in cleaning a bathroom. You can clean and

clean on something on a sink and then find out that it was something that wouldn't come off."

Steve is very slow at his work. I have only seen him working on bathrooms twice. Both times he was taken off of that job and put to work trashing. Trashing rooms and loading supply carts are his usual jobs. He has been taught to ask what to do whenever he finds something out of the ordinary so he will not throw away anything of value while he is trashing. He depends on using a list to follow when he loads a supply cart so he does not leave anything off. Al wrote the list for him.

The only assigned operation I ever saw John or Rick do was to operate a vacuum cleaner. They both moved quickly with these machines, starting at the point furthest from the door and working their way out. Al told me that he teaches them to work in that order with all of their operations so that nothing gets missed.

Al told Rick one night to use an edging tool to clean up close to the wall. Rick looked at the dirt he had missed and changed tools to meet the problem.

One night I asked John what was the hardest job here. He said the bathrooms are the hardest but, "They are all simple, all of the jobs." I have never seen anyone show John how to do anything here.

Don, the Production Supervisor, learned this work as a client of the program two years ago. He learned the craft

of the four operations they do here at that time. I never saw Al do any direct teaching of Don during my research at this site. He did, however, experiment with vinegar as a cleaner and suggested it to Al:

You can use vinegar to do that with. "Is that something you did at your other job?" No, I experimented with it at one of our contracts. I tried it on the fountain and it cleaned it right up. "We might make out real well with that, especially if we can dilute it with water." Yes, we'll try it here.

Don seemed proud of his suggestion and pleased that Al had taken it seriously. This is the only example I saw of Al taking in information.

The craft learned here is very simple. Most of the skills are picked up quickly. Norma learned to dust when Al explained and demonstrated it to her and she performs her operation independently. Dave and Steve need constant supervision and quidance because they are slower to learn the operations. They are the people who the teaching is focused upon because they cannot perform independently yet. John and Rick have learned their operations and proceed with little supervision. Don learned the craft when he was a client and knows what is expected of him and of the clients. Rather than a teaching/learning situation between him and Al, it is a simple passing of information. Those on the client-worker level are the main learners here, and within that group, those who are less worker and more client get the most attention as learners.

What Do They Learn?

The work at N.T.P. falls into four categories: gathering the trash, dusting, operating the vacuum cleaner and cleaning the bathroom. In order to do this work, the clients learn to do specific tasks and to organize those tasks into procedures. They also learn to recognize when to use standard procedures, when to modify those procedures and when it is necessary to develop a new procedure.

Simple Tasks

In these next two examples, both Norma and Rick learn specific tasks that are parts of the job they are working on. These tasks are the basic elements of the work.

Norma was assigned to dust. She was making a lot of noise, banging things around as she moved them and working vigorously with her feather duster. She was looking more at the objects she moved than at the surfaces she was dusting. Al watched her for a minute and then went to the office she had worked on earlier to check on how well she had done. There was a lot of dust and cigarette ashes on the desk.

He called her back and asked her to do it again. She brushed over the top of things with her duster. Al said, "You have to move those things to clean under them." He moved some papers and other things aside, dusted under them and moved them back. He told her, "You can move these things to get under them and then move them right back

where they were." He checked the tops of the pictures on the wall and showed her how to dust them. She had missed a few things so he reviewed with her the procedure of starting furthest from the door and working her way out.

Norma learned to use the feather duster, to move things out of the way, to put them back, to dust the top of pictures and to start furthest from the door and work her way out. Each of these is an individual part of dusting a room.

Another example involved Rick and the vacuum cleaner. Rick usually ran the vacuum. The job includes cleaning the carpet in general, cleaning around the perimeter of the room with an edging tool, which is an attachment that is smaller than the main cleaning head, and cleaning the seats of any upholstered chairs with another attachment.

Al noticed two problems on this particular night. There was dirt around the edge of the floor and Rick had missed entirely the back office in the suite he was working on. He reminded Rick to start furthest from the door and he pointed out the dirt along the base of the wall. He asked Rick how he should get that. Rick responded, "With the edger." Al told him, "You should take care of that. You can see these things." Rick put on the edging tool and finished the job. Rick had taken care of the task of cleaning the main area of the floor. He had to be reminded

what the other two parts of the job are: start furthest from the door and use the edger.

Both Rick and Norma had tried to do the jobs that were assigned to them, but they had major problems. They had to learn to do specific basic tasks in order to do the job right.

Procedures

Dave often has a problem organizing his work. I watched him clean the bathroom one night. He was working with a spray bottle of blue cleaner and a paper towel. He squirted cleaner on the counter top and wiped it down with the towel. Then he cleaned the sink bowl and the faucet. Then he did the counter again and then the faucet. He then did the bowl again. He repeated these operations several times. Then he cleaned the mirror and the towel dispenser.

He understood the separate tasks of the job and he did them well. However, if he continued to work on a purely task oriented level, he would need constant supervision to finish his work. The following vignettes are examples of workers who learned to organize their separate tasks into procedures.

In the previous section, Norma had gone through an office and had given the appearance of dusting it, but, as Al had found, the office was not clean. He reviewed the

separate operations with her and she learned how to do the individual tasks.

I watched Norma clean an office the next week. Al was not on the site to supervise and she was on her own. In dusting the desk tops, she moved each piece of equipment, each stack of papers, each object she came to, straight out from its position, cleaned where it had been and put it back where it had come from. Each piece was done separately and she progressed from left to right out of the room doing each object in careful order to avoid missing anything. She had learned to group the separate tasks of dusting each item into a step-by-step procedure of dusting an office.

When Steve started working here he would make a separate trip to the storeroom to pick up each of the cleaning supplies to take to the site where he was working. He had trouble remembering things. Sometimes when he got to the storeroom he would have to make a trip back upstairs to his worksite to see what it was that he needed. Each object represented a separate problem for him to deal with. He was spending more time walking to get things than he was spending on his cleaning tasks. Al gave him the responsibility of loading the supply cart. Now the first thing that Steve does when he comes to work is wheel the cart out of the storeroom and check it. He looks to be sure that the spray bottles are full. If they are not, he fills

them. He makes sure that there are paper towels for cleaning purposes and for filling each of the dispensers. He does the same for each of the supply items that are needed on the cart. After he is satisfied that everything is there that is needed, he then takes the cart to the worksite. The separate tasks of taking each item to the worksite have now become the procedure of loading the cart and taking it to the worksite.

In an earlier reference, Rick had cleaned an office by vacuuming the center of the floor but had not done anything about the dirt that the machine could not reach around the perimeter of the room. At that time, the task of cleaning the broad area of the carpet was the complete job to him. Al helped him to see that there was more to the job. On subsequent observations, Rick checked the area along the baseboard and if there was anything to be cleaned, he used the edging tool as a matter of course. The two simple tasks came together into the single procedure of cleaning the room.

I watched Dave run the vacuum cleaner in the hallway in front of the elevator. He started at the center of the wall to the right of the elevator and worked his way around the walls until he came back to his starting point. Then he worked back and forth across the center of the floor until he reached the other end of the area he had gone around. After he finished I asked him how he did it:

"I started here, then I went around there and there and there and came back to here. Then I did out there. I do things twice sometimes. Maybe three times. That helps." He has made a pattern of his actions in order to avoid doing things "twice, maybe three times." The pattern makes the series of tasks into the single procedure of vacuuming the hall.

In these examples, each worker has done the same thing. Actions have become activity patterns. Each worker has made a procedure out of the separate tasks in order to work effectively without repetition or omission.

Recognizing Old Problems

In the following example, the subjects have learned to recognize problems they have had before and remember how to solve them.

I asked Dave what the hardest thing is in cleaning a bathroom:

... the sink. You can clean and clean on something in a sink and then find that it was something that wouldn't come off. You have to clean here and you have to clean off here and make sure that there aren't any spots here.

The sink he was working on had a spot on it; a small chip in the enamel that was discolored. He recognized that as something he had tried to wash off in the past and it would not come clean. He remembered that there was no point in working on it. When he said, "you have to clean here and you have to clean off here ...", he was speaking from experience about the drain plug and the overflow vent, both areas that take extra work. He also indicated the importance of cleaning water spots off of the chrome faucet. These are all problems that he has dealt with many times before. He recognizes them and remembers how to solve them when they occur.

Steve is a very sociable young man. The night I first met him he was so pleased to have someone to talk with that he forgot he was supposed to be working. Al told me later that this was a problem that Steve was constantly faced with and one of the reasons that he was not able to compete in the open job market. He would simply forget that he was supposed to be working and spend his time talking with people. Four months after I first met Steve I was watching him clean a bathroom. He was very excited and had a lot to talk about. Al had found a possible part-time job for him washing dishes. Steve told me all about it. He talked He talked about the possibility that the about interviews. man would not want him and he would have to start looking He talked about how important it is to do a good again. job at work and he discussed talking on the job:

... and it is all right to talk while you are working. Your boss will not mind if you talk as long as you keep on working. He will not care as long as you get the job done.

While he talked, he was able to continue working. His conversation showed that he recognized this old problem and

the fact that he continued working showed that he remembered how to solve it.

The first time I watched Norma dust, she was just going through the motions of dusting. She moved around the room shaking her feather duster against things, making a lot of noise and activity. The problem was that when she was finished, the room was still dusty. She had gone through the activity of work without actually getting anything It was a ritual removed from results. done. The next week when I watched her, she had put the tasks of dusting together into a procedure and she had learned to make a connection between work and results. When she picked up a pile of paper and dusted around it, she looked to see if there was any dust still there before she put it back. The old problem that she recognized from the week before was the need to check her work. She remembered to check as a part of her procedure to make sure that she really was cleaning the room.

Dave recognized the chip in the sink and remembered that it would not wash off. Steve recognized the problem of working and talking at the same time and remembered to stay on task. Norma recognized the need to check her work. In each case, the subjects learned to recognize a problem they had been faced with in the past and remembered how to deal with it.

Recognizing Comparable Problems

The subjects at N.T.P. learn to recognize problems that are comparable to things that they have had to deal with in the past. In the following examples they applied means they had used in the past to solve those problems.

Dave works very slowly. Al rates his production at sixty-nine percent of what is normally expected of a janitor in competitive employment in a given amount of In order to increase his production Dave was taught time. how to exercise judgment in cleaning a mirror so that he would know if the whole mirror needed to be cleaned or if it was clean enough that attending to a few water spots or fingerprints would be acceptable. During a later on-site observation, Dave cleaned the lower area of the mirror where there were a few water spots. Then he looked at the stainless steel paper towel dispenser. He found a couple of spots on it, wet them with his spray bottle and wiped them clean. Dave recognized that spots on a shiny towel dispenser are not much different than spots on a mirror. If a mirror can be cleaned selectively, so can a towel dispenser. The problems were similar enough that he used the knowledge he had for cleaning one of them to clean the other.

Norma has to move a lot of things when she is dusting. In the offices that she cleans, she comes across piles of

papers, books, magazines, rolodex files, ashtrays, telephones, adding machines and many other items that have to be moved in order to dust around them. The second week that I watched her dust, she picked up a pile of papers so she could dust around them. She lifted them carefully with two hands. She raised them straight up, moved them toward her until the area was clear and put them straight down, being careful not to disturb anything else. After she dusted under them, she repeated the process in reverse. The next thing on the desk was an ash tray. She raised it straight up, brought it toward her and put it straight down. When she finished dusting under it, she again reversed the same process. In fact, everything on the desk that had to be moved was moved in that same way. Although each object is different, the problem that they all present is similar enough that she uses the same basic techniques in dealing with each of them.

Dave recognized the similarity of cleaning the towel dispenser and the mirror. Norma recognized the similarity of moving the papers, moving the ash tray and moving the other items on the desk. In each case, the subjects recognized problems comparable to ones they had dealt with earlier, and they were able to apply the earlier solutions to the comparable problem.

Recognizing New Problems

Sometimes a problem comes up that the worker-client cannot solve by adapting an established performance. The new problem is too different to be met by minor changes in a standard routine. A few unsuccessful tries at it may be made but if a solution is to be found, the worker has to recognize that it is a new problem, not another instance of something that has happened before.

An example of this kind of recognition is provided by this story of Dave and his problems with the janitor cart.

Dave was on his way to the elevator. He had finished cleaning the third floor restroom and was on his way to the second floor. He was pulling his cart behind him, looking back over his shoulder intermittently to make sure everything was going well. He was pulling the cart backwards, with the stationary wheels in the front and the casters in the rear. As he walked, the cart drifted to the left.

When this happened, the wringer handle dropped into an open doorway. He spilled his water that way last week. He lifted the handle, swung the cart to the right and attempted to go forward again. The problem was that the casters allowed the end of the cart to stay close to the left side of the hallway. When he pulled forward, the cart swung back and the wringer handle dropped into the doorway again. He made three tries like this to get free of the doorway. Finally, he pulled the cart forward and to the

right as far as the handle would let him. Then he pushed back and swung the casters as far away from the wall as he could get them until the handle stopped him again. At this point he stopped and looked the situation over.

He looked at the handle, the fixed wheels and the casters. Then he leaned down and slid the cart sideways on the fixed wheels. Next, he stood up, took a hold on the cart handle and pulled it down the hall. He looked back over his shoulder, smiled and said, "There." He was free of the doorways. He went on down the hall, negotiated a right turn around the corner, turned his cart to the left and pushed the button for the elevator doors to open.

His troubles were not over yet. When the elevator came and the doors opened, he turned the rest of the way to the left to pull his cart in and the wringer handle caught in the doorway. When he leaned out to free it, the mop handle fell into the same position as the wringer handle. He let go of the wringer to get the mop and the doors closed on his cart. Everything was happening at once.

The doors re-opened and he tugged the wringer handle out of the way. He turned his attention to the mop and the doors came at him again. He stopped them with his hands and they re-opened but both of the handles fell into the doorway.

After the doors were fully open, he took both of the handles in one hand and pulled the cart toward him with the

other. The doors were starting to close on him again. He had a determined look on his face. This time he turned his head away from the door nearest him and blocked it with his shoulder. The door re-opened and he pulled the cart into the elevator.

Dave sighed and pushed the button for the second floor. He had not spilled his mop water tonight.

What happened here? In terms of learning at work, what is this story about? Basically, Dave was in trouble. He had spilled his mop water on the carpet on two other occasions and he did not want to do it again. He had the immediate problem of getting his cart to the second floor without spilling anything and circumstances kept trying to prevent that. He had to learn how to get down that hall. Dave was by himself. There was nobody to help him or to tell him what to do. It was his problem alone and he had to solve it in order to continue working. There was nothing else he could do first.

He knew how the mop wringer worked. If the problem had been with the wringer handle alone, lifting it up would have solved the problem and he would have been on his way. He tried to work it out as he went down the hall, but he kept getting in trouble. The problem was too complex to solve on the run. It required a complex of operations for the solution.

In order to come up with a solution he had to stop trying to move down the hall and figure out what the real problem was. It was after he looked at the handle, the wheels and the casters that he generated the idea that sliding the cart sideways on its large wheels would make a new set of relationships among the casters, the wheels, the wringer handle, the doorways and the factor of movement that would allow him to go on his way down the hall. His early attempts were just trial and error. After he examined the factors, he was able to see that it was their complex that was the problem. This examination showed him that the key factor in solving the problem was not in the handle but in the way the wheels worked on the cart.

Once he realized this, he knew what to do. He had identified the right problem and figured out a solution. When he tried that solution it worked.

He had taken on something by himself that was quite difficult. When he looked back, smiled and said, "There," he expressed pride in a job well done.

When Dave first got caught in the doorway, he tried to get free by moving the wringer handle. If that had worked, he would not have had to give the problem any more attention. However, it did not work and he was faced with a decision. He could have chosen to try the same thing again, and to keep repeating the action of moving the handle because that is what you do when a handle tips into
a doorway. He did not do that. Rather than drifting into a ritual action, he kept his immediate goal in mind, examined the situation and identified the problem. By addressing the causes, he was able to generate a likely solution that would take him to his goal. The solution was verified when he tried it.

When Dave tried to get on the elevator and the wringer

handle got caught in the door he was again faced with an emergent problem. At that point it was a simple problem and it was sensible to assume that raising the handle out of the way would solve it. Even when the mop handle became part of the problem, it seemed likely that just lifting it doors added the solution. It was not until the closing that he had to control both handles with one hand and pull the cart in with the other hand to get in before the doors closed on him. When he saw that he was not going to make it, he added the action of blocking the door with his shoulder. Again, Dave had kept his goal in mind and idenshoulder. Again, Dave had kept his goal in mind and identhe real problem. Then he was able to generate a shoulder. Again, Dave had kept his goal in mind and identhe real problem. Then he was able to generate a

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procedure that would solve it.

A summary is included at this point to abstract the material covered in this discussion of what people learn on the job.

The workers at N.T.P. learn to perform specific tasks such as cleaning a mirror with a paper towel and a spray However, just knowing the task performance is not bottle. They also need to learn to organize the tasks into enouah. This enables them to clean a room in an procedures. orderly way with some assurance that they will neither skip nor repeat the tasks that make up the job. They also need to be able to recognize old problems and similar problems so they can apply standard procedures or modifications of them to their solution. For example, they learn that vacuuming an office floor is not much different than vacuuming the entryway to the elevators. They still do the center by starting at one end and working to the other, and they still work around the edges until they get back where they started from. Finally, they learn to recognize a new problem that a standard procedure will not fit, and to work out a new procedure that will solve it.

Why Do They Learn?

Because N.T.P. is a training facility, one of the reasons that the workers learn is to carry out the basic purpose of the program. N.T.P. exists to teach handicapped people how to be janitors so they can become contributing members of society.

Once they become a part of the program, however, the reasons for learning at work become much more immediate and much less abstract. As well as being a training program,

N.T.P. is a cleaning company. The maintenance contracts they hold are gained by competitive bidding in the open market and their obligations are the same as those of any other cleaning company. If their performance does not meet market standards, they lose the contract.

The workers do not learn according to an education based schedule designed to lead them into progressively more difficult and demanding work. The learning process is framed by the structure of the job and driven by the demands of the work to be done. The learning experiences are determined by the practical necessities of work in a natural setting.

Providing for the Future

One night, in a philosophical mood, Dave explained why he was in training at N.T.P. and shared his long term ambitions with me:

I saw on television the other day ... "Are you tired of pushing a broom in a dead end job?" I'm trying to learn that kind of work. I want to get a job and get off general assistance. I guess I could stay on for the rest ... I like to work. I'd like to be on my own. Some day... It's funny

Dave is learning to be a janitor because he wants a better life. He sees learning at N.T.P. as the key to that better life.

Steve shared the same feelings:

I had my own apartment. When my mother was alive. We shared one. Now I am in a group home and would like to have my own place again. I can learn. You can learn and get a job and have your own money and things. It makes you feel good.

He saw N.T.P. as a way of getting a job and having his own place again.

Both Dave and Steve are talking about their long range goals. These personal goals reflect the reason that N.T.P. was formed; to help handicapped individuals toward independence. The on-the-job reasons for learning however are much more concrete and immediate than are goals of future self-sufficiency.

Immediate Production

N.T.P. has the same demands placed upon it by customers as any other commercial venture. They must work efficiently in order to show a profit. In order to do this, their work is organized around the needs of production. The workers do not learn according to an abstract notion of what is educationally appropriate. They learn what they need to know in order to get the job done. It is very specific.

Steve explained how to clean a toilet:

You push most of the water down with this (brush). Then you put in two squirts of this (a disinfectant cleaner). You have to be careful not to get it on your hands, it is very strong. Then you swish it around like this with the brush and flush it. See, see how nice and clean it is.

I asked Norma one night why I always found her dusting and if she ever did any of the other jobs. She said that it depends on who is here. She has run the vacuum and sometimes she cleans the bathrooms but usually she dusts. The reason she gave is "because it will get done."

Al has related that he usually has people work on the job they do best. He would prefer to have everyone work at each of the jobs on the site, but this is seldom possible. Sometimes they are short handed and people are put on new jobs in order to cover the work. Other times, there will be more workers than are needed and he can assign people to jobs they have not done before. This is not the rule. Usually people do what they do best at the site.

The learning is important. It is the reason that N.T.P. exists. However, getting the job done has to come first on the worksites in order to stay in business and provide the opportunity to learn. Because of this factor, the workers learn in order to meet the needs of immediate production.

Emergencies

The regular and predictable needs of production provide the reasons for most of the learning that goes on at work. The majority of procedures at N.T.P. are quite routine. However, when a problem comes up that is out of the ordinary it has to be met and solved. An emergency provides a pressing need for learning at work.

The first time Dave spilled his mop water was such a situation.

I stepped off the elevator to find Don, Dave and Rick frantically blotting up a pool of water from the carpet with paper towels. Dave had overturned his mop bucket when he came around the corner with his cart. He was very excited and thought that it would mean the end of his training: "When Al finds out about this, I'm gone."

Rick and Don were not doing anything to make him feel more comfortable. The problem of water on the carpet was their focus. Don sent Dave downstairs to get some rags. He thought they would work better than the paper towels did. When he returned with them, Don sent Norma and Dave down to the first floor with instructions for Norma to dust and Dave to clean the bathrooms. He wanted them out of the way.

Don had assumed his role as supervisor then and Rick continued to blot up the water with the rags. He then tried picking it up with the vacuum cleaner. It worked, but not as well as they had expected. Don suggested that they try the smaller hand vacuum that was in the truck. Rick got it and they found that it picked up more water than the regular machine. At this point Don realized that they had a wet-dry vacuum stored in the basement. When they tried that, they were satisfied with the way it picked up the water-spill.

They had no regular use for that particular machine on this worksite. The incident of the spilled water made an

immediate need to learn how to clean it up. They learned that the wet-dry vacuum cleaner was the best way to clean up such spills because of the emergency.

Independence

A certain amount of independence of judgment is needed if people are going to be able to work without constant supervision. One of the reasons that people learn at N.T.P. is in order to develop that independence.

When Norma was first dusting the offices, she followed the procedure she had been taught. However, when she finished that procedure, the offices were not clean. In her mind she had done the job, but in reality she had just gone through the motions. After Al went through the operations with her, she watched to see if she was leaving dust behind or not. She had learned to provide her own feedback in order to independently respond to the demands of production.

It is this same kind of responsive engagement that Dave was having trouble with when he kept repeating operations in cleaning the bathroom. The following example serves to demonstrate this.

Al pointed to the paper towel dispenser and asked Dave if it was clean. Dave responded, "Probably not ... because of the way that it looks." When Al asked what he saw on

it, Dave could not indicate anything and Al told him that there was not anything there. He then turned to the mirror.

You have already cleaned this mirror. Let's just say you didn't, and you came in here and it looked this good. Would you have to clean it? "No." That's right. If there was a fingerprint right here, what would you do? "I would clean it off." Would you have to do the whole mirror? "No." That's right. You have to use your head on some of these. That was a judgment call. "I feel like a referee." That's right, you have to call them.

In this case Dave was intent on doing the separate operations but he could not tell when he was finished with them. His attention was on the process but he was not able to evaluate his success. By explaining that it was "judgment call" when you decide if you should clean something or not, Al was encouraging a responsive engagement with the entire process. This responsive engagement includes continuing feedback and appropriate response. Dave demonstrated that kind of engagement on a verbal level when Al asked him if a mirror as clean as the one they were looking at had to be washed and Dave responded negatively.

In these examples, an understanding of the purpose of both the separate operations and the whole procedure is the key to a responsive engagement with the work. They need to learn to have this responsive relationship with their work in order to develop the independence needed to perform without constant supervision.

How Do They Learn?

The people at N.T.P. learn by experience. The experiences that they learn by fall into two categories: direct experience and vicarious experience. They learn directly by working out tasks and procedures by trial and error and repeating what succeeds. They learn vicariously by listening to other people and by watching them. Sometimes the vicarious learning is a planned learning experience and sometimes it happens by chance.

Vicarious Learning

The following vignette is an example of Dave learning by watching and listening while Al demonstrates and explains how to clean a bathroom.

"You have to make sure that you get all of the marks and water spots off here ... and here." He pointed to the sink plug and the sides of the faucet as he spoke.

"You have to wipe this out real good in here." As he spoke he pointed and then reached his hand into the wash basin and made scrubbing motions. He then pointed to the stainless steel paper towel dispenser.

"Is this clean?" "Probably not." "Why?" "Because of the way that it looks." "What do you see on it?"

Dave did not respond to the question and Al pointed to places that smudges could be expected.

"There is nothing here or here. If there were, they would have to be cleaned off." As he explained, he pointed at specific places that spots might be and made appropriate cleaning motions with his hands, demonstrating how marks would be cleaned from those places.

I watched Dave clean that same bathroom a week later. He looked at the towel dispenser and sprayed a couple of spots on it with blue cleaner. Then he polished the area where the spots had been just as Al had shown him the week before. He also used the same motions on the wash basin and the faucets that Al had demonstrated to him the previous week.

He had learned these operations vicariously by watching and listening as Al demonstrated.

In the next example Norma learned how to dust a picture hanging on the wall by watching and listening to Al as he demonstrated the procedure.

Al asked if Norma had dusted the pictures yet. When she replied that she had not, Al showed her how.

He put his left hand on the center of the bottom edge of the frame and pressed it against the wall. Then he dusted the front of the picture, the sides and then the top with the feather duster.

As he showed her what to do, the following dialogue took place:

You go along the top like this, but what else do you do? "You hold the bottom." Why? "So it won't come off." Yes, we don't want to buy them any new ones, do we. "No." Norma learned vicariously from watching how Al dusted the picture, by listening as he explained ("You go along the top like this."), by responding to his questions by describing his action ("You hold the bottom.") and by giving the reason for the action ("So it won't come off.").

In the previous examples, Dave and Norma learned by watching and listening while Al demonstrated how to do the work and asked questions that guided their understanding of the operation. The following example is qualitatively different. It includes both observation and direct imitation of Al's actions.

Al wanted her to understand that she had to move things in order to dust under them if an office was to be clean after she had finished working on it. He picked a pile of papers straight up, moved them to the left and sat them straight down. He dusted where they had been and put them back, separating the movements up, over and down as he returned them to their place. He then picked up the telephone in the same way, dusted under it and returned it to its place. He looked at what he had done, saw some dust and blew on it to clean it off. Norma watched his every movement very closely. Then she went to the next desk in the office and imitated each movement Al had made. She articulated her movements into up, over and down just as Al had. She blew on the area of the telephone after she had

returned it to its place. Each move that Al had made in his cleaning operation Norma repeated as her own.

In this situation, Al had provided a model by his actions and Norma had cleaned the desk by imitating what he had done. This process of modeling and imitation is a bridge between vicarious learning and learning by direct experience. The modeling provided by Al was a vicarious experience for Norma that she made concrete by the practical experience of imitation.

Practical Learning

Knowing about an activity does not necessarily imply the ability to perform that activity. The ability to perform lies within the personal and practical experience of performance. The workers at N.T.P. learn in practice by directed activity, by rehearsal and by trial and error.

Responsive Engagement

The role of responsive engagement in a procedure has been touched upon in the context of independence on the job. Norma had gone through the procedure of dusting an office, but she was not responsively engaged in what she was doing and when she had finished, the office was not clean. It was after she learned to attend to the whole of her activities and to evaluate them and make corrections as she went along, that she was able to respond interactively to the demands of the work before her. Before her

responsive engagement, she followed a rote procedure. Afterward, she successfully performed the procedure of dusting an office.

Directed Activity

Rick was vacuuming the floor in the outer office of a three office suite. Al and I walked through the outer and middle offices into the inside one where Al noted that the floor had not been cleaned. He then checked the middle office and found that there was dust along the baseboard all around the room. He found the same condition in the outer office as well as underneath a small table. When he was asked about it, Rick thought it had already been cleaned. Al told him to clean it "after you are finished here, but first I want you to put the edging tool on your vacuum." Rick put the tool on.

Ok. Now, see all this stuff ... this stuff along here. Use your edger and run it right along here. Pick it all up. All around the room. Ok, that's right. Be sure and get that in the corner. When you're done in here do the same in there. And be sure and get under this table here before you go.

Rick had already vacuumed the center and outer offices. They were clean enough for him but they were not clean enough for Al (or probably the occupant). Rick may have been trying to save time by not changing tools and by working as close to the walls as he could with the floor attachment. He may have thought that the room really was clean. Al chose to not demonstrate how it should be done, but rather to direct Rick in the procedure. By doing so, Rick experienced how to do the procedure and he also experienced his own instrumentality in making the floor clean. Rick had ownership in the results in one directed procedure rather than in two steps of demonstration and imitation.

Rehearsal

John is not a stranger to me. I know him in another context. He is a student in the high school where I teach. When Al introduced us at N.T.P. I said, "Call me Dick here, Mr. Cunningham at school." John thought for a minute and said, "I should call you Mr. Cunningham at school, but I should call you Dick here." I responded, "That's right, John" and he replied, "I have to go back to work now, I'll see you later, Dick." I said, "Yes, I'll see you later, John."

The next morning at school, John was waiting outside of the staff room when I came out. He greeted me, "Hello Mr. Cunningham." I responded, "Hi, how are you this morning?" We talked for a while and then I said that I had to go to class. He said, "Ok, goodbye Mr. Cunningham."

In the past, John had never had occasion to call me by name. He was not a student of mine and our relationship had consisted of an occasional hello or a nod as we passed in the hall. John was practicing. He was trying on the idea of knowing me in two roles and rehearsing his use of a different name for me in each role. He did not want to

make a mistake. He wanted to use the right name for me in both contexts and he was practicing to make sure he understood.

This kind of rehearsal is also evident in other situations at the work site. In the following examples, the participants are verbally rehearsing something that they will do in practice.

Steve had found several boxes of bound pamphlets stacked on the floor beside the wastebasket. He did not know if he should throw them away or not because in the past he had destroyed some new material that had been stacked on the floor. He did not want to make that mistake again.

Al: What do you do when you find something like this?

Steve: I ask you and you decide because I do not want to throw away anything good. Then I throw it away if I am supposed to and I do not get in trouble.

In another conversation, Al asked Norma if she had dusted the tops of the pictures.

Not yet. 'You go along the top like this, but what else do you do?' "You hold the bottom." 'Why?' "So it won't come off."

When Dave explained to me how to clean a sink, he was very specific.

You have to clean here and you have to clean off here and make sure there aren't any spots here (as he talked, he pointed to each location). In each of these cases, the explanation is a verbal preview of a future performance. As a rehearsal of what the performance will be, it serves as a procedural model.

Trial and Error

A good part of the learning that takes place at N.T.P. is by trial and error. After they have learned the tasks and procedures that Al has guided them in, further learning tends to be in the realm of problem solving. This involves judgment on the part of the participants. Al finds that teaching them to exercise judgment is his biggest problem. They tend to go through a procedure that is independent of the goal. His workers will sometimes spend as much time cleaning a room that is already clean as they will on a dirty one. Conversely, they can sometimes follow all of the cleaning procedures and be satisfied that the work is done even if the room is still dirty. Al is trying to teach them to focus on the goal rather than the ritual and to exercise critical judgment in order to increase their effectiveness on the job. When they have this ability of critical judgment, they are able to use trial and error techniques in solving problems on the job. This is done in two ways.

The first of these ways is symbolic and is done by discussion. By talking among themselves they speculate on what has worked in the past, what others have tried and what they think might work. It is related to the technique

of rehearsal discussed earlier in that it is a symbolic, verbal procedure. It is different in that it is more speculative and it is done in a group setting with input by more than one worker.

The second means is concrete and is done in actual practice. It is a procedure that is self-corrected by the participants. A solution is tried and by means of successive approximation, steps that bring things closer to a solution are retained and those that do not are discarded and replaced by other possibilities that might work. In this way, the participants move progressively closer to their solution.

An example of the role of discussion in working out a practical problem is provided by the situation in which Dave had spilled his mop water. It was discussed earlier as an illustration of learning to meet an emergency.

Dave spilled his mop water on the hall carpet while taking his cart from one area of the building to another. He took his mop off the cart and started mopping the carpet to pick up the water. Rick saw what he was doing and suggested that paper towels would work better. They opened a bundle of towels and spread them over the water, pressing them down so that they would absorb more. Don came down the hall and watched for a minute before he started to help. Then he asked Rick if he thought that rags would work better. Rick kept blotting while he thought and said

that he thought they might. Dave was sent for the rags while Rick and Don continued to blot with the paper towels.

When Dave came back with the rags, Don sent him to work in another area and he watched while Rick blotted with the rags and wrung them out over the mop-bucket. The two of them talked about how much better the rags worked. Then Rick suggested that they try the vacuum cleaner. They talked it over and decided that trying it was a good idea.

Rick ran it across the wet area a few times and they thought that it was an improvement. He said that it was too bad that they did not have a wet/dry vacuum. Don said yes, that they had one earlier but they sent it to their operation in another town.

Don wondered aloud if the small hand vacuum that they had in the truck would work better because it was more powerful. They talked about whether or not it was worth the trip down to the truck to get it. They decided that it was and Rick brought it up. They were pleased with the results; it pulled the water out of the carpet a lot faster.

As Rick worked, talk drifted back to the wet/dry vacuum. Rick pointed out that:

Most janitorial places have them and you don't have to pay no nine hundred dollars for them either. They sell the same thing on T.V. for fifty, they do the same job. At this point in the conversation, Don got a surprised look on his face. "I think we have one here." He ran for the elevator to check and returned a few minutes later from the basement with the machine. They then finished the clean-up job quickly and went on to other things.

In this discussion, the two of them worked together to come up with solutions to the problem. Don consulted with Rick as to whether or not the rags would work better than the paper towels. When they both agreed that they would work better, they tried them. Rick asked about the use of the vacuum cleaner and Don later asked about the smaller but more powerful hand vacuum. In both cases, they discussed whether or not they would try the suggestion and combined their judgment before they acted.

They talked on two occasions about a wet/dry vacuum. They agreed that it was the best thing to use and that most custodial services had one. It was not until Rick was speculating on how to get one that Don remembered that they had one on the premises.

By speculating verbally on what might work and checking them against the other's judgment, they were able to come up with a series of solutions to try, each one working out in practice to be better than the last.

Al actively encourages them to discuss their work. On an occasion when Rick had failed to clean a floor because he thought John was going to do it, Al told him,

That would be a good time to talk to him. You can't assume that you know what somebody else is thinking. You need to ask them. You need to talk to each other.

He told me later that sometimes they are like four completely separate people working alone with no communication between them. He said that if they do not talk about the work, things get missed and they cannot work out procedures. The previous example shows how it works when they do work out a problem through their discussion.

The story of Dave and his problems with the janitor cart was used earlier to demonstrate the recognition of new problems. It also serves as an example of working through a problem in practice. He was pulling the cart down the hall behind him when the handle of the wringer dropped into an open doorway. When he realized what happened, he stopped and looked back. The problem seemed simple enough to him, and he lifted the handle into the clear and swung the cart out away from the wall to proceed. When he pulled forward, the wheels guided him back to the doorway and the same thing happened again. After three attempts, he figured out how to get out of that doorway and go on to the next one where he was again caught. This time, he slid the entire cart sideways so that the handle was nowhere near the wall. He had taken care of his problem by trial and Each time his progress was blocked, he varied his error. method until he had worked out in practice a way that was successful.

How Do They Organize What They Learn?

The material that the workers at N.T.P. learn is practical knowledge. That is, it exists in practice rather than in an abstract or theoretical form. For example, when Dave talked about trying to remove a spot that would not come off of a sink, he was talking about a real spot on a real sink, not something in his realm of imaginative possibility. I have noted earlier that the workers learn simple tasks and that they organize these tasks into These are concrete working procedures that procedures. give form to the solution of specific problems in the work place. In an earlier example, Norma learned in practice that in order to properly dust an office she was to go to the point furthest from the door and work her way out, picking up each object, dusting around it and putting it back exactly where it came from.

The organization of this procedure is a practical, concrete, working concept. In this case, the structure of the concept is linear or serial.

Serial Concepts

A serial concept is a fixed procedure that is followed in established steps. By following each step, just as Norma picks up and dusts around each item as she works her way toward the door, the entire job is finished. As long as nothing new is encountered, a working understanding (an

understanding in practice) of a serial concept will provide the organization needed to complete an operation or procedure.

There are situations where a number of choices have to be made in order to perform an operation. In these cases, a serial concept of what needs to be done does not suffice. A broader understanding is needed.

Comprehensive Concepts

A comprehensive working concept can be described as a broad understanding of possible alternatives in performing a procedure. These concepts are sets of possible practices that are in the worker's repertoire when procedural choices are to be made.

This is the kind of concept that Dave was developing when Al was teaching him that a clean mirror does not have to be washed and that sometimes, instead of polishing an entire towel dispenser, only a few fingerprints have to be cleaned off. Al was working to teach Dave to make choices appropriate to the specific instance out of the set of tasks within his performance repertoire that applied to bathroom cleaning.

When Dave told Al that he felt "like a referee" in making "judgment calls" he was describing the situation more clearly than he probably realized in that he was making decisions of what is proper and what is not within a clearly bounded set of possibilities.

Closure

The two kinds of working concepts discussed are both closed systems. The serial concept is a specific, step-bystep set of tasks that is organized to provide a standard working procedure for a given job. The kind of understanding it requires is the ability to perform the tasks and the ability to correctly follow the procedural line of the series.

The comprehensive concept is also a closed concept. There are choices to be made about what tasks to perform and how to perform them. This is what Dave was learning about cleaning the bathroom. A comprehensive concept has breadth in proportion to the number of tasks in its range of possibilities for choice. The working choices that are made establish the relationship of the tasks used to complete a given job. However, the number of possible procedures (or relationships) is limited by the number of potential task performances within the comprehensive concept. In this sense, a comprehensive concept is a closed system that provides for a breadth of working choices within that system.

The problem still remains of accounting for growth within these systems. If they are closed concepts, how are problems met that do not quite fit the existing concept?

Open Organization

When Dave spilled his water bucket he was faced with an unprecedented problem. He did not have a serial procedure on call as a standard solution. Nor did he have a comprehensive organization that covered the problem. What he had was a wet floor, a mop and a concrete understanding of the discrete task of using a mop. It was this task knowledge that he applied. When Rick saw what had happened, he applied the task knowledge of blotting water with paper towels. The next task applied to the problem was blotting with rags and wringing them out to be used again. Then they went through the use of progressively more effective vacuum cleaners.

In this example, none of the tasks applied to the problem represented the learning of new skills. They all were practices that had been learned and applied in other contexts. The quality that was new was their application to an emergent situation.

When Norma followed the serial procedure of dusting an office and Al found that the office was not clean, there was something wrong with Norma's concept of the job. Her closure had been premature because something was missing. She was attending to the tasks, but not to the results. Al taught her to be responsively engaged in the performance. The missing idea was added and she was then able to attend to the results and evaluate her effectiveness as she went

along. A new element had been added to her serial concept of dusting and the procedure was now effective.

The following week I asked Norma what the hardest part was in cleaning a bathroom.

Probably the toilet. People are real fussy about the toilet. They want it clean. It gets all dirty up under where the water comes out and it's hard to clean up.

While she talked, she washed the sink counter, mirror and dispenser slowly and carefully, deciding what needed to be worked on and what did not. The same quality of responsive engagement that became a part of her concept of dusting an office has shown up as part of her discussion of cleaning a toilet and in her concept of cleaning a bathroom.

These examples suggest that the ideas and items of task knowledge exist not only within closed concepts, but also in an open mental construct. In this open construct, they are available for the adaptation of existing concepts, both linear and comprehensive as well as for the formation of new concepts. These discrete vignettes of knowledge held in an open mental organization provide a common stock that the workers draw from in the development of working concepts.

Summary of Learning at N.T.P.

In general, it is the workers who do most of the learning at N.T.P. The work is quite simple and Al, the director, has a quite complete understanding of what needs to be done and how to go about it. His major function lies in teaching the workers. Because it is an educational facility as well as a janitorial business, this was expected.

The workers learn simple tasks and they learn to organize those tasks into procedures that they apply to the work they do. They learn to recognize problems that existing procedures will cover and related problems that can be solved by adaptations of existing procedures. They also learn to recognize new problems that require the generation of new procedures.

Because it is primarily a training facility, one of the reasons that they learn is to provide for their personal future. However, the job related reasons that they learn are to meet the press of immediate production and to meet emergencies that come up in the work place. They also learn in order to develop the independence needed to make working decisions.

The methods they learn by are concrete. They learn vicariously by watching others and they learn in actual practice by doing tasks and procedures. They learn by evaluating their own success through responsive engagement. They also learn through the rehearsal of tasks and procedures and through trial and error and the repetition of things that work.

They organize their knowledge into two kinds of concrete concepts. Serial concepts are organizations of tasks that are followed step-by-step through a procedure. Comprehensive concepts are broad groups of possible alternatives available for performing a given procedure. These concepts are closed organizations of tasks that are drawn together to meet particular needs in the work place.

The performance knowledge of these tasks also exists in an open organization where it is available to modify existing concepts or to form new concepts to meet new problems.

The Sign Shop

The Sign Shop is located in Lakeview City. Lakeview City is a town of three thousand people twenty miles southwest of Northtown. The economy of the town is built on a strong diversified base of light manufacturing and tourism.

The Shop

Brian came to Lakeview City in nineteen seventy-four with little more than an old van and a few hand tools. He held a degree in business management and had worked as a salesman for a wine distributor. He found no personal satisfaction in the work and soon quit to take a job as a handyman at a furniture store where he learned the basics of furniture repair. With this knowledge base, he moved to

Lakeview City and opened a small shop to repair antique furniture.

The local real estate broker who located the building he rented for his shop asked him if he could paint signs to put on location at properties he listed for sale. As Brian's furniture repair and restoration business grew, so did his sign business. Because it was a woodworking shop, it was a natural evolution from signs painted on wood to signs carved in wood. Eventually, the furniture restoration business was dropped and the shop has achieved national recognition in the design and fabrication of custom carved wood signs.

As the business changed, so did the building. At first, Brian rented one part of a three part building. The other areas were rented out variously as storage, an auto repair shop and headquarters for a carpenter. Gradually, as more space was needed, Brian rented the other sections of the building. Eventually, he bought the property, redesigned the facility and constructed an additional building on the site.

The Workers

Brian is about forty years old. He is the proprietor and is ultimately responsible for the entire operation. He does the hiring, assigns basic responsibilities, brings in the clients and does the buying for the operation. He and his wife, Judy, design some of the projects. He also works

with Willy in engineering the steel structure that is used in conjunction with wood in some of the signs.

Willy is about forty years old. He works as a structural engineer for one of the local industries and works for Brian as an independent contractor. He fabricates the steel work at his home shop after hours.

Marcy and Mark are husband and wife. Mark is about thirty years old and his wife is five years younger. Marcy manages the office and plans the work schedules for the craft workers. She also runs the computer that is used to lay out and cut the minor signs that they make with vinyl film lettering. Mark is skilled at all of the operations that are done in the shop. He is a capable designer, he can operate all of the machines, he is skilled with the hand tools and he is an able finisher and illustrator. When someone has a problem, they come to Mark. He is in charge of the shop when Brian is gone.

June is about twenty-five years old. Her job includes enlarging designs to life size from small designs. Like everyone else in the shop, she also does various tasks of painting, priming and the application of gold leaf.

Jerry is a young man in his late teens. He does most of the rough woodwork such as gluing up signboards and cutting them to size, cutting parts on the bandsaw that are to be attached to the signboard and preparing things that will be finished by more specialized workers.

Mike is about twenty-three years old. He is a recent employee who is learning as he moves from job to job in the shop.

Lena is a sixteen year old high school student. She is totally deaf and is working here part-time through a placement by the Intermediate School District. She is an excellent illustrator with a very advanced spatial concept. She plans on majoring in art in college. Her abilities make her a useful member of the staff.

Dan is a part-time janitor. He is about twenty-three years old. Brian describes him as "slow." He cleans up around the shop, runs errands and occasionally does some well supervised sanding and priming.

Although there is not a formal chain of command at the Sign Shop, there are levels of collegiality. The business relationship of both Willy and Judy are primarily with Brian and not a major part of the in-shop dynamics (see Figure 2).



Figure 2. Working Relationships at the Sign Shop

The Work

The signs that they make here range from simple boards with sandblasted lettering on them to elaborate free standing structures supported on the inside with steel and clad with carved wood, gold leafed and bound at the edges in bronze.

Each sign is a new problem that has to be designed and brought into reality by a series of concrete operations. Each new project presents its own problems that have to be worked out in practice with the available means and materials.

Who Learns at the Sign Shop?

Everyone at the Sign Shop that comes into contact with a project learns. This is because the shop does not do

production work. Every new project that comes into the shop presents its own set of problems to be solved. Everyone in the shop from Brian on down takes part in the solution of these problems and everyone learns in the process.

The shop built a large sculptured sign that was commissioned by an industrial city in another state. It is installed to be viewed from the freeway at the entry to the city. The piece is three trees representing spring, summer and fall. They are slightly over eight feet wide and vary from twelve to fourteen feet tall. They are mounted in a triangular configuration on a concrete base, each tree forming a face of the triangle.

Each of the trees is a silhouette with negative areas cut through. The silhouettes are a skeleton of welded steel to bear the load with wood mounted on each side. The wood is clad with bronze colored annodized aluminum. The edges are bound with the same material. On the outward facing side of each tree, large, carved leaves and branches are mounted. They are painted in the colors of the seasons that they represent.

Brian and Judy worked out the initial design of the piece and the details were worked out in the shop.

Working from the design sketches, Mark made a small foam board model to visualize the piece in three dimensions.

Usually a piece is drawn in a small scale, and June uses an opaque projector to enlarge it to actual size. Then she uses drawing instruments to clean up and clarify the enlargement for transfer to the actual piece. This project was so big that these procedures did not apply. Instead, Mark made several working sketches that were successive approximations of what the finished silhouette would look like. For the full sized pattern, large rolls of paper were taped on the wall and a section of the drawing was projected on them. After he traced the projected outline, the taped paper was moved and the next section was projected in place. Mark had learned to adapt procedures to fit an unprecedented situation.

Mark transferred those drawings to the stock that had been glued up for the job and the silhouettes were cut out. The shop had never done anything this big before. They found that they could not design the placement of the leaves on a small scale and enlarge them. It did not look right. They realized that they had to work in full scale with the final design.

The pieces were heavy. The entire staff carried them out and propped them up in the yard. Mark and Brian tacked cardboard leaves and branches on them, moving them around and double checking on them until it was agreed that they looked right. Then Brian took photographs of them to record the placement.

The preliminary design work had given them design experience with the forms but not with the size. The two main decision-makers in the shop were learning basic design on a new scale and had to devise new working techniques to fit the situation.

When the redwood stock was glued up for the silhouettes to be cut from, Mike and Jerry were faced with a new problem too. Usually, a signboard is glued up in a rectangular format and then the full size drawings are transferred to it and the final configuration is cut to shape.

On these pieces, that would have been three panels over eight feet wide and ranging from twelve to fourteen feet long. When the finished shapes were cut out, nearly onethird of the material would have been scrap. On a project of this size, that would represent an unacceptable amount of money.

Instead, they figured out how to glue up the stock so that it roughly approximated the finished shape. Then, when they cut the silhouette out, the scrap was negligible.

Because of the size of the project, Mike and Jerry had to learn a new approach to gluing up the material.

There was another problem with the material due to the size. Because of the grain structure, a single piece of wood this size is proportionately very weak. It is also very heavy. In moving the pieces around the shop, they had

to be careful with them and most of the staff had to quit what they were working on and help. When the pieces were mounted on their steel skeletons, they became very difficult to move and Willy made a wheeled framework with a chain fall on it to lift and move the pieces around the shop. With this piece of equipment, they learned that what had been a major concern became a routine procedure. Brian told me later that "with this piece of equipment, making a big project like this is not that much different than a little one."

They bound the edges of the pieces with bronze colored annodized aluminum before they clad the faces with the same material. Mark and Mike did the first one. The contours were complex and they had no regular way of bending and clamping the material on while the mastic dried. When they talked about it, Brian remembered that when he had worked for a furniture repairman, they had sometimes used rubber bands to hold parts in place. They used that idea for the binding. They cut strips of rubber from an inner tube, stapled them on one face of the panel, bent the aluminum to shape, stretched the rubber over it to hold it in place and then stapled the band to the other face of the panel. This was an entirely new technique for the shop that was generated for this project.

When this project was finished, it had to be transported several hundred miles to the installation site.

This is usually a simple matter of lifting the piece onto the truck and binding it down, sometimes with a little packing material to protect it. However, in this case, it was more complicated than that. At first they were going to make a welded steel rack to secure the parts to and transport them on one truck. Then they realized that it would cost less to rent a second truck and trailer to haul them.

Willy designed rigging to attach to a bucket loader to lift the pieces with. He also designed fixtures to be attached to the truck bed that used the assembly brackets for the finished project as securing points for shipping. This kind of serious shipping installation was new to the shop. It had never been necessary before.

Learning in the shop is not unique to this project. For example, Brian bought a computer to do all of the routine lettering projects. It is programmed to cut the words from a self-adhesive vinyl film with a paper backing, rather like contact paper. The staff had to learn how to use it. Marcy, as the office manager, operates the computer and June works with the cut film. Before they had this piece of equipment, June enlarged and traced the letters by hand for the painted signs. With the film, she separates the lines of print and finds the right spacing visually by trial and error on the finished signboard. Then she burnishes the words in place. This is a new
process that experienced people have learned in order to meet the demands of a new means of production.

The point to be drawn from these examples is that the work is not standardized in the shop as new work comes in, they all have to learn how to do it.

What Do They Learn?

In general, the people at the Sign Shop learn the same kinds of things that the people at the Northtown Project learned. They learn to do simple tasks and procedures. They learn to recognize old problems that they have solved in the past and problems that are comparable to them that have related solutions. They also learn to recognize when a problem is new to them and requires a new solution.

Simple Tasks

June had taken a sheet of acetate film from the computer, separated the words and mounted them by eye on the signboard. She was not satisfied with the results. She laid a piece of scrap acetate on her cutting board and carefully laid out and cut a piece three-sixteenths of an inch wide and as long as the signboard. She looked at me, smiled and said, "pinstriping." She cut three more pieces the same way and bordered the sign with them. June had to learn this simple task of cutting the stripe from acetate in order to parallel the more technical procedure of striping with paint and brush.

Procedures

June explained and demonstrated to me how to make a sign with lettering from their computer. The information had been typed in and the computer had cut the lettering from an acetate sheet with a layer of backing on it. June's first step was to "weed" the letters. This is the process of taking the scrap material from around and inside of the letter forms. She used a stencil knife to lift the edges and peel the material off of the backing. Then she laid a transparent contact sheet over the face of the letters, cut the separate words out and placed them by eye on a prepared signboard. When she found the arrangement she wanted, she peeled the backing off and stuck the contact strip, complete with the letters, back onto the sign-Then she burnished the letters down with a rubber board. kitchen spatula ("There is a fancy tool made for this, but these work better") and peeled off the contact sheet. The letters were permanently adhered to the sign.

She had learned this procedure to replace the more demanding one of projecting, tracing and hand painting the lettering on the sign.

Recognizing Old Problems

Brian was getting ready to leave for the dedication ceremony for the tree sculpture. The major piece was installed and there are two small signboards that will be put in place at the ceremony. He had mounted a carrier

on the top of the family Volvo stationwagon to transport the signs. They were wrapped in plastic and held to the car-top carrier with large "C" clamps. "That is a good way to carry them. It holds them right down tight."

Brian recognizes this as the same problem that he faced many years ago in transporting display fixtures to art fairs. The solution is the same. The clamps work as well to affix the signs as they did the display racks.

Recognizing Comparable Problems

Mark and Mike are working on the designs for the steel inner structure for a sign for a downstate bank. The finished piece will be a large rectangle on top of a single six inch square column. The base of the column is to be a steel plate three-fourths of an inch thick welded to the bottom of the column with triangular braces welded on the column and the base to strengthen the structure.

As Mark looked at it he realized that, "We have one of these all set to go." He found a pattern for a base they had made for a previous sign. When he looked at it, he realized that it was not quite the same thing that they needed. He laid it on a piece of pattern paper and traced around two sides and one corner of it. Then he extended the side lines so they would be the right length for the new design and traced around the next two corners. He then extended those lines to locate the remaining corner and traced around it. Then he visualized the point at which the triangular braces would "look right" for the proper support.

Mark recognized that the base they had designed for the previous sign was comparable to what they would need for the bank sign. The problem was not quite the same because the new sign was bigger. However, the dynamics were comparable and simple enlargement was the only adaptation needed to solve the new problem.

Recognizing New Problems

June said,

We are not a production shop. Once in a while somebody will work here who acts like we are. They will hurry things through and hide their mistakes. That makes us all look bad.

Brian told me that when he first started carving signs, he accepted every job that was offered and figured out how to do it afterward. That tradition continues in the shop. Every project is looked upon as a new problem to be worked out. The tree sculpture is an outstanding example because of its size and the complexity of its structure as well as the transportation and installation problems that it presented. However, a plain, lettered sign that June made to warn skiers to avoid staining their clothes on the ski lift also was a new problem. The type face and size had to be selected and the placement of the wording had to be designed to fit the proportions of the signboard. June said, "There is quite a lot to do on a sign like this. I've been messing around with this one all afternoon. When I do the second one, it won't take any time at all."

It is inherent in the kind of work the the Sign Shop does that each project that they accept is a new problem. They recognize this and accept their individual solutions as a major strong point of the shop.

Why Do They Learn?

In the Sign Shop, the workers learn in order to meet the needs of current projects and in order to meet future and emergent problems.

Immediate Production

People learn at the Sign Shop in order to meet the press of immediate production. Each new job that comes into the shop is to some extent unique. Because the projects are not the same, each one presents its own problems. Each of these problems has to be solved in order to complete the project at hand. Each of these solutions represents a learning experience.

Brian told me that when he opened his shop he intended to restore antique furniture. His only experience in sign making had been in his high school publicity club. A local real estate broker asked him if he could paint some small signs and because Brian needed the business, he said "yes." He did not have lettering skills so he made small layouts for the signs with commerical press tape. Then he projected them on the signboards, drew around the image in pencil and painted in the outlines. He did not have the needed skills when he started making signs. He learned them to do the jobs as they came into the shop. "When somebody asked if I would do a job, I said yes and figured out how to do it afterward."

One of the major problems that had to be figured out in making the tree sculpture was how to handle something that big in the shop. In the early stages, they just carried it with the help of three or four of the workers. However, the more they did to each piece, the heavier it got. They were carrying around a lot of steel. Brian and Willy put their heads together and designed a threaded rod with a ring on it to be screwed into the steel structure inside the tree. The ring served as the attachment point for mechanical lifting equipment to be used instead of muscle power in handling the piece. This system became their standard method of dealing with large, heavy projects. The method was worked out initially to meet specific production problems with the tree sculpture project.

Providing for the Future

When Brian and Willy worked out the use of the threaded rods with the lifting rings as an attachment point for lifting the tree sculpture, Brian said, "We'll keep those

when we're done." That system has become a standard working method in the shop. Its use as a standard method was not an initial goal. It was an outcome of solving a specific production problem. Brian said of this project,

We learned a lot about working big. With good planning we don't really have to worry about lifting and handling. That's all taken care of by machinery. With an understanding of how to use that kind of equipment, large scale jobs are not really that different than small ones.

The new techniques that were developed for this piece had become a part of the body of knowledge in the shop. A solution for immediate production became a provision for future work.

How Do They Learn?

The primary factor behind learning at the Sign Shop is the workers' quality of responsive engagement in the solution of work problems. The problems are worked out in practice, sometimes vicariously by watching someone who already knows the way, and sometimes as directed behavior where the experienced worker walks the inexperienced one through the solutions.

Sometimes the problem is approached with knowledgeable judgment and successive trials and modifications until a solution is achieved. However, an actual trial is not always made. Sometimes this trial is made in the form of a rehearsal, either mentally tracing the steps or working them through in another medium.

Responsive Engagement

Responsive engagement is the quality of attending to a task interactively. A working attempt is made to perform an operation. The results of the attempt are examined to see what effect it has had. Based on the evaluation of the results, a determination is made as to what should be done next. The worker responds to each modification of the problem until it is solved and the operation is performed.

An example of this is provided by June's procedure in working out the placement of the computer cut letters and striping on a small sign. The letters within the words were spaced by the computer, but the placement of the words on the signboard had to be designed by June. She first looked over the words as separate units. Then she looked at the proportions of the board. Then she laid the words on the board in what seemed to be a well organized place-When she looked at it from a distance, the words at ment. the bottom of the sign appeared crowded. She moved them to provide more space. They were no longer crowded but the movement had broken the lower boundaries of the general area of the lettering. To correct this she cut some thin strips from the lettering material and laid them around the signboard about an inch in from the edges. This reestablished the rectangular configuration of the wording and properly related it to the shape of the signboard.

This was the effect that she wanted. She burnished the letters down and used this sign as a model for the other three in the series.

Her process of responsive engagement can be seen as a cycle of trial, evaluation, modification and trial again until the problem is resolved to her satisfaction.

This is an example of learning by working out a problem in actual practice. However, it is not purely practical because she exercised the mental process of knowledgeable judgment in the evaluative stage. Also, although several trials are involved, it is not purely trial and error, because of the intervening use of knowledgeable judgment between trials.

Rehearsal

Brian and Willy were figuring out how to load the parts of the tree sculpture for shipment to the installation site. Willy suggested that they load them right at the shop door rather than outside in the parking area. They thought that the best order would be to load the trucks first and then pull them out of the way to make maximum clearance for manuvering the trailer. In order to visualize this in his mind, Willy walked to the open door and looked at the loading area. As he looked at the driveway he held his hands parallel to each other and pulled them toward his body. As he did this, he turned his body

and drew his hands in a right angle turn stopping at the doorway. At this point he looked over his shoulder into the building and gestured overhand with his right hand swinging it out of the doorway to point at the driveway immediately outside. The motions were those that he would have used to direct the backing of the trailer to the door and the loading of the tree onto it with the crane.

He learned the right procedure for loading the project by directing a visualization of it the same way that he would have directed the actual event. This visualization served as a rehearsal to work out the actual loading process.

A more concrete example of rehearsal in the Sign Shop lies in the making of models for the more creative projects. Judy made a small sketch of the tree sculpture as an initial step in the design process. Before Mark did any large scale drawing of the project he made a small model from the sketch. It was a very simple model without detail, assembled from foam board, a sandwich of quarter inch styrofoam between layers of thin card stock. The purpose of the model was to go through the project in three dimensions in order to know in rehearsal, through activity what the general requirements of the project would be.

Directed Experience

Brian was working in the shop after hours. There was no one in the shop except him and Dan. June was going to

need some signboards in the morning that were ready to put vinyl lettering on. The boards were cut to size and sanded but they had not been primed. Brian wanted to finish them before he went home. He asked Dan to help him.

"Go get that can of Oyster White paint over there and two three-inch brushes."

While Dan got the materials, Brian placed two of the signboards between a pair of sawhorses. Then Brian said, "Put the paint on like this." He laid a brush full on the board and brushed it out in each direction. Dan did the same, but left the paint quite thick. "Brush it out thinner Dan, like this, or it won't dry right." In this way Brian showed and directed him through each step of the priming process of the signboards.

Vicarious Experience

In the previous example of directed experience, Brian told Dan what to do each step of the way. He also demonstrated as he talked. By watching Brian work, Dan was learning vicariously as well as by direction.

Mike also learned vicariously by watching Mark design the wood clading for the steel support for a large bank sign. The sign is a large rectangle on top of a seventeen foot beam. The beam and the interior of the rectangular signboard are fabricated from welded steel designed to

withstand extreme wind loads without damage. The structure is covered with wood to give the appearance of being made entirely of wood.

The signboard area presented no design problems. Mark planned it according to standard mounting procedures. However, the beam did present new problems. The base of the steel structure had four large triangular braces welded to it to provide for a broad mounting surface to bolt onto a concrete foundation in the ground. This had to be covered so that it looked like a logical part of what appeared to be a wooden sign base. Mark had discussed this with Brian and they had decided that a simple rectangular box could be used to cover the braces. After it cleared the braces, an upper section would be added that tapered into the six-inch square dimensions of the wood covered steel beam.

Mike would be responsible for making the wood covering for the beam and its braces. However, he did not know how to design the job. Mark showed him how. He laid a piece of tracing paper over the full size drawings of the beam structure. With a thick leaded pencil and a ruler he drew the wooden parts over the steel drawings they would conceal. Mike watched. As Mark drew, Mike learned how to fit the wood pieces over steel and he learned by measuring the finished drawings what size and shape to make the parts.

He learned the design procedure by watching Mark draw and he learned the specifications of the finished pieces by

looking at the finished drawings. The practical experience in this example was Mark's. The transfer of knowledge was a vicarious experience through Mike's process of observation.

How Do They Organize What They Learn?

Learning at the Sign Shop is learning in practice. As such it is organized in and by activity. They do not learn a core of theoretical knowledge and develop working procedures around it. What they do is build organizations of ideas from the demands of their work.

For example, Brian did not theorize that he would need a crane to move the tree project around in the shop. The need was felt directly when the project got too heavy to move by hand. The crane was built in response to the immediate, practical problem. With the solution of that specific problem, Brian realized that with a knowledge of how to use various lifts and cranes, large projects will not be much different than small ones for the shop to design and make.

Serial Concepts

June uses a serial order in her conceptual organization of how to use the computer cut material for minor signs. The steps are: 1) "weed" the letters, 2) back the letters with transparent contact material, 3) separate the words, 4) space them on the board, 5) burnish them down and 6) peel off the contact sheet. This series of tasks is a working procedure that gives regular form to the solution of a standard problem. The procedure was not developed as an ideal, it was developed as a working process.

Comprehensive Concepts

When they were making plans to deliver the tree sculpture to its installation site, there were several possibilities to be considered and chosen from. The possibilities were to use one truck for all of the components or to use several vehicles and carry the components separately. If one truck was used, they would have to build a strong, steel shipping rack to hold the components safely. With three vehicles, the components could be strapped down on the vehicle with spacers to keep the load from shifting. When they started planning a shipping rack, they realized that it would cost as much to build the rack as it would to use three vehicles. They decided to use the simpler loading and binding method with a vehicle for each of the three components.

The entire set of possibilities formed a comprehensive concept of shipping, from which choices were made appropriate to this specific instance.

Closure

June's serial concept of making signs with the computer cut lettering is a closed concept limited to the specific steps in her procedure. It fits a single purpose.

The broader comprehensive concept of shipping presents choices that make it useful in more than one instance. It is easy to imagine a situation where it would be more useful to mount more than one component on the same vehicle for shipment.

However, both of these types of concepts are closed systems. The serial concept is closed to one procedure. The comprehensive concept is broadened because of the choices available within its structure, but it is closed to those specific possibilities of choice.

Open Organization

I asked Brian if Mark already knew the necessary techniques when he came to work at the Sign Shop. Brian started to say yes. Then he stopped and responded,

It isn't so much that he knows the techniques as it is that he knows enough about tools in general that he can figure out the creative possibilities of a particular tool he is using.

This general knowledge about tools is part of Mark's common stock of knowledge that he calls upon when he needs to organize discrete tasks into a procedure to meet a new problem.

For example, the shop had a contract for a large sculpted redwood sign for an industrial park. The piece was designed by making a model and the wood was glued up for the finished piece. It was ten feet long by eight feet high. The final form of the piece would take a lot of carving.

Mark grew up on a farm with a background of selfreliance and improvisation. He has cut a lot of firewood. He has also spent a lot of time patching up old cars. As a result, even though it had nothing to do with art, sculpture or sign making, he was well aware of what a chain saw and an auto body grinder can do. These are the tools he used on the sign.

It is from the open mental construct of his experience that he drew the knowledge to organize a working concept to carve this large sculpted piece.

Summary of Learning at the Sign Shop

The projects that came into the Sign Shop are unique and each new project presents its own set of problems. Everyone from Brian on down takes part in the solution of these problems and everyone learns in the process.

Categorically, the people at the Sign Shop learn the same kinds of things that are learned at the Northtown Project. They learn simple tasks and procedures. They learn to recognize problems that they have solved in the past. They also learn to adapt solutions to fit new but related problems. Finally, they learn to recognize and solve new problems.

This is a worksite, not an educational facility. Because of this, learning at the Sign Shop is to meet the needs of current production and to retain that knowledge in order to meet the needs of future production.

They learn by responsive engagement in the solution of work problems. The learning is practical. It involves trial and knowledgeable judgment of the results. The trial can initially take the form of actual practice, rehearsal, directed experience or vicarious experience.

Things that are learned are organized around the demands of the work. The resulting working concepts take the form of: 1) serial concepts, 2) comprehensive concepts and 3) an open organization which serves as a common stock of knowledge available to draw on for closure into new serial or comprehensive concepts.

Bud's Market

Bud's Market is located in Lakeview City. It is one of two large supermarkets in town. Bud's is the more successful of the two. There are also four convenience stores in town that stock a few groceries. They are mainly party stores and are not competitors for the grocery market in the area.

The Market

Bud's Market in Lakeview City is one of a chain of nineteen stores in the northern part of the state. The population of the area does not warrant the attention of the large national chains, but provides a strong market for a local firm.

Bud's is a community-minded organization supportive of local civic projects. They have a program of awarding nonprofit organizations one percent of the cash total on their sales slips. "Bud's Slips" are saved by the library, school classes and most of the other non-profit civic groups in the area. Last year, over ninety-seven thousand dollars was awarded through this program.

There are seven merchandizing departments in the store. They are: 1) Grocery, 2) General Merchandise, 3) Dairy, 4) Meats, 5) Produce, 6) Frozen Foods and 7) Beverages. Each department has a Department Head who is responsible for the ordering of goods, the stocking of shelves and the general order of the department. Each of the departments has additional workers who take care of routine responsibilities. Reflecting the corporation's ideal of teamwork, the term associate is used for all employees.

The front of the store where the check-out counters and the courtesy counter are located has a separate Department Head who is responsible for the smooth running of the area. The Front End Manager monitors the number of checkers on

duty, the bagging and carry-out operations, the placement and order of the grocery carts and all customer service operations.

General responsibility for the store lies with the Manager and the Assistant Manager.

The Workers

The majority of research was done in three departments of the store: 1) General Merchandise, 2) Produce and 3) the Front End.

Betty is the Department Head for General Merchandise. She is about twenty-five years old and married. She and her husband live in another town about thirty miles away. She started working for Bud's in her home town when she was in high school and continued after graduation. She worked in General Merchandise there and when the position of Department Head opened here she was willing to transfer for the promotion. She has been here for about nine months.

Her work includes the ordering and display of non-food and seasonal items such as hardware, household goods, clothing, and lawn and garden items.

Patti is the Department Head in Produce. She is about twenty-five years old and has been working in Produce for about five years, two of them as Department Head in this store. She started working part-time in high school for another firm in a neighboring town. After graduation she continued with them for another year. A position opened at Bud's store in the same town as a helper in Produce. After a short time, she was made assistant and then about two years ago, she transferred to this store as Department Head. She is responsible for the ordering and display of fresh fruits and vegetables.

Janie is her assistant. She is about thirty years old and has had this job for three months.

Bill is about twenty-four years old. He worked in Produce for two years in one of Bud's markets that was sold to another company. He worked in another branch for a couple of weeks and was transferred here to fill in when Janie went on medical leave. Patti said that there are a couple of managerial positions that are due to open up and if he works out well here, he stands a good chance of getting one of them.

Frank is a cashier. He is twenty years old and has worked for Bud's for two years. He worked part-time as a service clerk and was promoted to full-time cashier when he graduated from high school.

Anna and Fred are service clerks. They are both high school seniors who work part-time. Anna has been with the company about six months. Her main job is bagging groceries at the check-out counter. She also works some at stocking shelves. Fred usually works at shelf stocking duty and fills in bagging groceries at peak times in the Front End (see Figure 3).



Figure 3. Working Relationships at Bud's <u>The Work</u>

In the departments of General Merchandise, Produce and the Front End, the work falls into two categories. They are 1) customer related activities and 2) product related activities.

Customer related activities are based on the recognition that the customers are the most important people in the store and every effort is made to make their shopping as pleasant as possible. Associates are taught to smile and greet customers cheerfully and to realize that for some of the customers, especially the elderly, shopping is one of their most important social contacts.

Product related activities include ordering, pricing and displaying the merchandise. Products must be displayed to their best advantage, things that do not move have to be marked down so they will. Fresh fruits and vegetables have to be continually sorted and trimmed to be kept looking their best and the display has to be taken down each night, packed in plastic tote boxes and put on display again in the morning.

The work in the Front End includes ringing up purchases on the register, taking payment and making change and bagging the groceries. The importance of the cashiers and baggers is emphasized in training because, to the customers, they represent the store more than the rest of the employees. They are the customers last point of contact with the store.

Who Learns at Work?

Bud's relies on a lot of part-time help. Most of these people are high school students who are used in whatever department needs them as well as working as baggers in the Front End of the store. Many of the placements are new to them and each new move involves learning to meet new responsibilities.

Department Heads need to keep up with current needs in their areas. New products in General Merchandise involve the design of innovative displays. Although display directions may come from headquarters, they still need to be adapted to the specific store. Seasonal changes in fresh fruits and vegetables make new practices necessary in that department as well.

Department Heads and helpers at Bud's both have to learn in order to keep current at their work.

What Do They Learn?

Learning categories at Bud's are the same as they are at the other two sites. The workers learn simple tasks and procedures. They also learn to recognize old problems, comparable problems and new problems.

Simple Tasks

New employees are shown orientation videotapes that introduce them to their work. The tape on stocking shelves teaches them to use both hands to move the product from carton to shelf. The tape on bagging groceries makes the same point.

The experienced people in the store do use both hands. I watched the manager tidying a display that was out of order. He cleared a space on the shelf with his left hand. With his right hand he reorganized the product in that space.

Frank learned to perform with two hands in the Produce Department. He was setting up the produce rack for the first time. With one hand he lifted single bundles of parsley out of the packing tray and onto the display rack. Janie then demonstrated as he watched. Afterwards he lifted the produce out of the tray with both hands, several bunches at a time and placed them on the display as a unit.

Procedures

Bagging groceries at the check-out counter is a complex procedure. I asked Anna to write a paragraph that explained how she did it. This is her response:

When I bag groceries, I first notice how big or small the order is. I plan the order out in my mind how I'm going to put the groceries in. I ask if the customer would like paper or plastic bags. When there is cans or boxes in the order I put those on the sides to keep the bag more sturdy on the sides. I put the lighter items then on top. I try to put all the colder items in one bag. Also, I put things such as soap and bleach in a bag by themselves unless there's not enough to fill up one bag then I put them in a little plastic bag and put them in with the other groceries. When there is meat, I put it in a little plastic bag before I put it in with the other food because it's not good to let meat juice run on the other foods.

When I watched Anna bag groceries, I noticed that she did not look at the product when she picked it up or when she put it in the bag. She looked at its position before she touched it. When she made contact with it, she was already looking in the bag at where it was going to be. When she put the product in the bag, she was looking at the next item she would pick up.

The visual part of this procedure was always before and not during the operation except when something went wrong. For example, one can that she put in the bag did not go where she had planned. She looked in the bag, picked the can up and made the correction. Then she looked away.

She followed the same procedure when she put the bagged groceries in the tote box for transportation to the car. She looked at the bag, then the tote. When she put the bag in the tote she was looking at the number of people in her check-out line. Then, while she carried the tote to the conveyer that carried it outside to the pick up point, she was looking at her next station at the check-out counter.

The procedure of bagging groceries includes observation and manipulation of the items involved. Anna, an experienced worker, performs one manipulative step of the procedure while observing for the subsequent manipulative step.

Recognizing Old Problems

The manager toured the store looking for displays that were out of order. When he found confusion in the canned soup display, he cleared space with his left hand while rearranging the product in that space with his right hand.

Frank's display in Produce was not going well. As Patti walked by, he asked her for help. She looked at the display and decided that the merchandise needed to be consolidated. She held her right hand steady in the display and moved the produce into it with her left hand. Then she lifted the consolidated material into the cleared space with both hands.

One of the meat clerks was re-arranging a display that had started to look empty. I asked her if she knew where she was going to put the packages before she started. She responded, "I just start moving them around. The idea is to make the case look full even if it isn't."

She used both hands together to move several packages at once with a sliding and compressing movement. Only when something went wrong did she move an individual item.

The common problem in the store is to make the shelves look full at all times. It appeared in each of these instances. The problem of moving the merchandise in each of these cases is met by the complimentary use of both hands.

Recognizing Comparable Problems

The store is constantly undergoing adaptations because items get out of place or damaged and open spaces show up on the shelves during the course of the day. These changes are minor. However, they relate to the changes that are made during a major display reset.

Betty received a schematic drawing from the parent company of a major reset in the kitchen and cookware section. There was a problem. The plan showed one more four foot unit of shelving than Betty had available to use for her display.

The problem was closely related to the minor, everyday re-arrangement of shelves. The difference was of scale

rather than principle. The products were shelved closer together than the schematic showed, but they were kept in the same basic relationship to each other. The effect was about the same as the drawing called for. Betty explained, "We couldn't follow it exactly because we have one less four foot section than they show, but you try to get it as close as you can."

Recognizing New Problems

The floors at Bud's are washed and waxed with a rotary machine. Most of the lower shelves are high enough on the shelving unit that the merchandise on them is protected from any splashing from the machine. One of the units in housewares did not afford this protection.

Betty told me,

I was getting a lot of damage on those (packaged, throw away aluminum cooking trays) from the cleaning machine, so I put them up higher on the shelf. These (pyrex bowls) I can just wash off if anything happens to them.

She recognized that there was a problem with the cleaning machine that called for a variation of the diagrammed display. The problem was unique. The solution was simple. By re-shelving the products, she no longer had to discard damaged goods.

Why Do They Learn?

They learn at Bud's for the same reasons that they learn at the other sites. They learn to meet the needs of immediate production and they learn to provide for future needs.

Immediate Production

New service clerks are shown a videotape on how to bag groceries. After they watch the tape there is a meeting in which someone demonstrates the procedure. After these two sessions they are put to work bagging at a check-out counter as needed.

Frank was putting up the produce rack. He is taking parsley out of the packing tray one bunch at a time with one hand and laying each bunch on a bed of ice in the display. As he worked, he noticed that there was not enough room for all of the items. He asked Janie, "Have I done something wrong? I don't have enough room."

Janie looked at the packing trays and at the display. She reached into the set up with both hands and moved the produce, as a unit, into a closer arrangement. Frank followed her example, no longer handling things one at a time, but moving them confidently in groups. The display looked a lot better and he gained the space he needed.

Frank had lacked what he needed to know to solve the immediate problem of displaying the produce. When Janie showed him how, he had the knowledge and put it to use on

the problem at hand. New service clerks do the same. Their new knowledge is put to work on the immediate production problem of bagging the groceries.

Providing for the Future

When Patti told me that Frank was going to work in the Produce department, I asked her why. She said that the manager had decided that they need a man in Produce to handle the heavier merchandise. Summer was coming and there would be watermelons that would weigh as much as twenty-five pounds each. There would also be bags of garden soil and other heavy seasonal items. She described it as, "A lot of weight for one little girl to handle."

Frank was being trained in anticipation of a future need. They wanted him ready when the need developed.

When workers are trained, they are expected to retain that knowledge for the future. I asked Anna how she knows if an order is not bagged well. She said that if the bag is not sturdy, if it does not stand up or if the groceries move around in it, she takes them out and re-bags them. She said that sometimes customers will complain if the bags are too heavy.

Once they are taught to bag, they are not supervised in the operation. They are expected to use their knowledge now and in the future and if they have a problem, it is their responsibility to know how to take care of it.

How Do They Learn?

Learning to work at Bud's starts with the responsive engagement of the worker with the job to be done. This engagement includes rehearsal, directed experience and vicarious experience.

Responsive Engagement

In an interview I asked Anna what the problem is when a bag of groceries is not packed right. She said that the bag "will not be sturdy. It doesn't stay up. Things move around inside. Then you take it out and adjust it."

What she described is paying attention to what she is working on rather than just following a packing procedure. When the bag of groceries does not support itself, she modifies the job so that it will.

This engagement with the goal of making a bag of groceries that will support itself and not shift when carried is critical. This is the quality that is behind evaluation and improvement of technique. The engagement gives feedback that directs the course of further learning.

Rehearsal

Anna wrote in her paragraph that, "When I bag groceries, I first notice how big or small the order is. I plan the order out in my mind how I'm going to put the groceries in." Planning how to bag the order includes seeing what goods are there and thinking of the goods in terms of their function in building a well organized bag of groceries. The next significant mental operation is deciding how many bags to use and what components will be used to build each of the bags.

This decision-making process is a mental rehearsal of the actual bagging process as she wrote, "I plan in my mind how I'm going to put the groceries in."

Directed Experience

When new employees first bag groceries on the floor, someone is in the area to keep an eye on them and help them if they have a problem. The person is there to guide the new worker when a bag is not going to stand because it is packed wrong; to point out that something heavy has been put on top of a crushable item. This direction from another person helps the new employee learn from experience by providing knowledgeable judgment in the early stages.

With directed experience, the worker is helped to develop a feeling for how the work should go and becomes self-correcting through responsive engagement.

Vicarious Experience

In an interview, Anna told me that new baggers are shown a videotape of the bagging process first. After seeing the tape, they then attend a meeting where someone demonstrates and explains how to bag with groceries from a sample order. By watching the process on tape, new baggers see and hear how the job should be done. The experience is then repeated in a living situation where they are a part of the context of the operation. Watching gives them a chance to run through the entire process without breaking the continuity with mistakes. They are able to see how it should go without having to generate the procedure on their own by solving a series of problems without benefit of previous experience.

How Do They Organize What They Learn?

Learning at Bud's shows the same organization into serial and comprehensive concepts in closed and open forms, just as was found at the other research sites.

Bagging as a Serial Concept

When Anna wrote about bagging, she isolated three major steps in the job. First, she looked over the order to see what she had to work with. Second, she built up the sides of the bag. Third, she filled in the bag with the light things on top.

The three distinct steps form a procedural order that she follows in doing the job. It is a series of activities that, when followed, result in a well packed bag of groceries.

Bagging as a Comprehensive Concept

Anna explains in her paragraph that she plans in her mind how she is going to pack the groceries. She puts cans or boxes around the sides to make the bag sturdy. Then she fills in with lighter items. However, there are more categories than heavy and light that she keeps in mind while she classifies the merchandise. There are cans and boxes, soap, bleach, cold items and meat. She has to make a qualitative judgment with each of these items to determine which of the possible classes is most significant in deciding how to use an item in the bag.

Making these choices requires a broad understanding of groceries from a baggers point of view. There is a complex set of possibilities to choose from. This set of possibilities forms a comprehensive concept.

Closed and Open Concepts

The three steps in the serial concept of bagging are: 1) looking over the order to see what is in it, 2) selecting the appropriate things to build the sides of the bag and 3) filling the bag in with lighter things. Each step in the series leads to the next for the single purpose of bagging groceries. It is a closed concept leading to a specific end.

Bagging as a comprehensive concept is within the context of selecting items for their utility in filling a bag.

Despite the breadth of possibilities in categorizing, it is still a closed concept because the purpose in this organization is limited to bagging groceries.

Open Organization

Bagging is a closed concept made up of a set of specific skills. However, these skills are not necessarily exclusive to bagging. The training tape on bagging teaches workers to use both hands when they put the products into the sack. When Frank bags groceries, he uses both hands. When I watched him set up the produce rack for the first time, he only used one hand to lift single bundles of parsley into the display. However, after Janie showed him how, he used both hands.

Anna provides another example. When she bags groceries, she looks to see where the items are that she is going to handle before she touches them. When she picks them up, she is already looking at the place where she is going to put them. When I watched her stocking shelves, I saw the same thing. She had a carton of bottles in her left hand. She looked at the bottles first and then looked at the shelf. She kept her eyes on the shelf while she put the bottles on display. Her looking ahead skill is a part of both of these closed concepts.

Although a skill may be part of a closed concept, it is not exclusive to that concept. It does not exist only

within that closure. It is also available within the open organization of the learner's general knowledge where it is available for other applications.

Summary of Learning at Bud's

The work at Bud's is quite routine. Once the basic tasks and procedures are learned, problems tend to be new to the worker but not new to the store.

Learning at Bud's follows the same structure as learning at the other two sites. The workers learn simple tasks and procedures. They learn to use solutions to problems that have worked for them in the past and to adapt solutions to fit new but similar problems. They also learn to recognize new problems.

The need to learn is determined by the needs of the work place. Learning is driven by current utility needs in the store.

They learn practically by responsive engagement in their work. Sometimes, as with the tapes and demonstrations, the work experience starts vicariously. It is followed with actual work experience with immediate production as the goal.

The working concepts they develop are organized into the same serial or comprehensive organizations discussed earlier. Their knowledge is also held in an open organization that is drawn upon for the organization and closure of new concepts.

Qualitative Similarities and Differences in the Research Sites

These sites and their populations are not intended to be either random or representative. They were chosen as diverse places where people learn on the job. This diversity is intended to provide a greater breadth to the findings than evidence from one site would support.

Similarities

N.T.P., the Sign Shop and Bud's are similar first of all in that each one is a functioning business that has to be successful in order to stay in operation. N.T.P. has to acquire and maintain cleaning contracts. The Sign Shop has to attract clients for custom signs as well as design and fabricate the signs. Bud's must successfully merchandise their products as a supermarket.

Secondly, they are similar in that all three of them train their own workers. The trainees at N.T.P. come into the program without previous janitorial training and learn from experience by working with Al how to perform their jobs.

The people who work for Brian at the Sign Shop may have a general background in design and woodwork, but they are inexperienced as sign makers. Their specific training comes from working in the shop.
The employees at Bud's may have worked at other stores, but the majority of them have received their training within Bud's corporation. Like the workers at the other research sites, Bud's employees are trained by working on the job.

Thirdly, there are similarities in the motivation of the workers at N.T.P. and at the Sign Shop. The workers at N.T.P. are initially there to receive training so they can be self-sufficient. However, as special education students, most of them do not have a strong idea of the benefits of delayed gratification. Their immediate motivation is to be able to do the task at hand. Al sees to it that the work they are assigned is hard enough that they are challenged by it but easy enough to be within their grasp. Their motivation is intrinsic in that they gain satisfaction from successful encounters with their work problems.

Motivation at the Sign Shop is from the same source. The workers are motivated from within by satisfaction from the creative process. They are proud that they are a custom shop, not a production shop, and that their work represents problem-solving, not simple repetition.

Differences

As well as being a business, N.T.P. is a subsidized training facility for impaired people. The majority of their worker-clients are referrals from the Intermediate School District and are special education students. They

need a lot of attention in their training. Workers at the other sites are more representative of the general population and do not need as much guidance. However, one of the workers at the the Sign Shop has a special education background.

There are also differences in the scale of operations at the three sites. This branch of N.T.P. is basically a one-man operation. Al does the hiring, the scheduling and the training of all the workers.

Brian does all of the hiring at the Sign Shop and oversees the operations in general. However, he does depend on key employees for the specifics of production, problemsolving and the training of new workers.

Bud's Market is a fairly large corporation with nineteen supermarkets in the chain. They are the only site in this research that uses formal training materials for their employees. These materials are limited to a few videotapes. The majority of the training of new workers is done by Department Heads.

There were motivational differences between Bud's and the other two sites. Although Betty and Patti showed evidence of gaining a lot of personal satisfaction from their work, most of the associates were extrinsically motivated. After they had learned to perform their jobs there were not many new challenges and their motivation was more from trading a day's work for a day's pay than from a sense of personal expression in the work itself.

Chapter V

SUMMARY, FINDINGS AND RECOMMENDATIONS

The problem of this paper was to investigate experiential learning on worksites and to generate some grounded assertions from the findings.

The method of research was participant-observation. On-site research was guided by the following questions which served as advance organizers for field notes.

- 1. Who learns at work?
- 2. What is learned at work?
- 3. Why are things learned at work?
- 4. How do people learn at work?

5. How do workers organize what they learn?

Research was carried out on three field sites. They were: 1) a facility that trains janitors on the job, 2) a sign shop and 3) a grocery store.

Field notes were taken from observation and interviews of the participants. The data were analyzed in the light of the initial research questions and assertions were generated in answer to those questions.

The initial site observed was the janitorial training facility which served as the primary study. The other two sites were selected for their diversity. Those studies

are less intense than the first one. Their purpose is to broaden the applicable range of the first study as discussed by Bogden and Biklen (1982).

Who Learns at Work

In general, it was found that although everyone learns at work, it is the new employees who learn the most and the more experienced employees who provide the guidance.

What They Learn

The workers learned to perform simple tasks to achieve specific goals. They learned to organize those tasks into procedures to achieve more complex goals.

With experience they learn to recognize recurrent problems in new contexts and are able to apply the appropriate procedure to its solution. On occasion, problems will emerge that are related to things that have already been solved. They learn to recognize these situations and adapt existing procedures to their solutions.

They also learn to recognize new problems that require the generation of new procedures for their solution.

Why They Learn

The workers learn in order to meet the needs of immediate production. Even at Bud's where some of the initial learning is done by watching videotapes, the workers are learning in order to meet an immediate need on the floor. As soon as they have received their instruction, they are put to work on the task they were taught.

They learn with an immediate need in mind, not an abstract eventuality. However, they are expected to retain what they have learned in order to meet that need in the future if it should reoccur.

How They Learn

Learning at work is practical and takes place through experience. It has been found across the three studies that responsive engagement in the work is necessary. Otherwise, a job is just a procedural ritual and the quality of the work is not a factor. Responsive engagement is an interactive process that involves workers in both attending and responding to the work at hand. They attend to the goal, the activity and the result of what they are doing. They respond by making appropriate trials to achieve the goal, by evaluating the effectiveness of the trials and by modifying them to be more effective. Workers learn from experience, by self-evaluation and self-criticism. It is a process of trial, evaluation, modification and re-trial until the problem is resolved (see Figure 4).

Responsive Engagement				
Attention	Response			
Goal Activity Result	Trial Evaluation Modification			

Figure 4. Factors of Responsive Engagement

The trials, however, can be through a process of rehearsal. The rehearsal can be a mental process where the workers run through a procedure in their minds. It can also be a concrete procedure such as the making of models or patterns for a project in order to work out the problems beforehand.

Directed experience is another means of learning in the work place. This takes place when an experienced worker walks the learner through a procedure, directing them at every step along the way.

Workers also learn by vicarious experience. Watching training tapes at Bud's is one example. A more typical example is when an employee with personal experience performs a procedure while an inexperienced worker watches. The inexperienced worker then emulates the behavior of the model.

How Do They Organize What They Learn?

People at work organize what they learn into procedures that they follow to do their jobs. They do it by trying out ideas they think will work and continuing to use the ones that are successful. The concepts they develop are practical procedures established by activity and built around the demands of their work.

These concepts take two basic forms: 1) serial concepts and 2) comprehensive concepts.

A serial concept is a step-by-step procedure in which each step is followed in a set order until the job at hand is finished (see Figure 5).

TASK ----- GOAL

Figure 5. Organization of a Serial Concept

A comprehensive concept is also a step-by-step procedure that is followed until the job is finished but this time options are available and decisions have to be made to select the right one. For example, your problem is to smooth a board. The first step is either to plane it or to use a coarse sandpaper. The second step is to use medium sandpaper and the last step is to use fine sandpaper. This is a comprehensive working concept of how to smooth a board because the first step is a choice. You have to decide if the board is too rough to start with sandpaper. If it is, your choice for step one is to use the plane (see Figure 6).

TASK	TASK	TASK
TASK	TASK	TASK GOAL
TASK	TASK	TASK

Figure 6. Organization of a Comprehensive Concept

Serial concepts are used when the problem is always the same. Comprehensive concepts are broader and cover a wider range of possibilities in their application.

Both kinds of concepts are closed systems. They are brought to closure when they solve the problem or explain the situation that they were organized for. However, although a skill or idea may be part of a closed concept, it is not exclusive to that concept. It does not exist only as a part of the pattern within that closure. It also exists in the open organization of the worker's general information, a sort of experiential bank, where it is available to be drawn upon for use in other contexts (see Figure 7).

TASK		TASK		TASK		TASK
•	TASK		TASK		TASK	
TASK		TASK		TASK		TASK
•	TASK		TASK		TASK	
TASK		TASK		TASK		TASK

Figure 7. The Experiential Banking of Tasks

Findings

The most important findings of this study are: 1) the concept of responsive engagement, 2) the comprehensive concept, 3) the experiential bank, 4) the relationship of learning in vignettes and confabulation.

The importance of responsive engagement is that it enables learners to direct their own growth. It is an interaction in which feedback from the results of an output is used to determine future output. If the results of a particular trial at solving a problem are not successful, the learner uses that information to decide what to try next. A successful solution is the goal. Without monitoring the results, the procedure becomes a ritual independent of an end and growth does not take place.

The comprehensive concept is important because it explains how a series of tasks chained into a procedure for solving a specific problem can be broadened to meet a wider range of situations. A serial concept works well as long as nothing new is encountered. However, when novelty occurs in an otherwise standard procedure, options must be added at that step to augment the possibilities for solution. The comprehensive concept is a model of how this augmentation, or broadening, takes place.

The importance of the experiential bank is that is provides an explanation of an open or unpatterned organization of general information from which independent ideas or

skills can be drawn for ordering into new or expanded concepts. Knowledge (ideas or skills) exists in the ordered patterns of concepts and as such is in closure within those concepts. The experiential bank provides an open structure for the same knowledge that makes it available for use in other contexts.

People learn procedures in experiential vignettes. These vignettes are aligned in series in the process of problem-solving. Enough of these vignettes in alignment will prompt the mind to fill in the blanks and make a complete chain of thought. This is like the mental process of confabulation in which the mind makes up details that sensibly fill in the blanks in partially witnessed events. An understanding of the similarities between problemsolving by learning in vignettes and confabulation is important in understanding the experiential bank as a source of material for filling in the blanks in concept formation.

Implications for Schools

The findings of this study include several implications that relate to curricular development and classroom performance.

1. When people learn at work, they learn by acquiring and applying experience. They learn by what they do. Then they organize what they learned from their actions by

developing successful procedures in the actual practice of their work.

What they do not do is learn a theoretical base to work from and project their practice from it. Their theory is built from their practical experience and it is reinforced and broadened by further experience.

This kind of growth does not preclude a purely theoretical construct, but it does not depend on it either. It has a sense of reality and experiential truth about it that would appeal to a lot of students in the classroom who do not relate well to abstraction. However, according to observation on the worksite, the results are organized into concepts. This suggests the use of an activity and experience based approach to conceptualization in the classroom.

2. One of the major outcomes of this study has been the realization of the role that responsive engagement plays in learning at work. It takes more than just paying attention to a procedure to learn. It also requires checking the work in progress and adjusting the performance to get the desired results. Responsive engagement is an interactive relationship with the entire complex, not just the individual tasks of the job. The goal must be kept in sight. This is similar to the cybernetics needed in which the results of an output are fed back into a system to control the output of that system.

In the classroom just being receptive is not enough. Although it is an engagement, it does not take the goal into account. The resultant learning can be just ritual behavior.

The implications are that a responsive engagement in the classroom would have the advantage of experiential interaction with what is learned and result in a greater sense of meaning and ownership in the knowledge.

3. In the classroom, trials that do not answer the problem being dealt with are too often considered failures. Yet they are basic to the solution of problems in the work place. Something is tried. If it brings a solution nearer, it is retained. If it does not, it is dropped and something else is tried. The solution is approached by a series of steps and evaluations.

Learning in the classroom would be a less discouraging process if the success/failure mentality were replaced with a trial, modification and re-trial approach.

4. Lowenfeld and Britain (1970) use the term critical awareness to describe a conscious and objective approach. It is being able to recognize events, to understand what is important about them, to identify the results and to judge their impact. Critical awareness makes self-evaluation and self-correction of performance possible at work. It is the quality of discernment that makes knowledgeable judgment possible. The implications for the classroom are that the encouragement and development of critical awareness and knowledgeable judgment on the student's part would play the same part in self-correction and the generation of knowledge in school life that it does in work life.

5. A comprehensive concept is a broad organization of related ideas from which the most useful options can be selected to explain a given situation or solve a given problem. The presence of options is its key feature. It is an affirmation that there is more than one way to solve a problem in the work place.

In school, all too often, the single right answer is encouraged. This could well be changed with a comprehensive approach to conceptualization in the classroom.

6. Earlier in this paper I used the term experiential banking. It refers to an open holding of one's experience independent of any conceptual ordering where it is available to be drawn upon to modify existing concepts or form new ones.

Hursh and Borzak (1979) tell us that interns in social work find that it is only in school that the problems have clear answers with no loose ends. The reality of field work has a much greater complexity and richness than they had expected.

A broadening of experience in the classroom beyond the bounds of knowledge for the clean answers to clear problems would provide material for conceptualizing in response to the rich emergent situations of reality.

Recommendations for Further Research

In the course of this study, several areas for further inquiry became apparent and warrant mentioning.

1. The quality of responsive engagement has emerged in this study as critical to the ability to learn from experience on the job. Further study is suggested to investigate the development and nature of this quality.

2. Critical awareness was seen as a major factor in self-correction in the learning process. An examination of this function, its development and its role in responsive engagement is recommended.

3. Two types of rehearsal are discussed in this study. One is a mental imaging of a procedure and the other is a physical rehearsal exemplified by model making. The nature of these two means and their relationship warrant further study.

4. The nature of serial concepts and what kinds of procedures they are appropriate for is another suggested area for research.

5. Comprehensive concepts are seen in this study as organizations of related alternatives. Their structure and function in problem-solving are areas for additional study. 6. The open or closed quality of concepts and the function of an open organization of knowledge as an experiential bank to be drawn from in concept formation are further areas for research.

7. Direct teaching played a part in the learning that took place in some of the situations observed in this research. It was most evident at N.T.P. where Al explained and demonstrated procedures to the workers. Because learning, not teaching, was the main thrust of this project, the aspect of teaching was not pursued. The role of direct teaching in experiential learning is a recommended topic for further study.

8. This study was about learning a practitioners knowledge. Because the things learned in many cases were physical, the learning styles tended to be concrete, tactile and visual. An examination of the role of other learning styles involved in learning at work would be a topic for further study.

The outcomes of this study are findings grounded in observational data from the research sites. These ethnographic explanations of the phenomena observed generate material for further observational research as well as provide hypotheses to be tested by quantitative research methods.

Chapter VI CHANGES: THE EMERGENT STUDY

The Topic

In my experience as a teacher, I have watched people who were not successful in school become successful in their post-school work life. I have also seen many instances where people who were not successful in the rest of their schoolwork do well in my art classes. I wanted to know why. I wanted to know so badly that it became the main motivation for me to engage in a Doctoral program after spending twenty-five years in the classroom.

I wanted to find out what was behind this success and to see if it could become a part of school learning.

Because success for the population I was thinking about was in their work life, it seemed to me that the work place was where I should look to find some answers.

The Pilot

I had written a paper on learning in a foundry as part of the requirements for a course of study in fieldwork research. That paper has served in many ways as a pilot study for this project.

When I started my observations at the foundry, I expected to find that the workers learned step-by-step

procedures that they followed uncritically to end up with a product. What I found was that they also organized the material into working concepts that reached beyond the needs of immediate production and that they drew on the material to meet new situations. The richness of those concepts depended on the richness of the worker's experience which was enhanced by moving from job to job.

The existence of these adaptable working concepts seemed particularly important to me and I felt that they warranted further study.

The Sites

I considered several sites before making my selection for this study. They needed to be nearby so I could get to them without spending most of my research time traveling. They had to be sites where people learned in practice rather than by theory and I wanted them to be diverse in their nature.

I thought of watching a carpenter's helper learn the trade. When I checked with my contacts, no one was teaching at the time. I had done a study in a foundry and another factory setting did not seem to offer the diversity that I had in mind.

A group was building a replica of a nineteenth century schooner in a nearby town. The idea interested me at first. When I checked further on it, I found that their

work schedule did not fit the times I had available for research, and they were so far into the project that their workers were already well trained.

Finally, I settled on my three sites. I chose the grocery store because as well as dealing with products, the workers had to learn to deal with the public. It seemed to be a rich environment in both the physical and social context.

I chose the sign shop because it was a creative place. The work they did changed with each new project and the workers had to adapt accordingly. As June said, "There is always something going on here." I was interested in seeing how they handled the constant flow of new problems.

The third site, N.T.P., is a funded project that trains impaired people to be janitors. I chose the site for a couple of reasons. One was that the worker-clients were selected because the regular education system was not meeting their needs. Secondly, they were there for the specific purpose of learning at work. In a sense, it was a model population for my study.

I also had some misgivings about the site. They were not a typical population. They were special education students. Would they learn the same way as a more typical population? Would the findings have a general application? When I presented the dissertation proposal to my committee, they brought up the same questions.

On consideration, I had selected the sites for their diversity and ethnographic research is not necessarily generalized to other sites anyway. Seen in this light, the way they learned in comparison to the others and the similarity of the findings were just more material to be discussed in the summary and conclusions.

As it worked out, the main difference between N.T.P. and the other sites was that the thought processes were slower and thereby provided for a much more rich and detailed observation of what was happening.

When Don and Rick were figuring out how to clean up the mop water that Dave spilled, it took them over a half hour of discussion and trials to come up with the best solution to the problem. They explained and demonstrated every step along the way. A more typical population would have had their answer in a couple of minutes with very little overt evidence of how they did it.

Very early in the formative analysis of the field notes I saw that the richness of detail made this an ideal site for the primary study. Findings at the other sites were confirming the findings and broadening the range of their implications.

Expectations and Findings

When I started this study, I expected to find in general the same things that I found at the foundry in the pilot study. I expected that the learning would be immediately practical and the result of production needs. I also expected that they would organize what they learned into working theories that would go beyond the requirements of a particular job. I thought that they would generalize their knowledge and use it in new situations.

When I found that a step-by-step or linear concept could be adapted to fit a situation similar but not identical to the one it had been formed to meet, I looked for a way to explain it. My first working idea was that we must learn in vignettes. These vignettes are aligned in series to solve a problem. When there are enough of these factual vignettes lined up, our mind makes a leap to fill in the blanks and make a complete chain of thought.

This was something like the mental process of confabulation. Confabulation takes place when people try to remember things that they partially witnessed. In trying to make a sensible story, the mind will make up details that fill in the blanks. People will be sure that they witnessed these confabulated details.

In concept formation, this idea did not explain where the missing part came from. On reflection I realized that this could be explained by the addition of an alternative choice to a linear concept.

Somehow, the term linear no longer seemed right to me. Once established, a line does not have choices in it. I finally settled on serial as being descriptive of what I

wanted to say. A series, no matter how many or how few options are available, is still a series. It followed that as a matter of degree, a broadened series would become comprehensive.

A serial working concept then could be explained as a closed set of step-by-step procedures. The same concept with options added became a comprehensive concept. This meant that as well as closure, there had to be an open mechanism.

This can be explained by the idea of an experiential bank. Tasks are learned separately and organized into procedures. The procedures are serial or by the addition of options, comprehensive concepts. However, the same tasks that are brought to conceptual closure are at the same time, available in an open organization as an experiential bank. It is from this open order that material is drawn for the modification of existing concepts and the formation of new ones.

The surprise in this theoretical framework is that these concepts are not a generalization that is applied to specific cases. They are an expansion and re-ordering of specific items of knowledge.

I watched Norma go through the procedure of dusting the office without getting it clean. Al showed her that it was still dirty and modeled how she should do the job. The

second time she went through the procedure was qualitatively different and resulted in a clean office.

That was the incident that brought the idea of responsive engagement to my mind. She was motivated the first time, but she was not successful. Something was missing. She was not checking her work as she went along and adjusting her performance to get the desired results. After Al showed her how, she attended critically to the job and made the adjustments that resulted in a clean room.

Something still bothered me about my understanding of responsive engagement as a part of learning on the job. From watching Norma clean an office, it was clear that she had to be in contact with what she was doing in order to learn. It seemed clear and simple. Yet, I felt that the idea was incomplete. The insight that I was looking for came from events outside of the formality of my research.

I took my truck to the garage to be serviced. It vibrated badly on the road. I had traced the problem to two contributing causes. The drive shaft had excessive wear in its components and one of the wheels was bent out of round. I explained this to the service representative. Over the next two weeks an in-house mechanic did some work on the drive shaft. Then it was sent out to a specialist for further work. The vehicle was reassembled and contracted out to another specialist to have the wheels balanced. This shop reported that the wheels could not be

balanced because one of the rims was bent. I explained that this was why I had taken the truck to them in the first place and the repair was subsequently done.

This whole transaction took three weeks and many telephone calls to complete. Something was wrong. At first I wondered if any of them knew what they were doing. Were they performing a mechanical ritual that was removed from the reality of the repairs that were needed? I did not think so. The work that they did was done properly and I knew that it was necessary but the problem was not being taken care of. The problem did not seem to be engagement in the specialties. Then I realized what was happening.

When a component reached a specialist, it had no specific identity. It was simply another example of its kind for the specialist to engage in with his procedure. No one was involved in the specific case of that individual truck. In fact, it was the service representative's job to break down the specificity of the vehicle into generalized components. This was the missing part in my understanding of responsive engagement. In order for growth to take place, the participant has to be responsive to the entire complex, not just the individual tasks of the job.

Dealing with Disconfirming Evidence

One of the findings of the study is that the workers learn by experience. Yet, Al was modeling activities to his workers and Bud's was showing videotapes to new

employees to teach them how to do their jobs. How does this fit into the idea of experiential learning in the work place.

I found my answer in the work of Bandura (1971) who explains that modeling, both behavioral and verbal, is a major factor in learning. Vicarious learning in the work place seems to work like any other learning there. It is practical, not theoretical, and it is applied to immediate production problems. Vicarious learning is not a discrepant case, it is just a different kind of experiential learning.

When Brian started the sign shop, he really did not know a lot about making signs. He accepted a job that had a lot of gold leaf in it and he did not know how to lay gold leaf. He bought a book. He read through the book underlining as he went. Then he went through it two more times, following up on the underlined passages. He told me he could not really learn that way. So he "bought some gold leaf and went at it." He told me about other sign people who come to him for advice on technique. He just tells them to try it. "Let them lay two thousand dollars worth of gold leaf in the next six months time. They'll learn how."

Brian started this learning process by reading. After reading about it, he worked the procedure out in practice

and this is what he recommends to people who ask him about it. However, it remains that he did not start experientially in this situation.

I noticed as I watched on the sites that the people were not committed to ideologies. What they wanted were solutions to their problems. Thus, we have a janitorial training facility where the teacher has to be the janitor when they are short handed and a woodworking shop that uses welded steel inside of some of the projects. A possible explanation is that when things are worked out in practice, consistency is not functionally important while in a theoretical structure, ideological consistency is a basic requirement.

Changes in the Questions

It was expected from the start that as the research unfolded, there would be changes in the research questions.

The major questions all held up well in directing the research. Some of the minor ones lost importance as the study progressed. For example, in answering "What is learned at work?," the importance of learning to recognize old problems, similar problems and new problems emerged from the data as a major point.

The sub-questions on how the workers organized what they learn are another example. Although they did not clearly address the emergent findings, they led to the

major idea of open and closed concepts, serial and comprehensive concepts and the open organization of experiential banking.

What Comes Next?

As well as the formal implications for further study outlined in the summary and conclusions of this paper, there is another possibility that keeps turning over in my mind. There is some kind of a relationship between the way we organize our knowledge into serial and comprehensive concepts and an open experiential bank and Jung's idea of the collective unconscious.

Hall and Nordby (1973) explain Jung's thinking on this in terms of a common mental inheritance of humankind. We have inherited a potential to put ideas together in certain successful ways when confronted with experience because those of us who put things together that way have genetically survived.

Does this mean that we have inherited the kind of mind that orders our experience in solutions to problems and that, when something is missing, holds that order until experience provides the missing parts? Can we mentally bridge that gap with logically generated solutions or must it be through experience? How does that relate to the dual functionings of the bicameral mind? However, that is material for another paper. The next step is to work out in practice what the findings of this study mean in the classroom.

APPENDICES

APPENDIX A

LETTER OF INTRODUCTION

APPENDIX A

LETTER OF INTRODUCTION

October 16, 1987

To Whom It May Concern:

This letter is to confirm that Richard Cunningham is a doctoral student at Michigan State University who is beginning to collect data for his thesis. His study will focus on how people learn at work. We believe this will provide valuable insight regarding learning in general and perhaps will help us do a better job of instruction in the classroom. There are of course many possible implications for adult education and program development.

I hope you will be willing to allow Mr. Cunningham to observe your workers whom you employ and how they are learning the job. May I assure you that Mr. Cunningham is not engaged in any sort of evaluation activity. Careful procedures will be used so that any participants remain anonymous.

As Dick's advisor I want to express my appreciation for your consideration of his need to do this study. Thank you for your assistance.

Sincerely,

Arden Moon

COVER LETTER TO BUD'S

APPENDIX B

APPENDIX B

COVER LETTER TO BUD'S

TO: Bud's Market

FROM: Richard E. Cunningham 622 West Michigan Avenue Boyne City, Michigan 49712 616-582-9373

RE: Research Project

DATE: October 8, 1987

I am working on a Ph.D. degree in education at Michigan State University. I am doing research on "How People Learn at Work" for my dissertation. I would like very much to use your Lakeview City store as one of my research sites.

This would involve my presence in the store as an observer at various times during the day, mostly on weekends. I would be observing how employees learn to do the work they do from each other and from management.

An example would be to watch as someone was shown how to trim and wrap lettuce and then observe as they develop their own skill and judgment.

I would like access to backroom areas of the store as well as the public areas in order to do this research. My role will be very unobtrusive with a strong obligation to keep out of the way and not interfere in any manner with your employees and their work. I also will make it clear to everyone that I am not working for the company as their observer, and that the project has nothing to do with evaluation of them as employees.

Every effort possible will be made to ensure the privacy of the individuals involved as well as that of your firm. False names will be used in all material that comes out of this study and the location will not be specified.

The observations will start after the project is approved by the university committee that examines research projects to be certain that no one's rights are violated and that there will be no harmful effects.

Thank you for your consideration, I hope that you will be able to approve my observations. APPENDIX C

SITE ACCESS INFORMATION

APPENDIX C

SITE ACCESS INFORMATION

LEARNING AT WORK: A RESEARCH PROJECT

Richard E. Cunningham

The Project

I am a doctoral student at Michigan State University. I am collecting data for my thesis. The subject of my study is learning by experience.

The Purpose

The research is being done on how people learn at work. The hope is that this will bring out some things about learning in general that will help in the classroom.

The Method

This research is being done by observing people at work and taking notes on the steps that they go through in learning how to do a job. Among other things, I am looking for some answers to these questions. What happens as their skills develop? What steps do they leave out and what do they add as they get better? How do they solve new problems as they come up? Do they learn new information by being shown, told or by trial and error?

Confidentiality

It is important to protect the privacy of everyone involved in this research. All of the names will be changed and none of the locations will be identified to make sure that everyone's rights will be protected.

The Research Sites

It is important that the researcher has as little effect as possible on the work site. This is important for the accuracy of the research as well as the proper functioning of the work place.

The Results

There will be no evaluation in these observations or as a part of the study. The results of the research will be an analysis of the kinds of learning that have taken place on the job.
APPENDIX D

CONSENT FORM

APPENDIX D

CONSENT FORM

To Whom It May Concern:

I am a doctoral student at Michigan State University. I am doing research for my thesis on how people learn at work. The research is being done by taking notes on the steps people go through in solving the problems that come up during their work day. The right will be reserved to use this information in the thesis and for other educational purposes such as articles and presentations. I would like to ask you to participate in this research.

If you consent to this, your part would be to allow me to observe and take notes as you go about your job. Occasionally I would like to have you talk with me about your work activities in order to help me understand what you are doing.

The research will start when you give your consent and continue for a time span of about three months. It will consist of two or three observations a week lasting for a period of one to three hours.

The project has been cleared with your employer and will not interfere with your work.

Thank you,

Richard E. Cunningham 616-582-9373

164

I have read the above letter and this research project has been explained to me. I voluntarily consent to participate and understand that I am free to withdraw at any time without recrimination. It is my understanding that the data will be used only as described above and that the identities of the subjects will be known only to the researcher. I also understand that on request and within these restrictions, results will be made available to the subjects.

Signature

Parent or Guardian if a minor

Date

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