IMPROVING ORGANISATIONAL LEARNING IN ENGINEERING DESIGN

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UNIVERSITY OF LIVERPOOL

for the degree of

Doctor of Business Administration

by

TAIWO HASSAN OLUSOLA ELEGBA

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Dedication

This dissertation is dedicated to my late parents Mohammed Shitta Ayinde and Kuburah Ashake Elegba on one hand and Clement Akindele and Cecilia Alake Peters on the other hand.
I wish to acknowledge the many people who have helped me along my way throughout this dissertation journey. My journey has been marked with certain individuals who have given me the guidance I needed to continue. First, I want to thank God for giving me the wisdom, the guidance and the ability to complete this work.

I am deeply grateful to my family, especially my wife Aminat Titilola for providing support throughout the DBA journey. I would like to thank my children Jagunmolu Oluwarotimi, Fuad Ajanaku Olusola, Erelu-Ejide Simisola and Iyalode Hafizat Oluwafunmilayo, and also my grandsons Eniitan Amari Olusola Joshua Ray Elegba and AbdulJabbar Olatunde Iyiola Olambiwonnu.

I am deeply thankful to Prof Mohammed Arif for your guidance, wisdom, moral support and willingness to share with me your time and thoughts throughout the dissertation process. I say thank you to Dr Caroline Ramsey for your candour and guidance, too. I owe an enormous debt of gratitude to all my interviewees and participants who gave so generously of their time and insights. Last but not the least, I also thank my colleagues and members of DBA Cohort II for their collegiality.
Abstract

INCREASING ORGANISATIONAL LEARNING CAPACITY IN ENGINEERING DESIGN

The local content drive in the oil and gas industry by the Nigerian government has compelled organizations in the industry, including the companies in its engineering design sector, to focus on means of increasing their organizational learning capacity. But there are no sound practices in these companies to increase organizational learning. The problem studied was how to increase organizational learning in the design sector of the Nigerian oil and gas industry.

Most organizations nowadays have organizational learning as an important constituent of their strategic plans. In line with their espoused values, they have established learning departments headed by senior managers. Yet, the outcomes of learning activities are not encouraging, no thanks to the fact that not only are learning efforts inappropriate, they also often ignore the human socio-cognitive aspect that is essential for organization learning, alluding to the thinking that the process of how organisations learns is still unclear to them.

The purpose of this research was to examine in detail the organizational learning experience of the engineers working in the engineering design sector of the Nigerian oil and gas industry through a phenomenological diagnostic study and apply the implications from the findings in an action research to increase organizational learning capacity in the sector. The study explored and identified strategies that lead to increased organizational learning capacity. The findings revealed sub-optimum practices in the companies in the sector with regards to organizational learning-influencing constructs. Suggestions were made for improvement and some of these are being implemented and results are being assessed, too.

For the phenomenological study, semi-structured interviews were conducted with 12 participants, 10 of whom were employee engineers and the other 2 executives who were also engineers in their own right. Five themes emerged from the data: (1) The way we are, (2) You are on your own, (3) Facing one’s business, (4) Coming together and (5) Lull in the industry.

The vehicle for the action research intervention was a joint inter-organisational engineering design project.
The recommendations for further research are in the areas of impact of company’s age on organisational learning and similar study in the construction and power industries to advance the literature on organisational learning in Nigeria.

*Keywords: organisational culture, leadership, organisational learning, learning organisation, inter-organisational learning, collaboration, local content.*

Word count: 49,857.
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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR</td>
<td>Action Research</td>
</tr>
<tr>
<td>DPR</td>
<td>Department of Petroleum Resources</td>
</tr>
<tr>
<td>E&amp;P</td>
<td>Exploration and Production</td>
</tr>
<tr>
<td>IOC</td>
<td>International Oil Company</td>
</tr>
<tr>
<td>NCD</td>
<td>Nigerian Content Development</td>
</tr>
<tr>
<td>NCDMB</td>
<td>Nigerian Content Development and Monitoring Board</td>
</tr>
<tr>
<td>NETCO</td>
<td>National Engineering and Technical Company Limited</td>
</tr>
<tr>
<td>NNPC</td>
<td>Nigerian National Petroleum Corporation</td>
</tr>
<tr>
<td>NOC</td>
<td>National Oil Company</td>
</tr>
<tr>
<td>OL</td>
<td>Organisational Learning</td>
</tr>
</tbody>
</table>
CHAPTER 1 INTRODUCTION

1.1 Purpose of the Research

The purpose of this qualitative research is to (i) explore and understand in detail, the organisational learning experience of engineers working in indigenous engineering design companies of the Nigerian oil and gas industry and (ii) attempt to improve organisational learning in the companies through an action research intervention.

1.2 Background to the Study

The oil and gas industry in Nigeria is the mainstay of the nation’s economy contributing about 90% of the gross domestic product. In 2012, the total Nigerian export was US$142,52 billion while that from petroleum export only was US$94.64 (OPEC 2013). Studies by Adedeji et al., (2016) further show that Nigeria’s revenues from oil and gas increased from US$718 million in 1970 to US$47.9 billion in 2005 and to US$94.6 in 2012. The affairs of this industry affect directly and indirectly those of other sectors of the economy such as power, manufacturing, education, trade and hospitality business.

However, the local Nigerian participation in the industry is minimal. Ozigbo (2008) from his studies found out the across the Nigerian oil and gas industry is very low as over 60% of the work value in the industry is carried out abroad. In order to increase the local content, the Nigerian federal government on the 22nd April, 2010 enacted into law the ‘The Nigerian Oil and Gas Industry Content Act’ (the Act). The adoption of local content policy is an effective strategy to increase participation of indigenous firm in the supply chain of the industry, and is also seen as creating a multiplier effect of about 2.5 in local activities; Norway’s Central Bureau of Statistics reported an average multiplier of 3 in 2013 (Tordo, 2011).

The Act stipulates the development of, and improvement in local participation in the nation’s oil and gas industry. By the same Act the Nigerian Content Development & Monitoring Board (NCDMB) was established and charged with superintending over all activities in the industry and with the responsibility for monitoring the implementation of the Act’s provisions, with a view of ensuring compliance by all participants and stakeholders in the industry.
The industry is made up of operators, service providers and regulators. The operators are the biggest players in the industry who give out not less than ninety per cent of the contracts in the industry. This group consists of both international oil companies (IOCs); national oil companies (NOCs) such as The Nigerian National Petroleum Corporation (NNPC), Nigerian Petroleum Development Company (NPDC) and Nigerian Gas Company (NGC); and some smaller indigenous oil prospecting companies. The service providers are also both multinational and local companies. This group includes also local contractors and the engineering design companies, both local and international. The regulators are the government establishments like the Department of Petroleum Resources (DPR) and the Nigerian Content Development and Monitoring Board (NCDMB) which is my workplace.

The engineering design companies constitute a sector of the oil and gas industry. They provide the industry with services such as technical and engineering studies and analyses; conceptual, front end and detailed engineering; and project management activities. They are a knowledge-based sector and are in the upstream of the industry. The sector’s role in the industry is significant because engineering studies and design must be carried out before any project is executed. Engineering design is basically a team work because many disciplines come together to carry it out. However, the capability of the local engineering company to do this is not impressive and their industry participation is not improving. While there are individual brilliant engineers, this has not resulted in the companies’ capability development. This is corroborated by Monday (2015) who asserted that the lion share of the profit from the government enormous investment in the industry is paid out to foreign firms for services such as Conceptual Designs, Front End Engineering Design (FEED), Fabrication, Engineering Procurement Construction (EPC) and seismic studies. This problem is evident when project execution plans from the local companies are reviewed at the NCDMB where all contracts in the nation’s oil and gas industry pass through before award. It is observed that the engineering design companies are still largely doing what they were doing years back; they are not moving into new and other knowledge areas for which expatriates are proposed. The organisations are not learning or learning well. It is also noted from the capacity development plans which they submit to the NCDMB that there is a lack of a sound strategy for organisational learning. The engineering design companies send their engineers on trainings on single disciplines such as pump design, offshore structures design,
Primavera, where they learn individually. For example, and organisation submitted the following training programme:

5.1 NUMBER OF CANDIDATES REQUIRED
Candidates required shall be as listed below:

<table>
<thead>
<tr>
<th>DISCIPLINES</th>
<th>NO. OF CANDIDATES REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality Control</td>
<td>3 persons</td>
</tr>
<tr>
<td>Project Planner</td>
<td>3 persons</td>
</tr>
<tr>
<td>Construction:</td>
<td></td>
</tr>
<tr>
<td>- Piping</td>
<td>6 persons</td>
</tr>
<tr>
<td>- Instrumentation Automation</td>
<td>6 persons</td>
</tr>
<tr>
<td>- Electrical</td>
<td>6 persons</td>
</tr>
<tr>
<td>- Structural</td>
<td>6 persons</td>
</tr>
</tbody>
</table>

Efforts towards group learning are not mentioned in their plans. While on-the-job training is mentioned, results often show that minimal knowledge transfer happens. Also linkage between engineers’ learning for the overall use of the organisation is not evident. Furthermore, the training programmes remain unchanged the following year. This shows that the engineers are not learning new things, either because they are not taking up more demanding responsibilities or they really have not grasped what they learned before. So the learning method needs adjustment.

The passage into law of the Nigerian Content Act is a main impetus for this study to explore how learning can be improved in the in the engineering design companies. The Act seeks to increase local participation in the nation’s oil and gas industry by prescribing minimum thresholds for the use of local services and materials and to promote transfer of technology and skill to Nigerian staff and labour in the industry. Section 106 of the Act describes Nigerian Content as “the quantum of composite value added to or created in the Nigerian economy by a systematic development of capacities and capabilities through the deliberate utilisation of Nigerian human, material resources and services in the Nigerian oil and gas industry” (Nigerian Oil and Gas Industry Content Development Act, 2010).

Sections 1 and 2 of the Act state as follows:

1. Notwithstanding anything to the contrary contained in the Petroleum Act or in any other enactment or law, the provisions of this Act shall apply to all matters pertaining to Nigerian content in respect of all operations or transactions carried out in or connected with the Nigerian oil and gas industry.

2. All regulatory authorities, operators, contractors, subcontractors, alliance partners and other entities involved in any project, operation, activity or transaction in the Nigerian oil and gas
industry shall consider Nigerian Content as an important element of their overall project development and management philosophy for project execution.

Section 6 of the Act states

*Upon the completion of this Act, all subsequent oil and gas arrangements, agreements, contracts or memoranda of understanding relating to any operation or transaction in the Nigerian oil and gas industry shall be in conformity with the provisions of this Act.*

And finally, Section 11. (1) states:

*As from the commencement of this Act, the minimum Nigerian Content in any project to be executed in the Nigerian oil and gas industry shall be consistent with the level set in Schedule to this Act.*

The Schedule stipulation with regards to engineering design is as shown in the table below.

**Table 1.1  Nigerian Content (NC) Level**

<table>
<thead>
<tr>
<th>Description</th>
<th>NC%</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEED and Detailed Engineering on Onshore facilities</td>
<td>90%</td>
<td>Man-hour</td>
</tr>
<tr>
<td>FEED and Detailed Engineering on Offshore facilities – Shallow Water</td>
<td>90%</td>
<td>Man-hour</td>
</tr>
<tr>
<td>FEED and Detailed Engineering on LNG facilities</td>
<td>50%</td>
<td>Man-hour</td>
</tr>
<tr>
<td>FEED and Detailed Engineering on Gas gathering facilities</td>
<td>90%</td>
<td>Man-hour</td>
</tr>
<tr>
<td>FEED and Detailed Engineering on Deep offshore facilities – Hull and Topsides modules</td>
<td>80%</td>
<td>Man-hour</td>
</tr>
<tr>
<td>FEED and Detailed Engineering on Deep offshore facilities – Floating concrete structure</td>
<td>80%</td>
<td>Man-hour</td>
</tr>
</tbody>
</table>

The present Nigerian content level for the above is about 40% except for LNG facilities which is about 20%. In order to meet these legally stipulated levels, it is imperative for the local engineering design companies to increase their organisational learning capability.

I head the NCDMB’s Capacity Building Division which is responsible for monitoring and regulating the building of capacities and capabilities in the industry. The division together with the organisations agree on the minimum learning embarked upon in the different organisations and on projects. The division monitors the execution of the learning and reports back to the NCDMB top management. The division thus can recommend to or instruct organisations as to what learning or intervention to explore. It is from this
background that I want to work in collaboration with the design engineers, their companies and the operators to study how to increase organisational learning in the engineering design companies. The patterns of deliberate actions that support this inquiry and provide opportunity for insight are:

1. Examine in detail the issues with organizational learning presently in the sector
2. Take deliberate action and monitor the results.

1.3 The imperative of organizational learning

It is now an era of knowledge society with a faster pace of change requiring more new knowledge. To survive, organisations have to improve their learning capacity. Globalisation has heightened competition in the Nigeria oil and gas industry just has it has done worldwide, so the indigenous companies must learn and improve performance at a faster rate. Organisations need to acquire new knowledge and skills in order to improve existing and future performance (Ortenblad, 2004). Organisational learning is a key component of efforts to increase organisational performance and improve organisation’s competitive advantage because it develops new learning that makes the competencies ever dynamic (Garcia-Morales, Jimenez-Barrionuevo and Gutierrez-Gutierrez, 2012).

Organisation learning is also central to the success and survival of firms in the engineering-procurement-and-construction industry (Pham and Swierczek, 2006, p.188). Today’s engineering design firms operate within a continually changing environment. As the process of the design activity becomes more complex and technology-based, the need for learning increases. Thus a main constraint on improving engineering design firms’ products or processes can be their ability or inability to learn. It is therefore imperative for engineering design firms to engage in organisational learning to achieve a state of readiness for these changes and develop competences to respond to new design processes and technology.

While many studies have been carried out on it, scholars and practitioners still have not reached consensus on what organisational learning is (e.g. Scott, 2011; Idowu, 2013). It is therefore not surprising that practitioners such as those in engineering design get confused as to how to increase their firms’ learning capabilities. But then, in order to improve their organisational learning, organisations need to understand its essence and nature.
Organisation learning is a group endeavour (Cook and Yanow, 1993). The group capacity is enabled by the history of its past practices and interpersonal relationship. The past practices include the rituals they engage with, the stories they tell, the myths and beliefs they hold, the artefacts they create, etc. These are major constituents of the culture of the organisation. Organisational learning is also impacted upon by the leadership in an organisation because the leadership approves what learning takes place (Scott, 2011).

Despite a wealth of literature on organizational learning, only minimal amount of research exists on learning in the engineering and construction industry. There are no organizational learning studies yet carried out on engineering design companies of the Nigerian oil and gas industry. There have been few studies in other sectors of the Nigerian economy, like banking and hospitality. There also have been few studies on organizational learning in engineering design outside Nigeria.

In his study on ‘Organisational Learning, Innovation and Financial Performance of SMEs in Nigeria, Idowu (2013) revealed that the organizational learning components of systems orientation, organizational climate for learning orientation, knowledge acquisition and utilization orientation, information sharing and dissemination orientation and financial performing are positively related. Oyeniyi (2011) also found from his study on “Organizational learning and Sustainable Competitive Advantage – The Nigerian Experience” that organizational learning is positively related to sustainable competitive advantage in the Nigerian hospitality industry.

Pham and Swierczek (2006) found from their study - “Facilitators of organizational learning in design” – on design professionals in Vietnam construction firms that leadership commitment, incentives and staff interaction have impact on the organizational learning process and outcome. Also, Yitmen (2012) shows from his study on organisational learning and performance improvement in Turkish construction industry that supportive leadership, strategy development and implementation and organizational environment are important predictors of organisational learning.

1.4 Research Justification

The learning practices in the nation’s local oil and gas engineering design companies need to be improved to bring their industry participation to the levels stipulated in the
Nigerian Oil and Gas Industry Content Development Act. While the mechanisms of organisational learning have been of interest in research, these are generally with respect to large organisations mostly in the advanced nations. The local engineering design companies in the Nigerian oil and gas industry have issues different from those of the large corporations. For example, these companies have limited resources and little or no technological base, something that inhibits the development of capacities and capabilities. Studies on organisational learning in such organisations as the engineering design companies in Nigeria have not been carried out. Organisational learning is also situational (Gherardi and Nicolini, 2000 cited in Zhang, Macpherson and Jones, 2006), accordingly, it would be appropriate to study it in the context of the Nigerian oil and gas industry rather than trying to apply results from studies of some large western organisations.

This study addresses the problem of lack of sound organizational learning practices and strategy in the companies and presents the opportunity to rectify this. It examines the issues with organisational learning practices in the companies and attempts to examine and understand in detail the employees’ experiences of these notions and the mechanism of organisational learning. The outcome of this is used to develop actions for improving organisational learning in the companies. Understanding key factors in organisational learning will yield invaluable practical reference to the local engineering design companies in the industry. There is also potential application of the research findings in other industries both within and outside the shores of Nigeria.

1.5 Research Questions

The overall research problem is: How can the companies in the engineering design sector of the Nigerian oil and gas industry increase their organisational learning? The research attempts to answer this question making use of an action research in inter-organisational learning through the vehicle of a multi-firm joint project execution.

The study was in two parts. The purpose of the first part was to investigate organisational learning issues in the engineering sector of the industry; this was done through a phenomenological empirical study. The second part was to increase the understanding and practice of organisational learning through an action research (AR) intervention.
As pointed out above in Section 1.3, organisational learning is influenced by the notions of shared vision, trust, transparency, mutual support, organizational structure and learning strategy which are products of the type of leadership and organisational culture that exist in the companies. It is also influenced by what collaboration among industry stakeholders exists.

The main research problem is therefore examined through the following research questions:

1. How do engineers describe their experience of the type of leadership that obtains in their company?

2. How do engineers describe their experience of the type of organisational culture that obtains in their company?

3. How do engineers describe their experience of learning and organisational learning in their companies?

4. What do engineers say about their experience of industry’s collaboration and contribution to learning?

1.6 Research Objectives

The two main objectives of the research are:

- To increase the understanding of organisational learning in the engineering design sector;
- To effect an improvement to organisational learning practices in the sector

Towards achieving these objectives, the research is also expected to:

- Provide knowledge and learning on organisational learning;
- Cause change in perceptions and ways of doing things;
- Cause change in behaviour with regards to sharing and knowledge transfer.
1.7 Methodology

This study was in two parts: a phenomenological empirical study and an action research.

1.7.1 The empirical phenomenological study

My aim was to first explore the description by the engineers of their experiences. To enable me hear directly from those concerned, the meaning for them of organisational learning, and to understand the various perspectives of their individual experiences from which I will develop a composite description of the essence of the experience of the engineering design companies, I chose to employ a qualitative research with the approach of phenomenology and the philosophical tradition of social constructionism for the method of inquiry. The study involved personal interviews using a semi-structured interview with two executives and ten engineers. The questions were open-ended. Please, see Appendix D.

1.7.2 The Action Research

Action research is informed by a critical theoretical approach (Johnson and Duberley, 2011, p. 137). Through it, I as the researcher may (1) bring to the organisational members new knowledge and (2) to the organisation, a beneficial and workable local theory which may also be of use to the research community (Thorpe and Holt, 2008). Action research models are closely related to Kolb’s experiential learning of experiencing, reflecting, conceptualizing and experimenting in real life situations (Kolb 1984). My aim was to adhere to the fundamental AR notion of intervention and together with participating organisational members bring about some change in the working of the organisation, no matter how small (Thorpe and Holt, 2010, p. 17). Another distinguishing feature of action research is that it is a form of self-reflective inquiry by organisational members to improve their own practices through better understanding of those practices. Action research is collaborative for it aims to enhance people’s involvement in the generation of knowledge about them, their work and the actions they take. This is in line with the general understanding of the processes of organizational learning (Coghlan, 2006). According to Argyris and Schon (1978b) action research is an appropriate research method for organisational learning.

The action research intervention was informed by the literature review and the phenomenological studies and was implemented in the form of a ‘temporary organisation’ using a multi-firm joint project execution (See Chapter 5).
1.8 Thesis Contribution

The findings from this study will progress the theoretical knowledge base concerning how engineering design companies in the Nigerian oil and gas industry approach increasing organizational learning as part of their efforts toward improving local content in the industry. The findings expose both positive and negative learning practices in the development of local engineers in the industry. These findings will add to the literature and best practices with respect to organisational learning in the nation’s oil and gas industry’s engineering design sector, useful for both employee engineers and company executives. The finding therefore may lead to a translation into a better implementation of organisational learning within the engineering design sector of the Nigerian oil and gas industry.

This research, in the third-person perspective, would interest the academia, too, because more knowledge is required to understand intra-organisational learning and also inter-organisational learning in settings such as projects, networks or temporary organisations. In the second-person, it will increase the understanding of organisational learning by the participants and their companies and improve their organisational learning capabilities. In the first-person, the research will deepen my understanding and knowledge of organisational learning and of action research and enhance my scholar-practitioner development.

The research will also demonstrate the potential of inter-organisational learning through the vehicle of joint project executions in the Nigerian oil and gas industry.

1.9 Thesis Structure

The thesis comprises eight chapters. Chapter 1 provides the introduction, background and context of the research. Chapter 2 deals with review of the literature on relevant concepts affecting the research topic. Chapter 3 describes and justifies the methodology employed for the study while Chapter 4 presents the findings from the empirical study. Chapter 5 presents the AR intervention – the FPSO Project. In Chapter 6 are the discussions and implications from Chapter 5. Chapter 7 discusses the reflection on learning in personal practice and knowledge and Chapter 8 presents the implications, recommendation and conclusion.
1.10 Summary

It is imperative to increase organisational learning in the engineering design sector of the Nigerian oil and gas industry. This chapter described the issues of organisational learning in the sector and how this topic and the methodology came to be chosen for this research. The action research approach has been identified by Argyris and Schon (1978) as an appropriate research method for organisational learning study. Also, the overall research problem and the research questions were stated.
CHAPTER 2  LITERATURE REVIEW

2.1  Introduction

The concept of organizational learning has been studied from various viewpoints by different scholars. Many papers and work have expressed the opinion that there is no comprehensive model or agreement on what exactly organizational learning is. Thus studies towards this continue to swell the already existing wide range of scholarly discussions and debates on organizational learning. However, regardless of the disputed state of the debates, organizational learning still happens. But there is not a single best approach. And in addition, learning is contextual, it occurs within the social relationship in which the learner is engaged (Gherardi and Nicolini, 2000 cited in Zhang, Macpherson and Jones, 2006). So the issue faced by organisations is how to find their own solution taking into account the context in which they exist. Exploring the existing body of knowledge on learning in organisations will provide a reasonable basis for assumptions to be made in this research. Also, doing this, while concurrently having at the back of one’s mind the context of the engineering design sector of the Nigerian oil and gas industry, will assist one to identify a comprehensive set of factors that, if present might increase learning in the sector, as well as to identify factors that, if removed might do same.

The majority of existing studies on learning in organisations are on general and mainstream organizational learning with little or none on engineering design companies. There are certain peculiarities in the latters’ climate and environment, especially those in the oil and gas industry. The oil and gas industry has a very strict attitude toward safety and schedule. Engineering design in the oil and gas industry is highly multidisciplinary. The vast majority of engineering design services takes place in the project environment.

The literature is rife with how learning takes place in organisations, reasons why organisations do not learn or learn well and also the strategies and approaches of improving organization learning. The debates in the literature on organisational learning can be split into various numbers of groupings. This study uses the following three groupings: (1) debates on learning and knowledge, based on the two central questions: (a) what is learning? and (b) what is knowledge?; (2) debates on organisational learning methods and
strategies; and (3) the debates on factors influencing organisational learning, such as organisational culture, leadership, structure, strategy, and environment. Reviews of these groupings follow.

2.2 Learning and Knowledge

2.2.1 Learning

Learning is the way “in which individuals or groups acquire, interpret, reorganize, change or assimilate a related cluster of information, skills and feelings” (Casey, 2005, p.133). Huber (1991) describes learning simply as a processing of information whose outcome enables a selection to be made. Various scholars on learning have approached the subject from different perspectives which include (1) the cognitive perspective, (2) the behavioural perspective, and (3) the social/situational or social constructionist perspective.

The cognitive learning perspective sees learning only as the development of new insight through revision of or change in assumptions, causal maps or interpretative schema leading to new belief systems, and which may not necessitate any behavioural change (Freidlander, 1983; Huber, 1991). It is concerned with individual mental process in the acquisition of new insights; the individual learner is more important than the environment.

From the behavioural perspective learning is complete only if cognitive development leads to new behaviour; action is required for complete learning. This is supported by Kurt Lewin’s (1947, 1953) idea that if you want to understand a system, you must seek to change it. He posits that active learning is more effective than passive learning. The concern is how cognition leads to action which in return leads to deeper cognition through reflective processes.

The social learning/constructivism perspective goes beyond the cognitive-behavioural to take into account the situational setting. People learn in frameworks that have setting – a community of practice. Most human behaviour is learned through observation. By observing other people, a person creates a model of how a new behaviour is performed, and uses this model as a template for action (Bandura, 1977, 2007). This modelling can take place through
conversation, storytelling, apprenticeship and other face-to-face interactions all which are means of acquiring practical knowledge.

Whether the acquisition of new insight is sufficient for learning to have taken place or whether this has to be accompanied by a change in behaviour is central to various authors’ debates on learning (Scott, 2011). In engineering design firms the two schools of thought are equally crucial and complementary to each other (Love et al., 2004). The highly multidisciplinary nature of engineering design, especially in the oil and gas industry, requires the engineer to relate to and see things from the perspectives of multiple players; this demands social interaction and behavioural adjustment. The broader social perspective that sees organizational learning as situational in addition to both the cognitive and behavioural nature is widely adopted by scholars (Easterby-Smith, Crossan and Nicolini, 2000).

Accordingly, the socio-cognitive standpoint of organizational learning is leaned upon in this study; the implication therefore is that this work highlights understanding the context and situation of learning in organization.

Learning in organisations is usually discussed from the two perspectives of individual learning and collective (group) learning. Though organisations consist of living individual, it in itself is not a living thing; it cannot learn directly, but through the individuals constituting it. Individual learning is the foundation of organizational learning (Argyris and Schon, 1978). Organisational learning is greater than the sum of the learning of individuals in the organisation. Individual learning is a necessary, but not sufficient, condition for organizational learning to occur.

Organisational learning happens when individual learning is converted to collective knowledge (Huber, 1991). Collective knowledge consists of group, organisational and inter-organisational knowledge. Together, the individual, group, organisational and inter-organisational form the four levels of organisational learning. The first three levels are intra-organisational, i.e. within the organisation. This is illustrated in Fig. 2.1 below.
Experience has shown that learning does not happen just like that, organisations pass through certain stages in the process of learning and scholars have suggested various models for this. It will be instructive to review some of these models for appropriate guidance.

Argyris and Schon (1996) suggested that learning consists of acquiring, processing and storing information. Other scholars (e.g. Popper and Lipshitz, 2000 cited in Chang and Lee, 2007; Kolb, 1976, 1984) have presented various versions of Lewin’s experiential theory in the form of a four-stage experiential learning cycle consisting the steps: (1) having a concrete experience (2) observation of and reflection on that experience (3) conceptualization and retention of the knowledge which are then (4) used in active experimentation to test hypothesis in future situations, resulting in new experiences and behavioural adjustment. This is typical of the way individual engineers learn.

The difference here between individual and organisational learning is the absence in the former the dissemination of information to other organization’s members and its interpretation in an organizational way. This dissemination aspect in organisational learning is expressed in various scholars’ schemas of learning.

Huber (1991) suggests a schema with four interrelated processes: (1) knowledge acquisition; (2) information distribution; (3) information interpretation and (4) organisational memory. Huber (1991) also suggests a series of sub-processes in the implementation of the main ones. These are shown in the Table 2.1 below.

<table>
<thead>
<tr>
<th>Intra-organisational</th>
<th>Inter-organisational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>Group</td>
</tr>
<tr>
<td>Individual</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 2.1 Individual, Collective, Intra-organisational and Inter-organisational Learning. Source: this study.
<table>
<thead>
<tr>
<th>Process</th>
<th>Sub-process</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge acquisition</td>
<td>Congenital learning</td>
<td>What individual learns is determined by what is already known to other organisational members and what information is existing in the organisation; that is by the organisation’s inherent knowledge.</td>
</tr>
<tr>
<td></td>
<td>Experiential</td>
<td>Improving exploitation and exploration, unintentional learning and learning curves.</td>
</tr>
<tr>
<td></td>
<td>Vicarious</td>
<td>Copying others, benchmarking</td>
</tr>
<tr>
<td></td>
<td>Grafting</td>
<td>Shadowing others, acquisition through the recruitment of new members.</td>
</tr>
<tr>
<td></td>
<td>Searching and Noticing</td>
<td>Scanning, focusing on performance monitoring</td>
</tr>
<tr>
<td>Information distribution</td>
<td>Use of information technology</td>
<td>Computer archiving and retrieving of information</td>
</tr>
<tr>
<td></td>
<td>Human-based distribution</td>
<td>Person-to-person information/knowledge distribution</td>
</tr>
<tr>
<td>Information interpretation</td>
<td>Sense-making</td>
<td>Uniformity of meaning derived from the information depends on the richness of the information-conveying media, uniformity of individuals’ mental or cognitive maps, pre-existing information load and the amount of unlearning involved.</td>
</tr>
<tr>
<td>Organisational memory</td>
<td>Storing/Retrieving IT system</td>
<td>Robustness of the IT system influences the amount and integrity of information stored.</td>
</tr>
<tr>
<td></td>
<td>Procedures, Specifications, Guides</td>
<td>Organisational memory includes also Procedures, Specifications, Instructions and Guides. Maintenance and revising them keep organisational memory up to date.</td>
</tr>
</tbody>
</table>
Pawlosky’s (2001) cyclical model is similar to that of Huber’s (1991) above. It consists of four related processes: (1) Identification, (2) Diffusion, (3) Integration, (4) Action, and back to Identification. First, information relevant to generation and/or creation of knowledge is identified, then the knowledge is disseminated among members after which it is integrated into the existing system or use to modify it, and lastly, the knowledge is transformed into action and embedded in organisational routines.

Crossan et al. (1999) suggest a four interrelated processes (the 4I model) of: intuiting, interpreting, integrating and institutionalizing (Lloria and Moreno-Luzon 2014). Intuiting is a characteristic of individual level learning involving recognition of a pattern and also may include lessons from personal experience. Interpreting is explaining an idea through words or action; it connects the individual level to the group level. Integrating connects the group and the organisation levels; it is the development of a shared understanding between individuals and undertaking actions that imply mutual adjustment. Institutionalising is at the organisational level; it is the development of routines that guide individuals in the organisation.

The 4I model has been seen by some scholars as needing improvements and also being inherently political. Aponte and Zapata (2013), point out that (1) most of learning is conscious and not preconscious as suggested by intuition, and (2) while some group conversations are about intuition (in interpretation), most are premised on current ideas, beliefs and the situation (Bandura, 2006).

It is criticised for neglecting the role of power and politics and therefore as being insufficient to address the issue concerning which new ideas will be transferred into organisational and which organisationally instituted idea will provide basis for further intuition because it is power and politics that provide the social energy that transform the insights of the individual and groups into organisational. The politics of organisational learning are intrinsic part of the process and should be appreciated and leverage upon by managers and employees because the key factors in the success or otherwise of transformation at any of the stages is the political will and skill, that is, the power of those attempting to make the transformation (Lawrence, Mauws, Dick and Kleysan, 2005).
Though the scholars use different nomenclatures, their models of organisational learning are centred more or less around the processes of knowledge acquisition or creation, dissemination or distribution, interpretation and institutionalising in organisational memory all happening simultaneously at the levels of individual, group and organisational.

Learning in organisations tends to have one of two results: (1) simple identification of errors and correcting them or (2) identification of the root causes of errors and correcting them. Argyris and Schon (1978, 1998) explain these two types of learning using the concepts of single-loop (SLL) and double-loop learning (DLL). There is also third type of learning called deutero-learning which is learning to learn.

SLL only corrects errors without examining the underlying assumptions in use (Brockman, 2013). It is regarded as lower-level learning by Fiols and Lyles (1985). Though SLL still adds to the knowledge-base it may not change the fundamental nature of activities within organizations.

DLL is the corrective actions taken by changing the underlying assumptions that had caused the errors. Fiol and Lyles (1985) refer to it as higher-level learning. Senge (1990) calls this generative learning. In DLL organizations change their knowledge base or competences because of new understanding (Berta et al, 2015). SLL seeks to ensure that organizations “do things right,” whereas DLL seeks to assist organizations in “doing the right things” for achieving the project goals (Hayes and Allinson, 1998). DLL emphasizes the need to look for thorough rather than discrete solutions in order to avoid recurrence of the same problem.

This writer’s experience shows that in the project engineering design environment, “doing things right” is ensured by following approved laid down procedures and assumptions in document such as design guides and engineering instructions. Clients especially in the oil and gas industry where safety and schedule are paramount discourage trying to do “a right thing” that is outside the approved guidelines. This affects the way of learning in the design companies (Section 2.3.2, p.23).

It is important for an organisation to be aware of their type of learning since they develop different capabilities – exploitation and exploration and also require different learning strategies – adaptation or innovation (Sections 2.3.1 and 2.3.2).
2.2.2 Knowledge

Knowledge is the product of learning. Learning and knowledge are entwined in a cycle of mutually reinforcing process in which learning produces new knowledge and knowledge impacts future learning (Scarborough et al., 2004). Knowledge is the form in which organisations use their learning to achieve their objectives and solve their problems and it exists in various forms.

Knowledge may be captured explicitly and encoded in formal policies, procedures, instructions, design guides and organisations’ archives, or less explicitly in informal communication channels, culture, and behavioural norms all of which can be likened to the organisation’s memory (Berta et al., 2015). These are referred to as explicit and tacit knowledge respectively.

Explicit knowledge being formally documented has, in some form, been communicated and is relatively easily shared among organisational members than tacit knowledge (Chinowsky and Carrillo, 2007) which is based on experience, mental models, and perspectives and difficult to communicate. Failure to either share tacit knowledge or create explicit knowledge from it can result not only in loss of an organisation’s competitive advantage but also in loss of prospective projects. Tacit knowledge exhibits stickiness to the beholder (Polanyi, 1962 cited in Smith, 2003) making it difficult to share; rather than literature-based its transfer is person-embodied thereby requiring a culture of openness and trust. Engineering design practice though guided by published guidelines, codes and instructions is largely tacit in nature. There are so much the codes and standards can contain; the tacit aspects are omitted and thus can only be acquired through person-to-person action. So whether or not the culture in an engineering company is that of openness and trust encouraging personal networks and sharing is important for learning in the company. Thus the question of what sort of organisational culture exists in the company.

2.3 Organisational learning methods and strategies

Organisational learning occurs when individual knowledge, as a result of a shared interpretation among groups of individuals, gets transferred to collective during social interactions within the organization (Sanzo et al., 2011).
Organisational learning thus takes place within a community of interaction in which the organization creates knowledge, which expands in a constant dynamics between the tacit and the explicit (Garcia-Morales et al., 2012; Nonaka and Takeuchi, 1995). This community of interaction also includes inter-organisational (Mariotti, 2002). The foregoing reinforces again the idea that full examination of organizational learning should be from the social perspective.

The basis for creating organisational knowledge is the individual’s tacit knowledge which the organisation must be able to mobilise and elevate from the individual level to the collective levels of group and organisation; and organisations should also be able to learn through inter-organisational collaboration (Lloria and Moreno-Luzon, 2014). The mobilization of individual learning to group or organizational is through social interactions (Sanzo et al., 2011; Nonaka, 1994). Hence organizational learning is predisposed to the rules and regulations of these interactions which are prescribed by the culture and leadership in the organization. Organizational learning occurs under specific conditions and is consistent with the culture of the organization (Cook and Yanow, 1993; Chang and Lee, 2007). Knowledge creation and knowledge sharing through collaboration are not enough; leadership must translate them into action, for example, by encouraging people to participate in decision making (Magnier-Watanabe and Benton, 2013). By conveying their vision to and creating learning opportunities for their subordinates, leaders can enhance the capability of organization learning (Edmondson, 2002; Popper and Lipshitz, 2000 cited in Chang and Lee, 2007). Inquiry about leadership and culture in an organization when examining learning therein is thus necessary.

An analysis of organizational learning from the perspective of each learning level helps to: identify their roles in the overall learning of the organization; identify factors that enhance learning; and factors that inhibit learning (Rudawska and Platonoff, 2014). Towards this end the following presents and discusses learning methods and strategies at the individual, group, organisational and inter-organisational levels.
2.3.1 Individual Level Learning Methods and Strategies

Engineering design work in the oil and gas industry is not only highly knowledge intensive, but also eclectic with several disciplines working in tandem to deliver a project within tight schedules. A project team requires both theoretical knowledge and work experience (Peansupap and Walker 2009), at least, from the senior engineers in the team. Individual learning in some respects is as good as the organisational context within which it takes place (Antonacopoulou, 2006).

Individual design engineers acquire knowledge through means including formal academic courses, instructor-led courses, seminars, lectures and workshops, professional and technical journals, manufacturers and vendor publications, codes and standards and company’s archive. They also learn through conversations with colleagues, clients, sub-consultants, external experts and vicariously by copying others. Lastly, they acquire knowledge through learning-by-doing, e.g., by carrying out designs. These learning methods of design engineers combine experience, cognition and behaviour, and self-directed efforts (James-Gordon and Bal, 2003).

Engineers in the design office also learn through methods driven by strategies and dimensions of learning (Beaver, 2009):

- whether to use a strategy for adaptation or for innovation and
- whether to increase the depth of their discipline knowledge or to increase the breadth their knowledge of the practice.

Engineers may aspire to deepen their discipline knowledge and aspire to develop their personal mastery (Senge, 1990, 2006) in order to promote their personal vision or intention (Nonaka, 1994) with respect to how discipline work should be done and thereby establishing autonomy (Nonaka, 1994) in introducing new knowledge development, that is, becoming discipline expert. Alternatively, he or she may desire to widen their knowledge, extending into other disciplines, too, thereby building project engineering knowledge. This latter involves moving into networking and thinking system wise.
Deepening knowledge through adaptation is continuous improvement of current way of working; that is, exploiting existing organisational knowledge to build expertise (Beaver, 2009). This is single-loop learning. Moving from adaptation to innovation requires double-loop learning. Senge (1990, 2006) refer to this as generative learning.

James-Gordon and Bal (2003) describe learning methods in the open design office where the individual engineer’s first attempt at acquiring knowledge is through tacit transfer from colleagues and then experts before resorting to explicit and written information. Intentional seeking of information from a colleague is informed by the characteristics of the relationship between the seeker and the giver (Borgatti and Cross, 2003). Information seeking is a function of (1) knowing and value, (2) access (3) cost.

One's perception of another person's expertise will influence their decision to seek information from that person when challenges surface (Borgatti and Cross, 2003). Knowing that someone else has valuable expertise is important, but having access to the person is equally important. Knowing without access is useless. Access is different from physical proximity. Engineering design offices are often open areas and this enhances information seeking. However, the knowing and relational mechanisms impact on the relationship between physical nearness and information seeking. It is thus necessary for organisations to promote relational mechanisms through which physical proximity leads to information exchange (Borgatti and Cross, 2003).

Seeking information from others may involve cost in the sense that the seeker takes a risk by admitting ignorance on a given subject in a competitive environment (Borgatti and Cross, 2003). Also due to reciprocity norms, obligations resulting from an exchange can also be seen as a form of cost; asking people for significant amounts of help may place a person in their debt.

Individual learning is also achieved by tasks that successively further develop on individual skills by (1) participating in increasingly more complex tasks; (2) moving from mono functional to cross functional tasks, (3) conducting lesson-learnt sessions (Kotnour, 2005).
There is evidence that physical proximity affects the likelihood of communication between a pair of employees, most probably by increasing the probability of chance interactions (Borgatti and Cross, 2003). While people working from different backgrounds in the same physical setting may see things differently, their visions still gravitate to one another. For example, mechanical and piping engineers working in the same open design office with time come to appreciate each other’s basis of design more and develop new insights into design processes that result in new learning.

The literature thus shows that learning efforts by individuals are affected by a number of features, either as enablers or disablers, which merit attention when examining individual learning. One of the implications for this research lies in identifying for this sector (1) individual learning enablers and how to enhance them and (2) individual learning obstacles, their causes and how to eliminate them.

Chinowsky and Caaillo (2007) proposed that examining organisational learning should include the assessment of the following five learning entities: (1) leadership, (2) processes and infrastructure, (3) communication, (4) education and (5) culture.

James-Gordon and Bal (2003) identifies the constraints that impact individual wanting to learn as: perceptual, cultural, emotional/motivational, intellectual and environmental. The engineer may perceive that he or she doesn’t need much learning and that resources are even limited anyway. Intellectual obstacle is in not seeing the need for learning being continuous and defective understanding of it. The causes of these two obstacles could be traced to the leadership in the organisation; for example, if leadership is reluctance to provide resources for learning and/or is comfortable with the level of knowledge in the organisation. Cultural obstacle has to do with expecting nothing more than the traditional training methods. Also, the fear of failure and being ridiculed can create emotional obstacle to individual learning. This is linked to environmental obstacle when the firm’s lack of encouragement to take risk results in discouragement toward new learning methods and options. The motive for individual learning, depending on the society and its culture or the extant situation, may be different from achieving organisational learning for the firm. If the individual’s and organisational motives are different, organisational learning will be adversely affected.
2.3.2 Group Level Learning Methods and Strategies

The first collective learning medium is the group or team level. Organisations rely on work groups and teams. Groups act as core agents of learning and generators of innovations through facilitating mutual trust building among members, providing opportunities for information sharing and, creating new ideas through dialogue and discussion (Curado, 2006). A team or group is made up of individuals, who see themselves and are seen by others as a social entity, who are interdependent because of the task they perform. Team type varies and could be: project teams, discipline group, autonomous work groups, etc.

Most of the work in oil and gas engineering design is carried out by teams. Group learning is second only to organisational support in enhancing effective learning (Peansupap and Walker, 2009). Grouping enhances knowledge transfer by bringing together the transferees and the transferors in a closer proximity. When engineers work in a team, they exchange ideas in trying to solve the team’s (e.g. a project’s) design problems. This is done through communication, and group inquiry in a collaborative process that enables transfer of tacit information (Reinmoeller and Chong, 2002; Nonaka, 1991). This necessitates reflective conversation (Senge, 1990, 2006) including dialogue with their colleagues in groups.

The reflective conversation generates creative tension that leads to the surfacing of personal mental models (Senge, 1990, 2006) which are challenged to achieve shared vision (Senge, 1990). Mental models are our ingrained assumptions, views and prejudices that impact on our interrelationship with others and how we think the organisation works in the wider world (Senge, 1990). Senge’s (1990) discipline of mental model is the surfacing for inquiry, reflection, modification and/or replacement if necessary our thinking and images maintained in our mind of ourselves and the world. They affect our ability to share knowledge because sharing is largely impacted upon by interrelationship among people based on their feeling. Even if we try to hide our true feelings and project otherwise it will not help because then our actions (which are governed by our mental models) will not match our words. That is, one’s espoused theory (what one says) is different from one’s theory-in-use (mental model) (Argyris, 1990), a situation that is unfavourable to sharing.
Surfacing mental models enhances sharing and thus learning among people when they update and upgrade their latent views and beliefs.

Surfacing of mental models also bring to the open individuals’ personal visions which when truly shared bound people together by a common aspiration and provides the focus and energy for learning. Senge’s (1996) discipline of shared vision is collectively developing a common sense of purpose for the organisation and actions for achieving that purpose. Development of shared vision is vital for diffusion of information and team learning. When meanings are shared behaviours are easily understood and predictable (Szulanski, 1996). While creating vision is part of management responsibilities, visions created by management cannot be considered shared until other organisational members feel part of it (Taggart, 2010). A learning vision is successful if it is a shared vision. Employees buy into a vision if its implication on them is taken into account when it is being created by management, that is, if management thinks system-wide. Systems thinking (Senge, 1996) induces learning across discipline boundaries and increases the learning in the organisation. Communicating organizational goals and visions to workers has been suggested as a motivator for revising, reflecting and sharing individual knowledge and competences at workplace (Nonaka & Takeuchi, 1995). Therefore leadership must communicate with and be accessible to organisational members.

When individuals surface their mental models and create shared visions from the visions of their personal mastery, they do so in a group. It engenders group or team learning - collectively thinking and taking concerted action to develop in the organisation a team intelligence bigger than those of all its members (Senge, 1990). Team learning is built upon personal mastery by members drawing on the talents, knowledge and experiences of each other through their interaction, coordinating their efforts and communicating openly and closely (Taggart, 2010). Dialogues and discussions in teams often bring up disagreement, the presence of which is required for effective team growth because the team will not learn unless team members disagree at times due to free flow of conflicting ideas. Dialogues donate a level-playing field for individual ideas when their strengths and weaknesses are discussed (Senge, 1990, 2006). Dialogue and reflection at group level promote experience sharing that leads to collective insight (Edmondson, 2002; Scarbrough et al., 2004; Senge, 1990, 2006). Dialogue is also the medium for communication and collaboration with outside
the group. It is through dialogue that the seeker and giver of learning maximize knowledge
transfer between them. The learning seeker-giver relationship characteristics of (1) knowing
and value, (2) access and (3) cost) (See Section 2.3.1) are also relevant at the group level
when groups or networks collaborate beyond their boundaries.

Edmondson (2002) warns that learning is not uniform across groups. She pointed out
that because the propensity to learn in different groups in an organisation differs due to
local groups’ subcultures, there is potential difference in learning approach and learning
effectiveness across organisational groups thereby resulting in much localised learning. This
makes organisational learning to be variegated across the groups. This can lead to
difficulties in sharing learning across group boundaries. It is thus necessary for groups to
find balanced collective inquiry within and beyond the group. Learning in groups is also
variegated when some groups focus on single-loop learning and others on double-loop
learning (Argyris, 1982) both serving different learning goals – incremental and radical
learning respectively - for the organisation at the group level (Edmondson, 2002). Both are,
in fact, essential for effective organizational adaptation. The ability to produce new ideas in
design capabilities is vital to competitiveness in the industry, while the ability to detect
ersors, effect changes and modify tasks accordingly will improve quality of on-going work
and get it finished within schedule leading to reducing costs of projects for both the
company and the client.

There are two prominent types of groups in the oil and gas engineering design
companies setting: the project team and the discipline group. The project team is headed by
the Project Manager while the discipline group is headed by the Chief or the Lead Discipline
Engineer. There are also other informal groups where people on their own come together to
share knowledge, like some sort of community of practice. The company at times set up a
special group to look into certain technical or design issues.

Experience in the oil and gas industry shows that while the project teams tend to focus
more on incremental or exploitative learning due schedule and cost issues, the discipline
groups have the latitude to also give considerable time to radical or explorative learning.
This is because on most projects, the oil companies would rather have teams pursuing
exploitation, i.e. single-loop learning rather than exploration, i.e. double-loop learning
though there are occasions when the client expects some explorative activity for uncommon designs. Projects must be completed on schedule and within budget rather than exploring new knowledge; exploitation of known knowledge is often preferred by both the client and the engineering design contractor thereby steering learning along the adaptation trajectory.

The above-discussed collective learning-supporting characteristics of groups are latent to the ordinary engineer in the industry, so they don’t strive to enhance them in order to maximize group learning. Part of the gains from the AR intervention (Chapter 5) was that participants were made aware of these characteristics which they promised to work upon to maximize group learning in their respective organisations.

2.3.3 Organisational Level Learning Methods and Strategies

While the cycle individual – group – organizational may suggest a hierarchy among levels’ learning processes, the learning processes overlap across levels and learning actually occurs on the different levels simultaneously. The individual level learning is imbedded into organizational level learning through (or without) group level learning and finally is transferred into actions that will be bases for the future learning. These cycles repeat, overlap and applies to the various section of the organizational throughout its life (Rudawska and Platonoff, 2014).

Learning at the organizational level includes developing and modifying organizational memory through embedding in the memory the learning at the individual and group levels and later disseminating it through management instructions, plans, policies and strategies which have all been adjusted in the light of the new learning. It also includes monitoring an unexpected outcome. So learning results include institutionalized knowledge embedded in non-human elements of organization and in culture that together enable consistent efficient and effective action that are compatible with environment requirements (Radowska and Platinoff, 2014).

Interrelation and interactions across group boundary lines are imperative for engineers in the design and project settings. Veshosky (1998) and Chinowsky and Carillo (2007) found that personnel in architecture, engineering and construction have difficulty communicating across boundaries, so boundary management is essential. Szulanski (1996) suggests
boundary management in the forms of transfer and translation processes. Carlile (2004) suggests the following processes that include transformation in addition to transfer and translation:

1) Transfer – Relocation of information across boundaries having a common lexicon on both sides; main concern is the processing of the information; can be problematic if the lexicon across boundary changes. This type of boundary is a syntactic or information processing boundary.

2) Translation – Interpretative approach requiring the development of common meaning because different lexicons exist at the boundary; may require negotiating interests and making trade-off between parties. This is an interpretive boundary.

3) Transformation – Sharing learning across boundary between actors whose interests are pragmatically different or are in conflict as a result of which additional cost is incurred by the actors involved thereby reducing their willingness to make changes. It requires managing potential conflicts and the ability of actors to translate knowledge with view of their consequences. This is a pragmatic or political boundary.

Transfer is a distinct event effective for transferring knowledge within single engineering discipline or among closely related ones. Translation is diffusion occurring over a less well defined period (Szulanski, 2009). Translation is essential for project settings where various disciplines and units are involved and must adapt learning by absorption and reflection, thereby enabling application of knowledge to others (Scarbrough, et. al., 2004). In engineering design transfer is appropriate for discipline groups, translation for project groups and transformation for inter-organisational collaboration. The success of transformation is in the ability to represent knowledge in an inviting and political way such that it is attractable in spite of its novelty and differences across groups. Organisation’s leaders are in the best position to supervise management of boundaries, so they must be well acquainted with type of boundaries in the organisation in order to apply the right transfer process.
2.3.4 Inter-organisational Level Learning Methods and Strategies

In the strict sense, organisational learning consists of intra- and inter-organisational aspects (Fig. 2.1). The former is made up of the first three levels of learning in organisations - individual, group and organisational. Inter-organisational learning occurs in a network of organisations or a ‘temporary organisation’, also referred to as an ‘imaginary organisation’ (Holmqvist, 2003). It is the fourth level of learning in organisations.

While both exploitative and explorative learning happen in intra-organisational learning, inter-organisational learning produces mainly explorative (Mariotti, 2002).

Holmqvist (2003) dynamic model of intra- and inter-organisational learning explains that exploitation and exploration learning occur both within and between organisations in deeply intertwined learning processes. Exploitation within an organisation is the prerequisite for exploration between organisations and conversely inter-organisational exploration is the requirement for single organisations’ exploitation. The explorative tendency of inter-organisational learning results from the confrontation and combination of single organisations’ experiences. Individual organisations acquire and internalise learning from inter-organisational processes and actions (Holmqvist, 2003).

Inter-organizational learning is a process in which members of an ‘imaginary organisation’ act jointly to create collective knowledge (Holmqvist, 2003; Mariotti, 2002). It is the development and/or acquisition of knowledge for the specific context, e.g. a joint project, and located within the project archives, but can also be adopted by the constituting individual organisations. Network members come together and interact to jointly fulfil their shared goals, in the process exchanging knowledge and jointly managing them. On joint engineering projects, members create collective knowledge by converting their individual knowledge brought along from their respective organisations into inter-organizational knowledge and creating an inter-organizational ‘memory’. This is achieved through transferring, complementing and combining each other’s knowledge and organisation-specific knowledge to create new knowledge. Therefore learning in networks requires the ability to identify, assimilate and utilise a partner’s knowledge (Mariotti, 2002). Accordingly,
inter-organizational knowledge consists of joint knowledge, which is exclusive to the collaboration and independent of any single organization’s knowledge (Holmqvist, 2003).

Mariotti (2002) suggests four important facilitators of inter-organizational learning: (1) the ability to develop and sustain valuable resources; (2) absorptive capacity; (3) combinative capability and (4) trust. Participating firms must bring to the collaboration own resources and be able to work with other to sustain such resources and develop new ones. Firms must be able to recognise the value of others’ knowledge, assimilate and make use of it and also have the ability to combine existing and acquired knowledge to create new knowledge (Cohen and Levinthal, 1990).

The issue of trust has been very prominent in discussions of collaborative processes such as a joint project execution (Vangen & Huxham 2003). Just as in intra-organisational learning, trust is an important facilitator of learning at the inter-firm level for it is the very foundation on which interrelationships are built (Mariotti, 2002). Trust is the maintenance of reciprocal faith in each other in terms of intention and behaviours. When their relationships are high in trust, people more willing exchange knowledge. Lack of trust among employees is one of the key barriers against knowledge exchange.

However, Vangen and Huxham, (2003) point out that trust building is problematic and management of trust implies both the ability to cope in situations where trust is lacking and the ability to build trust in situations where this is possible. While they require some trust to initiate them, collaborative ventures will not necessary fail even if there is no initial trust. Trust does develop incrementally during interaction (Butler and Gill, 1995; Das and Tang, 1998). The point is that in collaborations without history of trust, participants should be willing to take risk and become vulnerable to the actions of the other partner (Vangen and Huxham, 2003).

Trust in collaboration is hindered by issues of power relationship, control and power difference. Power game, power plays and power struggle have been identified as significant contributors to mistrust. The success of collaborative ventures is enhanced by: clarity of purpose and objective; resolving power differences and imbalances; sharing workload fairly; having equal ownership and effective communication (Vangen and Huxham, 2003).
Mariotti (2002) identifies at least four ways in inter-organisational learning through which knowledge is shared:

(1) through exchanging data and information – information involves participating companies sharing and exploiting existing codified knowledge.

(2) through mediating specialized knowledge – gaining knowledge from experts in the joint venture

(3) through overlapping specific knowledge - the combination and exploitation of existing knowledge by individual participating companies.

(4) through exploring new knowledge opportunities - often results in collective creation of informal knowledge, i.e. inter-organizational knowledge. It is a deliberate joint effort by the network to search for new solutions and knowledge; and the knowledge created is usually available for all companies to internalise and exploit.

2.4 Factors Affecting Overall Organisational Learning

As has been severally shown above organisational learning does not happen in a vacuum, but is subjected to the impact and influences (either enabling or disabling) of some variables at all learning levels (Tseng, 2010).

Scholars emphasize the importance of culture, leadership, organizational structure and internal and external environments for individual and collective learning (Casey, 2005; Marsick and Watkins, 1996).

Organizational learning is a key mechanism for organizational development and therefore constitutes an organizational mandate (Brzenziski, 2000 cited in Rudawska and Platonoff, 2014). Hence management has the responsibility to enjoin employees to learn and to work for its realization. Thus the success or otherwise of the organizational learning endeavour is influenced by the sort of leadership provided by the management.

At the individual level, the formal training and development programs, the strategic choice between adaptation and innovation, and the dimensional choice between increasing the depth and increasing the breadth of learning (Section 2.3.1) are heavily influenced by
organizational leadership. Leadership is a key organisational driver which defines the mission, vision and values of the organisation and how these are realized (Magnier-Watanabe and Benton, 2011). Leadership determines the type and the extent of learning in the organisation. Individuals’ motivation-driven commitment to learning (Section 2.3.1) further shows the impact of leadership on individual learning in that leadership can enhance extrinsic motivation by rewarding learning through, for example, promotion, salary increase or recognition.

Leaders’ decisions with respect to learning developed at the group and organizational levels affect what sort of knowledge goes back through the feedback mechanism (Crossan et al, 1999) for learning by the individual. Leadership role is important in the provision of physical setting and conducive environment that enhance chance interactions and perception of a colleague’s expertise. True access requires more than physical proximity because one party must want to approach the other and the latter must also want to make himself/herself accessible. This is dependent on the kind of culture present in the company: whether or not it is a culture of trust, transparency, openness, sharing, clan or competitiveness. These notions are also impacted upon by the organisation’s values, beliefs and norms which constitute the culture of the organization. Thence the stance by many scholars’ (e.g. Giberson et al., 2009; Magnier-Watanabe and Benton, 2011) that organizational culture affects learning in organisations. Individual cognition and behaviour through which organizational learning necessarily occurs is shaped at the team or group level by social influences, that is, by the attitudes and behaviours – culture - of others with whom they closely work (Edmondson, 2002).

2.4.1 Enabling Factors Affecting Overall Organisational Learning

Learning-enabling factors need to be present in one form or the other for organizational learning to occur (Love et al., 2002; Senge, 1990, 2006).

Marsick and Watkins (2003) identified seven "action imperatives" for a learning organization: (1) creating continuous learning opportunities, (2) promoting inquiry and dialogue, (3) encouraging collaboration and team learning, (4) establishing systems to capture and share learning, (5) empowering people to have a collective vision, (6)
connecting the organization to the environment and (7) provide strategic leadership for learning. These imperatives must be effected to engender organizational learning.

Foucher (1995 cited in Confessore and Kops, 1998) identified organizational variables such as: (1) the presence of a participative management style; (2) a supportive environment in which employees enjoy autonomy and in which management believes the employees are competent and motivated; (3) support for experimentation and tolerance for error; and (4) support for unplanned, non-sequential learning activities.

An enabling environment has four distinguishing characteristics (Edmondson, 1999): (1) psychological safety - employees being comfortable to express their thoughts without the fear of being belittled when they disagree with peers or authority figures, ask naive questions, own up to mistakes, or present a minority viewpoint; (2) appreciation of differences - learning occurs when people become aware of opposing ideas and recognize the value of competing outlooks and alternative worldviews; (3) openness to new ideas - learning is not only about correcting mistakes and solving problems, but also about crafting fresh approaches and exploring the untested and unknown; (4) time for reflection - allowing time for a pause in the action and encouraging thoughtful review of the organization’s processes.

Senge (1990) identified five disciplines necessary for organizational learning: (1) systems thinking, (2) personal mastery, (3) mental models, (4) a shared vision, and (5) team acquisition of knowledge. The goal of the learning organization is to employ these disciplines to increase organizational learning.

Trust is imperative (Lee and Choi, 2003; García et al., 2007). It determines cooperation, communication, and information sharing. Trust increases the quality of information exchanges and improves relationships among departments. Furthermore, when trust exists, people are more inclined to ask for help and take risks with new and creative ideas, as well as cooperate.

To create a learning culture, the traditional authoritarian image of the leader has no place. In a learning culture, critical roles of leadership have each taken on new meanings: designer, steward and teacher (Senge, 1990b).
The function of the leader designer is “social architecture” and he/she has three tasks: design the mission, the vision and the core values for the organisation; put in place policies, strategies and structures that guide decision making; and create effective learning process.

The stewardship of the leader is in overseeing the fulfilment of the organisation’s vision and seeing this role as involving a commitment to, and responsibility for the vision, but not as its owner. He/she is only managing it for the benefit of the members (Senge 1990: 351). This engenders participative leadership style where decisions are taken with the participation of the concerned organisational member (Miah and Bird, 2007).

The leader teacher’s responsibility is to assist all organisational members including himself or herself to gain deeper insight into current reality, rather than authoritatively teaching people the “correct” view of reality (Senge, 1990). This starts by helping to surface people’s mental models; then teach them how to “restructure their view of reality” so as to be able to not only see further than the superficial, but into the underlying causes of problems and thereby be able to identify new opportunities for shaping the future. This is a supportive leadership.

Supportive leadership is imperative in order to establish a conducive and participative organisational environment (Yitmen, 2012). Leaders must focus on developing strategies that encourages building relationships, creating shared vision and empowering people to learn at all levels, creates an environment where risk taking and is not only acceptable, but encouraged when managed properly and is focused on enhanced performance, and champion the integration of new knowledge into the organisation.

The design of organizational structure and operations impact on whether or not interactions among staff in terms of knowledge and learning is enhanced (Pham and Swierczek, 2006). Large power distance takes decision making further away from the average organisational member (Curado, 2006). Being part of decision making increases employees’ responsibility and ownership of change imperatives for achieving predetermined objectives such as learning (Andert, Plat and Alexakis, 2011). Organisational learning is engendered by challenging others’ opinions even if these are those of more
senior members. However, the ability to do this is influenced by the organisational structure (Sampe, 2012).

The enabling factors apply at the different levels of organizational learning. Though there may be differences among the nomenclature used by different scholars, there is general agreement on their meaning and characteristics. By associating similar characteristics, it is seen that learning in organisations requires that organizations possess the following:

1. Culture that values openness, sharing, collaboration; where there is trust; and where there is effort to bring closer the theories of action and the theory in use.
2. Leadership that is supportive; rewards learning; promotes individuals’ leadership quality; shares mental model; and is designer, teacher and steward.
3. Organizational structure that is organic, flat and with little power distances thereby facilitating interactions among employees.
4. Strategy that learning is built into as component; that employ double-loop learning rather than only single-loop to develop new knowledge and practices.
5. Climate of individual employee autonomy, inquiry and open dialogue, risk taking, fluctuation, personal interaction and trust
6. Environment: Organisation understands the dynamics of the environment and connects strategy and people to it.

The factors of organizational structure, strategy, climate and environment are influenced by organizational culture and/or leadership. Organisational culture and leadership influence one another. Table 2.4 below shows the above factors together with their respective characteristics as treated by the scholars.
<table>
<thead>
<tr>
<th>Factors</th>
<th>Attributes</th>
<th>Influencer</th>
<th>Scholars</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning Culture</strong></td>
<td>Learning is valued; openness; shared experience; collaboration; adhocracy; participative management style; Theory of action and theory in use.</td>
<td>Leadership</td>
<td>Argyris and Schon (1996); Senge (1990, 2006); Nonaka (1994); Nonak and Takeuchi (1995).</td>
</tr>
<tr>
<td><strong>Supportive Leadership</strong></td>
<td>Designer, teacher &amp; steward; shares mental model; empowers people, motivation; continuous learning opportunity; supportive; courage; risk taking.</td>
<td>Culture</td>
<td>Senge (1990, 2006); Marsick and Watkins (2003); Teare (1998); Tannenbaum (1997); Fillion et al., 2015;</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td>Organic; less pyramidal, flat; little power distances</td>
<td>Leadership/Culture</td>
<td>Curado, 2006; (Pham and Swierczek 2006); Sampe, (2012).</td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
<td>Theories of action and theory in use; learning built into strategy; DLL more intense than SLL; internal and external knowledge acquisition</td>
<td>Leadership</td>
<td>Argyris and Schon (1996); Yitmen (2012)</td>
</tr>
<tr>
<td><strong>Climate</strong></td>
<td>Employee autonomy; inquiry and dialogue; risk taking; personal interaction; trust; physical proximity.</td>
<td>Leadership/Culture</td>
<td>Lee and Choi (2003); Nonaka (1994);</td>
</tr>
<tr>
<td><strong>Learning Environment</strong></td>
<td>Connecting strategy and people with dynamics of environment; physical proximity.</td>
<td>Leadership</td>
<td>Marsick and Watkins (2003); Nonak and Takeuchi (1995); Yitmen (2012); Garvin, 1993.</td>
</tr>
</tbody>
</table>
2.4.2 Disabling Factors Affecting Overall Organisational Learning

Situations that are opposite to the enabling factors will probably be disabling; for example, lack of trust, leadership that is not supportive, culture where there is no openness, transparency, collaboration and sharing, or that is restrictive and organizational structure that is not organic and which has large power distances. Lack of time for reflection - when people are too busy or overstressed by deadlines and scheduling pressures, their ability to think analytically and creatively is compromised and they become less able to diagnose problems and learn from their experiences.

Some impediments are due to individuals in the organization, such as: individualism, self-centeredness, lack of motivation, reluctance, established behaviour, and past negative experiences (Coutu, 2002).

There are various other learning disabilities such as incorrect learning (Huber, 1991) and superstitious learning (Miner and Mezias, 1996 and Fiol and Lyles, 1985). Furthermore, scholars have identified numerous various disabilities which may or may not be interrelated and which may be due to one cause or multiple causes. These include:

- non-systems thinking, externalization, short term view, and skilled incompetence (Senge, 1990, 2006);
- externalization, the illusion of taking charge, the delusion of learning from experience and the myth of management team (Taggart, 2010);
- tight control of units, superstitious learning, and deficient learning diffusion (Yeung et. al., 1999);
- defensiveness, unfriendly relationships, deficient absorptive capacity (Szulanski, 1996);
- problem with balancing exploitation and exploration, diffusion of expertise (March, 1991);
- non-appreciation of learning, non-incorporation of learning into new tasks, risk aversion in learning situation, absence of supportive policies and practices (Tannenbaum, 1997);
• vision obscurity, uninformed task assignment, management non-appreciation of learning (Farid, et. al., 1993).

2.5 Research Questions

While previous works have extensively studied the concept of organizational learning in general, these studies are incomplete with respect to organizational learning in the engineering design companies of the oil and gas industry. These studies show the influence of organizational cultures and leadership on organizational learning in general and do not treat in detail how the constituents of each influence certain characteristics of organizational learning capabilities. Hence the two questions on organisational learning and leadership in the companies.

1. **How do engineers describe their experience of the type of leadership that obtains in their company?**

2. **How do engineers describe their experience of the type of organisational culture that obtains in their company?**

Likewise, while studies discuss the strategic learning choices of adaptation and innovation (generative learning) (Section 2.3.1), little or nothing is said about how an engineering design company can perform generative learning in an industry that is averse to innovation during design projects. There is an impact on organisational learning direction and the engineer’s perception of it. There is thus a gap which informs the third question:

3. **How do engineers describe their experience of learning and organisational learning in their companies?**

Inter-organisational learning is not sufficiently treated in the literature including with respect to engineering design, so the fourth question is about it.

4. **What do engineers say about their experience of industry’s collaboration and contribution to learning?**
2.6 Chapter summary

Research interest in organizational learning is not new. However, being focused mostly on large western organisations with minimal attention given to the developing world, more so, an oil and gas engineering design sector, makes these studies insufficient for the setting herein. While the literature describes how organisational learning can be improved in general, little literature addresses how this can be achieved in an industry that attaches extreme importance to safety and schedule and is averse to risk, thereby suggesting careful balancing between exploitative and exploration learning. The import of this is that previous researches and the literature have not adequately addressed organizational learning in engineering design companies such as those in the Nigerian oil and gas industry which is the subject of this study.

Organizational learning consists of multiple processes - knowledge acquisition, dissemination, integration and organizational memory - and could be of the type single-loop or double-loop and occurring simultaneously at the learning levels of individual, group, organizational and inter-organisational. It happens in social interactions whose rules and regulation are informed by the culture, leadership, structure, strategy, climate and environment of the organization. The highly multi-disciplinary nature of the oil and gas industry underscores the importance of interrelation, openness, sharing, networking and behaviour adjustment.

The next chapter gives a detailed account of the Methodology employed in this research.
CHAPTER 3  METHODOLOGY

3.1  Introduction

The research problem was how to improve organisational learning in the engineering design sector of the Nigerian oil and gas industry. The purpose of the qualitative study was to explore and identify strategies that may increase organizational learning and subsequently aid the local engineering design companies in the sector to improve their local content contribution in the industry. Towards this, I aimed to understand in detail the organisational learning experience of indigenous engineers working for local engineering design companies in the sector in order to gain knowledge of the extant organisational learning practices therein and make proposals for an action research intervention in a joint multi-firm project.

In this chapter, I discuss the philosophical tradition and assumptions that underpin my research (Section 3.2). I also explain why the qualitative phenomenological approach was chosen for the empirical study and how the participants and their companies were selected (Sections 3.3). Section 3.3 also contains explanations on data collection and analysis and ethics for protecting the participants. I explained the AR intervention in Section 3.4 and summarise the chapter in Section 3.5.

The literature review (Chapter 2) revealed that looking for ways of improving organisational learning in an organisation will require examining therein the kind of leadership, culture, collaboration, structure, strategy, climate and environment. This informs the formulation of the four research questions for this study. The research questions Q1 (How do engineers describe their experience of the type of leadership that obtains in their company?) and Q2 (How do engineers describe their experience of the type of organisational culture that obtains in their company?) brought out the characteristics of leadership and culture. The third research question Q3 (How do engineers describe their experience of learning and organisational learning in their companies?) addressed directly the organisational learning strategy and environment in the companies. The fourth research question Q4 (What do engineers say about their experience of industry’s collaboration and
贡献于学习？） looked into the benefits of industry linkage and inter-organisational learning which hitherto had rarely been given fitting consideration.

I realised that the methodology for this study would not be implemented in a straightforward manner. There is dearth of adequate qualitative research on organisational learning in an oil and gas engineering design sector; therefore, the methodology should be one that involves close interaction with the players. In addition, theory-practice focused researches often require different methodological approach to those that are purely theoretical and academic focused. Being theory-practice focused, my aim in addition to understanding organisational learning experience in the sector included deepening the result in the form of an action research intervention. I first carried out an empirical study first before the action research intervention.

### 3.2 Philosophical Tradition and Assumptions

Philosophical issues are central to management research and it is very important to sort them out first for appropriate research design and research quality (Easterby-Smith, Thorpe and Johnson, 2011, p. 56). A clear declaration of the philosophical tradition in which this research was based would allow the reader to situate both the researcher and themselves more appropriately. Philosophical assumptions or traditions dictate the choice of ontology, epistemology and methodology (Creswell, 2007, p. 15). Ontology deals with what my understanding of the nature of the reality of the world is. Epistemology is concerned with my general assumptions about the best ways of inquiring into the nature of the world. Methodology is the approach or combination of approaches used to enquire into a specific situation. Easterby-Smith, Thorpe and Johnson (2011, p. 56) describe two philosophical traditions: positivism and social constructionism; and also a third one – pragmatism that combines methods from the former two traditions.

The essence of my research questions above consists of seeking understanding to the meanings participants attach to their experience of organisational learning (Section 2.1). These meanings would be diverse, multiple, and negotiated socially and historically. In other words, they would not just be the initial meaning making of individuals in their minds, but their final meaning products constructed through interactions with others and impacted
upon by individuals’ history and culture (Creswell, 2007, p.21; Gergen and Gergen, 2008). It is not about searching for ‘the truth’, but about establishing how people construct in everyday life the various claims for truth and reality (Easterby-Smith, Thorpe and Jackson, 2011, p. 59). This is especially true for organisational learning because it is collective and happens in social interaction among people (Section 2.2.1, 2.4). An appropriate approach would be such that possess the capability to understand processes and the meanings people attach to actions; and be flexible so as to be able to adjust well to emerging matters and ideas.

The above requirements do not align well with the positivism tradition whose fundamental idea is in its ontological assumption that “reality is external and objective” and its epistemological assumptions that “knowledge is only significant if it is based on observations of this external reality” and that the “truth” is out there regardless of our perception (Easterby-Smith, Thorpe & Johnson, 2011, p. 57).

Social constructionist contrary to positivism posits that reality is neither external nor objective, but is socially construed and given meaning by people (Easyerby-Smith, Thorpe and Jackson, 2007, p. 57). Thus there can be no ‘one truth’ because there can’t be universal laws. Since the participants in this study were human beings with feelings, beliefs, rules and values, I refrained from understanding the social world from only the perspectives of simple causal relationships based on some over-arching laws. It was thus essential for me to rely on the participants’ understanding as much as possible and take note of the context in which they existed. I realised that reality and the social world and the meaning people give to both are constantly being reconstructed, and this enlightened me that my actions would be guided by the social constructionism worldview or paradigm.

Though they have the drawbacks of longer time for data collection and intricacy in data analysis, social constructionist approaches possess the capability to understand processes and the meanings people attach to actions. They are flexible for they can adjust well to emerging matters and ideas; and because they gather data in the natural setting they are seen as not being artificial. Accordingly, my philosophical base for this research is social constructionism. Knowledge is constructed out of interaction between human beings and then the world. Meaning is not discovered, but socially constructed by the people who
experience a particular phenomenon. It is of the subjectivist ontology (i.e. the world is available subjectively) and social constructionist epistemology (its interpretation is to be negotiated) (Greenwood and Levin, 2007, p. 56). Therefore, my methodology was qualitative inquiry and my approach was phenomenology (Section 3.3 below).

Action research is covered by the social constructionism philosophical tradition, too. The philosophical foundations of action research: the ontology, epistemology, theory, reflexivity, and role of the researcher have been discussed by many writers and these are articulated by Coghlan and Brannick (2010, p. 41). Action research is of the subjective view of epistemology that denies the possibility of a theory-neutral language. It concentrates on epistemic reflexivity which is not a neutral process, but leans on the researcher’s belief system (Johnson and Dubereley, 2010, pp. 138-139) that is guided by the principle of democracy and commitment to change (Coghlan and Brannick, 2010, p. 43). The research theory is particular; action research is situational. The role of the researcher is characterised by being close to data rather than being distanced from data as in positivism.

3.3 The Empirical Study
3.3.1 Qualitative Research

This empirical study was a qualitative research. As has been pointed out above, my aim in the empirical study was to understand in detail the organisational learning experience of engineers working in the local engineering design sector of the Nigerian oil and gas industry, thereby gaining knowledge of the extant organizational learning practices in the sector. The results would form the basis for the action research intervention. The intervention was the systematic infusion of the data and characteristics of the results into the temporary organisation for the execution of the inter-organisational joint project. The intervention project is discussed in details in Chapter 5.

The literature review showed that the questions to be answered in this empirical study phase would include those on culture, leadership and strategy (Section 2.4). Organisational culture is a set of assumptions that guide what happens in organisations by defining appropriate behaviour for various situations (Section 2.3, 2.4; Ravasi and Schultz, 2006). It consists of the values, beliefs, ideas, symbols, artefacts, rituals, myths, language, norms,
practices and behaviour. Leadership is a key organisational driver which defines the mission, vision and values of the organisation and how these are realized. Leadership also determines what sort of knowledge is sought and created by members (Section 2.3, 2.4). Leadership provides credibility in communication and it offers the possibility to initiate large changes with small efforts (Wahlstrom, 2011). Therefore, answering questions on organisational culture and leadership will involve the issues of shared values, rituals, myths, beliefs, symbols, languages and ideology constituting the organisational culture; setting mission, actualising goals, sustaining commitments and responding to change constituting leadership; and individual learning, group learning and social learning; trust, collaboration and sharing. These are notions about which information is best gathered in the field at the place of happenings talking directly with those experiencing the occurrence.

Qualitative research studies things in their natural settings trying to make sense of phenomena in terms of the meanings people attach to them and the way people make sense of the world through mutual sharing of their experiences through the medium of language. It focuses on descriptions rather than on numerical data that is the basis of quantitative research which strives to prove a hypothesis (Easterby-Smith, Thorpe and Jackson, 2011, p. 59). What was important for this study was not gathering facts and measuring how often certain patterns occurred, but appreciating the various meanings that people attached to their experiences. It would serve my purpose better if I allowed the person experiencing or not experiencing collaboration or the person learning in an organisation to explain the ramifications of their experience rather than trying to proclaim understanding of the experience solely on the basis of some theory.

Scholars have commented that the combination of qualitative and quantitative approaches could result in good understanding of a problem. I did not see this being applicable to this research, because of its explorative nature and focus on understanding learning in temporary organization. I believe a qualitative form of inquiry is most suitable for the above setting and therefore choose to conduct a qualitative research.

Having chosen the qualitative inquiry it was necessary to determine which of its approaches to employ. The approach not only needed to align with my philosophical stand, it also had to be appropriate for the objective of the study, speak to the research questions,
and be able to, as much as possible, gather rich, relevant data from the field such that it will be easy for the reader to understand.

Would I want to immersed myself in this research and pursue the ethnography approach? This would entail working in these organisations during the period of the study. This was not feasible. Did I want to write a story based on what I saw and from my perspectives alone or from the life storey of an individual? I didn’t want this sort of narrative because the voices of the many experiencing this phenomenon was essential for this kind of research. The intent was to establish the “universal essence” (Creswell, 2007 p.58) of organisational learning from the stories told by various individuals in the different organisations. A phenomenological approach would be good for this. The phenomenological design is suitable when a researcher wants to explore the lived experiences and the perceptions of participants in a study. Hence I chose to use this approach, and having decided on this I gave little consideration to the grounded theory and case study approaches.

3.3.2 Phenomenology

Phenomenology which has its roots in the philosophy of subjective openness of Edmund Husserl (Moustakas, 1994, p. 25) is concerned with understanding of the meanings which individuals ascribes to their “‘lived experience’ of a concept or a phenomenon” (Creswell, 2007, p.57). The research questions being about experiencing something therefore makes phenomenology a natural choice for me. It is the study of an occurrence from the perspectives of its perception by the various individuals who experience it. The experience will not be exactly the same for all them. The focus of the research will be to examine what the respondents have in common in experiencing the occurrence in order to understand in detail the nature of the phenomenon (Creswell, 2007, p. 58).

Phenomenology’s aim is to transform lived experience into a textual experience such that the reader will experience empathy with the actual experience (van Manen, 1997a). It is thus essential that the reader does not misunderstand the text, thus the importance of hermeneutics. Moustakas (1994, p. 9) mentioned Schliemarcher’s definition of hermeneutics as “the ability to avoid misunderstanding”. In hermeneutics, our aim is to find
how we can use the participants’ experiences and understanding of the phenomenon under research to explain the phenomenon (Moustakas, 1994, p. 11). In my approach I focused more on the description of the participants’ experiences rather than on my interpretation, and also exhibiting Husserl’s notion of “epoche” (Creswell, 2007, p. 59) or “bracketing” by setting aside my own previous experiences. Moustaks (1994, p.90) himself saw epoche as “the first step in coming to know things, in being inclined to see things as they appear, in returning to things themselves, free of prejudgment and preconception”. This affords the researcher a fresh perspective of the phenomenon under study. Serning (2011, p.28) pointed out: “bracketing is not about seeing the world out there more clearly, but about seeing our world more clearly”.

Van Manen (1997b) posits that phenomenology in its pure transcendental form may be unattainable as experience is always recounted in retrospect, hence interpreted. He also argues that examining a specific experience while one is having the experience, fundamentally alters it. Furthermore, he regards description and interpretation as existing on a continuum as against being in opposition.

The participants’ descriptions of their experience of organisational learning are not pure descriptions because they are influenced by things like passage of time, the interview setting and their perception of me etc. Though I endeavoured to be mindful of the way that I made use of the participant’s statements, I however, recognised that the participant’s statements are how they interpret their experience now, in an interview with a researcher rather than at the original setting and having had many months to forget, remember, interpret and re-interpret their stories. Furthermore, it must be accepted that this research is my interpretation of my experience of the participant’s interpretations of their experiences, presenting a double hermeneutic situation (Smith, Osborn, 2003, p51). My intention therefore was to endeavour to continually keep to the portion of the continuum covering the description side and some part of the interpretation side, that is, focusing more on the description of the participants’ experiences rather than on my interpretation of them, and also exhibiting Husserl’s notion of “epoche” by setting aside as much as possible my own previous experiences. The approach goes further than recounting participants’ statements to examining the indicated underlying assumptions behind the statements.
However, this must always be rooted in the participants’ statements in order to avoid introducing extraneous meaning. This underscores the importance of reflexivity.

3.3.3 Data Collection

I employed face-to-face semi-structured interview for my empirical study. This afforded me to collect information and data which capture the meanings which the respondents attach to their experience.

3.3.3.1 Sampling Design

Purposeful sampling was used in this research. The participants were selected “because they could purposefully inform an understanding of the problem and central phenomenon in the study” (Creswell, 2007 p.125). For phenomenological studies, it is essential that all participants have experienced or are experiencing the phenomenon being studied. I followed Creswell’s (2007 p. 125) four sampling design steps: (1) deciding on who or what should be sampled, i.e. the population frame; (2) what form the sampling will take; (3) how many people or sites to be sampled and (4) confirming the sampling is consistent with the approach to inquiry being used.

As this was a study on the engineering design sector of the Nigerian oil and gas industry, the population chosen for it consisted of engineers working in companies inside the sector. These companies are mainly located in the southern part of the country with headquarters in Lagos, Warri and Port Harcourt. I chose to interview engineers from five companies in the Lagos area since they were fairly larger in terms of size (they accounted for the highest percentage of engineers in the oil and gas engineering design sector) and disciplines variety than those in other parts. They were also more accessible for me. The criterion for participation was that the companies were engineering design firms in the oil and gas industry and that the participants have worked for a minimum of three years in their organisations.

Appropriate sample size is an important decision in sampling strategy (Creswell, 2007, p. 126). While it seems that larger samples mean better inferences about a population from the sample, a very large sample could be very costly, unfeasible and not worthy of the
trouble. Large sample often produce voluminous amount of data to deal with, something that requires enormous resources and time which I did not have. Contrary to positivist research that requires large random sampling, in social constructionism, a sample size doesn’t necessarily have to be large; it can be “small number of cases, chosen for specific reasons” (Easterby-Smith, Thorpe and Jackson, 2011, p. 59, Table 4.2). Smith, Flowers and Larkin (2009, p. 52) recommend four to ten participants, making 7 the average. They caution that “it is more problematic to try to meet phenomenology’s commitments with a sample which is ‘too large’, than with one that is ‘too small’ and that “it is important not to see the higher numbers as being indicative of ‘better’ work” (Smith, Flowers, Larkin, 2009, p. 52).

For example, in her phenomenological research on “The Experience of New Nursing Graduates on Labor and Delivery Units: A Phenomenological Approach” Simpson-Cosimano (2010) interviewed 10 labour and delivery nurses employed at 3 hospitals in a large metropolitan city. Likewise Serning (2011) interviewed 7 participants in his qualitative research on “International aid workers’ experience of support – an Interpretative Phenomenological Analysis”. Cochran (2013) interviewed 12 SME leaders from 4 companies in a qualitative multiple-case study for her doctorate research – “Exploring the Strategies of Enhanced Organizational Learning in Small- and Medium-Sized Enterprises”.

Bearing in mind that sample in phenomenology could be small I initially contacted 28 prospective participants. 15 eligible ones volunteered to participate. However, only 12 including 2 executives eventually participated. These participants are of different disciplines and have extensive Nigerian oil and gas experience, averaging about 12 years.

The ratio of 10 engineers to 2 executives is regarded as appropriate. Firstly, the ratio of employees to executive is naturally high; the employees constitute the vast majority. Secondly, the issue of organisational learning experience is associated more with the employees than with the executive. The details of the influencers of organisational learning (e.g., sharing, trust, collaboration, training, motivation, culture, leadership, etc.) are better obtained from the employees than from the executives. Stewart (2007 cited in Abu-Jarad et al., 2010, p. 26) states that “the strongest component of the work culture is the beliefs and attitudes of the employees; it is the people who make up the culture”. Having said this, interviewing the executives is also beneficial for they can serve as a check to that of the
employees. The executives’ interviews also provide insights into things that employees’ interviews cannot. These include relationship with certain other industry stakeholders, cost of running the office and other financial constraints.

The sample is not representative of the whole engineering designing sector of the industry. I was carrying out a phenomenological study on a small group of participants, and I wanted them to as much as possible be demographically similar to one another. I am not making any claim outside this group though I would wish to have an understanding of a wider coverage. However, I lean on the proposition from scholars that the existence of a particular experience in one place points to the possibility of this experience existing elsewhere (Serning, 2011). By conducting in-depth and detailed interviews, it would be possible to gain insight into the key issues shaping organisational learning in the sector.

3.3.3.2 Access to Research Setting

Organisations are often uneasy about granting access for degree research because it is going outside the organisation and will be read by outsiders and also the possibility of the researcher having some political agenda that could differ from theirs. However, my discussions with them around the fact that increasing organisational learning which will help develop local content was a collaborative endeavour by all industry stakeholders and not individual effort only, and my guarantee to them of research ethics involving non-disclosure, confidentiality and adherence on my part to the purpose of the research made the organisations I approached to agree to talk to me. Furthermore, the research was seen to be in the interest of the local engineering design companies in the Nigerian oil and gas industry. Most of these companies genuinely want to know how they can learn better and improve performance.

3.3.3.3 Avoiding Bias

In as much as multiple views are expected in social researches, especially when using interview, and therefore “no one objective view to be discovered which the process of interviewing may bias” (Easterby-Smith, Thorpe and Jackson, 2011. p. 147), it is still necessary to try and avoid actions that can lead to bias during the interview or during interpreting the responses thereby weakening the research. I addressed this issue by using
open-ended questions; but I did this carefully so as not to allow participants seize the opportunity to stray too far away from the focal issue of the moment.

Another source of research weakening could be the fact that I am a part of the industry. My knowledge of the industry may affect my choice of focus and methods of inquiry. This fact actually supports the use of the phenomenological approach to allow others with the experience to talk about them and what they mean to them.

3.3.3.4 Ethical Issues

In order to guide against any harm coming to the participants or their companies as a result of the research I abided with the necessary ethical guidelines and guaranteed confidentiality and non-disclosure position. I informed all the participants the aim and method of the research prior to obtaining their consent to participate. They were not referred to by their real names and their organisations’ names were also not mentioned. All participants read and signed the informed consent form showing they are participating voluntarily; they were informed that they can withdraw from the exercise any time they wish without any consequences for them. All hard copy documents with information that may point at participants or their companies are locked in a safe place the key of which is with me while the soft information on my computer is safely pass-worded.

3.3.3.5 Interview

The essence of qualitative interviewing is to collect information, which captures the meaning and interpretation of phenomena with respect to interviewees’ worldview (Easterby-Smith, Thorpe and Jackson, 2008). The objective of this study’s interviews was to ascertain how the participants experienced organisational learning in the sector.

Qualitative research is subjective in nature; its effectiveness is impacted upon by the researcher’s attentiveness and interviewing skills. In order to not only to understand the interviewees’ views well, but also to be able to help them think more deeply about their beliefs and surface more views of their experience, I posed as little as possible precise questions and I encouraged them to discuss issues their own ways. I was able to achieve some laddering by using the phrases “What?” “How?” and “Please, explain further” based
on their responses. These facilitated implementing the probes techniques suggested by Easterby-Smith, Thorpe and Jackson (2008): basic probes by repeating initial questions when the respondent seemed to be confused or wandering off the point; explanatory probes by building onto incomplete or vague statements made by the respondent; focused probes for obtaining particular information; and silent probe or pause when the respondent was not forthcoming with answer to a question.

Due to internal organisational politics some participants developed preconceived views which affected their responses to questions. At times, participants attempted to introduce unrelated political issues into discussions due to the open-ended nature of the questions. In some cases, participants would not properly articulate their responses to the effect that the responses might not actually reflect their views. In these cases I would disregard the unrelated aspects and tactically try to bring them back or course or ask the question again, maybe, a bit differently and in trying to answer again they may bring out their true views.

In order not to monopolise discussion and turn it into a one-way dialogue thereby creating a power relationship issue between me and the interviewees I refrained from projecting my opinions unnecessarily, but encouraged them to elaborate on their history and “lived experience” of the phenomenon.

Since I had some initial knowledge of the research topic, from both practice and the literature review, I approached the interviews with an interview protocol which contained some broad view questions on the issues and with space for me to write down some notes. I put little structure into the interview by asking open-ended questions to achieve the targeted full depth. The detailed interview questions are included in the Appendix D. In addition to voice recording the interviews, I made notes and comments in my notebook during the interviews. I used an MP3 recorder to record proceedings in four of the interviews. I however used two MP3 devices simultaneously to record the remaining interviews because during the fourth interview the MP3 device did not record and we did not know until the end of the interview; so I had to conduct the interview again.
3.3.4 Data Analysis

A persistent concern among qualitative researchers is how to apply systematic, conceptual and analytical discipline that proves the credibility of interpreted data and conclusions (Gioia and Corley, 2012). Data analysis in a qualitative research can be carried out using methods such as content analysis, conversation analysis, narrative analysis, discourse analysis and thematic analysis. My preference for this part of the research is thematic analysis. Thematic analysis is a method for identifying, analysing, and reporting patterns within data (Braun and Clarke, 2006). It’s a very useful technique for extracting the details of meaning within data (Maguire and Delahunt, 2017). As it focuses subjectively on human experience and the meaning they attach to it, thematic analysis is appropriate for phenomenology. Furthermore, its flexibility engenders rich and detailed description of data (Braun and Clarke, 2006). Braun and Clarke (2006) posit that thematic analysis should be seen as a foundational method for qualitative analysis because it provides core skills that are useful for conducting many other forms of qualitative analysis. In fact, Boyatzis (1998) sees it as a tool applicable to various methods. Though some researchers (e.g. Ryan and Bernard, 2000) see thematic coding as a process performed within other analytical methods, Braun and Clarke (2006) argue that it should be seen as a method in its own right. The flexibility and minimalist nature of thematic analysis (Braun and Clarke, 2006) makes it apt for this study.

Thematic analysis is a 6-step process that starts with familiarising oneself with the data (please, see Section 4.3). Each recorded interviews was transcribed and the transcriptions were prepared for easy management using Microsoft Word. I read the transcriptions several times after which I started the real analysis. Clicking New Comment in the Comments group under the Review tab allowed me to mark-up significant statements and also write notes and memos at the margins. The memos contain observations, important notes, codes or categories identifications.

I focused on one participant at a time and read the transcriptions looking for significant statements and making comments which were initially mostly descriptive. As my “dwelling” with the data (Finlay, 2011 p. 229) increased my comments started including queries and thoughts occurring to me. I then carried out classification of the collected information by
looking for binding texts or meanings to reassemble them into themes. Thematizing involved reviewing the text and apportioning an appropriate theme to segments of the text. I used the NVivo 10 software to organise the analysis more efficiently. I carried out the interpretation of the obtained data by taking an overall look trying to form a larger meaning of what the data represent. The data analysis is discussed in more details in Section 4.3 of Chapter 4.

3.3.5 Validity

Social constructionist qualitative researchers believe that reality is neither external nor objective, but is socially construed and given meaning by people. So for them, being concerned by the ‘truth’ or ‘falsity’ is not necessary. But the issue of validity, whose main concern is “truth” or “falsity” still needs to be addressed.

Different criteria have been proposed for assessing validity in qualitative studies. Lincoln and Guba (1985) advocated for the following criteria which according to them are more appropriate to constructionist research: credibility, transferability and dependability.

Credibility is involved in establishing that the results of the research are believable. It is about ‘quality’ and not ‘quantity’ and depends on the richness of the information gathered. Because it is authentic representation of experience, it is really the participants who can reasonably judge the credibility of the results since the purpose of phenomenological and other qualitative research is to understand and/or describe the phenomenon at hand from the participants’ perspective.

I employed the practices for achieving credibility which included: prolonged engagement; purposeful sampling, bracketing, data saturation, triangulation, and member checking (Charmaz, 2003 cited in Atkins, 2011; Lincoln and Guba, 1985). Being a member of the industry, prolonged engagement was given for I have spent sufficient time in this field to learn or understand the culture, social setting, or phenomenon of interest. I have explained severally in different parts of this thesis how I employed purposeful sampling and observed “bracketing”. Data saturation was achieved by the 8th interview of the employee participants, though all the interviews still took place diligently. With respect to triangulation, I worked with twelve participants investigating their individual lived
experiences to ensure that the account was rich, robust, comprehensive and well-developed. For member checking, a copy of the transcribed interview was emailed to each participant. Each participant was asked to review the transcription for accuracy of information.

**Transferability** refers to the degree of applicability of the research results to other contexts or settings. It is the reader of the study who normally often tries to generalise. He/she compares the methods and situation of the research to similar situation of theirs. Though scholars like Creswell (2007), Easterby-Smith, Thorpe and Jackson (2011) and Smith, Flowers and Larkin (2009) promote the use of small size samples for qualitative research (Section 3.3.3.1), this creates issues with regards to transferability for a study such as this one. Creswell (2007, p.209) suggests rich thick description to help the reader to decide on transferability). Therefore I have explained the context of this research in detail. For example, I write about the existence of an enabling law in the industry which may or may not be the case in other industries or contexts. There are detailed discussions on such issues as the description of the industry, industry stakeholders, the high importance attached to maintaining schedule and budget and the existence of many specialised areas of expertise. These would help a reader to decide on the degree of transferability of the work based on “shared characteristics” (Erlandson et al., 1993, p.32 cited in Creswell, 2007, p. 209).

**Dependability** shows that the findings are consistent and could be repeated with the same results. It is assessed by the way the research is conducted, analysed and presented. The researcher also needs to describe in detail the changes that occur in the settings during the course of the research and how they affect the way the researcher approaches the study. The practices for achieving dependability include mechanically recorded data, multiple researchers, participant researchers and triangulation (Lincoln and Guba, 1985). I used mechanical data recorder – the MP3 recorder – for the interviews. This helps in endorsing the authenticity of the information gathered. One change in plan was that after the first four interviews, I started using two MP3 recorders simultaneously because during the fourth interview the machine was not recording without our knowing.
3.3.6 Reflexivity

I made a persistent effort at being aware of my own suppositions and bracketing them. I also try to disclose as much of them as I can in this sub-section. This was especially important because I have worked in the nation’s oil and gas industry for a considerable length of time. During my time in the design sector I saw organisational learning as learning-by-doing or on-the-job learning. I took individual knowledge deficiency as being solely due to lack of individual effort. Working at the NCDMB I saw knowledge deficiency in the organisations a result of simple lack of seriousness. For example, as a design engineer I used to put in big effort in studying and being on top of the knowledge I needed for my task. I thus wondered at times when participants complained about some colleagues hoarding knowledge. However, by endeavouring to remain neutral and as the participants’ narrative continued to align largely, I became more receptive to their stories.

Therefore I had to be vigilant throughout in order to effectively engage “epoché”. At every point in the course of the study – sampling, data collection, data analysis and representation, I looked at the action I was taking and consider the merit of the action for me, the participants and the reader. Thus, I endeavour to be attentive to data, intelligent in understanding, reasonable in judging and responsible in taking action (Coghlan, 2011, p.154). Furthermore, being of social constructivist epistemology this research relies on dialogue and conversation; it is thus based on language as the platform for co-creation of meaning. As such, I phrased my questions and queries carefully in order not to inadvertently influence participants’ responses. This was important because having worked in the industry for a considerable length of time I have some sway and influence. However when I felt that I was not getting enough response I tactfully would urge the participants for more.

3.4 Action Research (AR)

AR based on a collaborative action relationship between researcher and the members of an organisation or community. The type of knowledge that AR seeks to create is practical knowing, which is the knowledge responsible for moulding “one’s moment-to-moment” actions (Coghlan, 2011; Coghlan and Brannick, 2010, pp. 35-36). Practical knowing deals with what we know and how we know in everyday living. Its interests and concerns are how
people succeed in their assigned tasks and how to resolve associated issues, which are usually situational and context dependent, as against scientific knowing that concerns itself with universal solutions. Practical knowing recognizes that solution in one place or at a point in time or a situation may not work in another. Understanding peoples’ action requires inquiry into the meanings they have about their situations, themselves and the world. “No two situations are identical” (Coghlan and Brannick, 2010, p. 37). Therefore it is necessary for us to:

“reason, reflect and judge in a practical pattern of knowing in other to move from one setting to another, grasping what modifications are needed and deciding how to act” (Coghlan and Brannick, 2010, p. 37).

AR is especially applicable to organisational learning studies; it involves investigation into how organisations could develop systems to increase the quality of their work practices (Nyame-Asiamah and Patel, 2009). By definition, organizational learning is a social phenomenon in a collaborative co-operative setting. Furthermore, the collaborative nature of action research enhances people’s involvement in the creation of knowledge about themselves, their work and the actions they take. This is in alignment with the general understanding of organizational learning processes (Coghlan, 2006). My objective is to learn in detail the organizational learning experience in the engineering design sector and then change it from a lower level to a higher one. This aligns with two beliefs normally associated with action research: (1) if you want to understand something well, try changing it and (2) those most likely to be affected by the change or implementing it should be involved in the research itself as much as possible. The transformation into a virtue the difficulty of separating the researcher from the research normally seen as a problem has made AR to become an attractive approach for organizational learning (Easterby-Smith, Thorpe and Jackson, 2011, p. 93).

Participants in action learning environment learn as they work by taking time to reflect with peers, who offer insights into workplace problem (Raelin, 2008). People learn best when they reflect together with likeminded colleagues on real problems occurring in their own organisations (Revans, 1980). Accordingly, I consider action research as an appropriate methodology for organizational learning.
Action research has four steps (constructing, planning action, taking action and evaluating action) in spiral cycles (Coghlan and Brannick, 2010, pp. 9-10).

Fig. 3.1 Action Research Steps  
Source: Coghlan and Brannick, 2010

For the constructing step and the pre-step in this research, the need for change was established in the desirability to increase organisational learning in the sector (Chapter 1 Section 1.4); I inquired into the context for change and the issues on whose basis action would be planned.

Planning started with the joint assessment (by me and the participants) of extant state of organisational learning in the companies, i.e. the empirical studies. It also involved making implementation plans for realistic execution of the intervention in Chapter 5 from the results of the literature review in Chapter 2 and the inquiry in Chapter 4. I thought about relevant participants, whether inside or outside the organisation (see Section 7.5.4.1); activities such as meetings and discussions during the intervention and also deciding on the vehicle for the intervention.
Taking action was through feeding into the intervention the empirical study’s outcomes, i.e. the identified issues using the chosen vehicle which in this case was a chanced joint project execution which was planned to start about this time. Coghlan (2001) noted this possibility when he describes action research projects as consisting of “opportunistic planned intervention in real time situations while simultaneously studying those interventions” (2001:49).

Evaluating action involved reviewing the results of the whole exercise and reflecting on the experience gained in Chapter 6. It started with the collaborative evaluation of the success or otherwise of improving organisational learning capacity of the team. I examined the sense that participants made from the exercise; what they said about their new attitude and outlook towards openness, sharing and group learning. In this manner their joint sense-making emerged. Discussing all these together with what had come up for me during the exercise yielded our overall joint sense-making. What we actually were doing were taking note of (1) what the participants learned from the intervention exercise, (2) what previous views, beliefs and assumptions have changed as a result of the intervention, and (3) what we could have done better. We made recommendations that were immediately communicated to the companies and the NCDMB. We identified best practices that participants would take to their respective companies for dissemination. We took note of the various knowledge of organisational learning gained from the intervention.

This research employs action learning in an inter-organisational learning setting in the form of a multi-firm joint project execution which is considered as a ‘temporary organisation’ (Mariotti, 2002). Action learning leads to more effective communication, work climate, cooperation, shared vision and development at organisational level (Cho and Evan, 2009). I therefore expected that the participants’ learning styles and practices would improve during the intervention itself. I further expected that they would take these newly imbibed practices to their respective companies to increase organisation learning therein. If these objectives were successfully achieved at the end of the intervention, a significant contribution would have been made to improving organisational learning in the sector.

This AR is in a community, the engineering design sector of the Nigerian oil and gas industry. So it’s an insider action research for this author. It concerns how to improve
organisational learning in the sector. I worked for twenty years in the engineering design sector before moving to the Nigerian Content Development and Monitoring Board (NCDMB) that is a regulator in the industry. I work in the Capacity Building Division that oversees the building of capacity and capabilities in the industry and thus works closely with the various industry sectors. The engineering design sector was being studied through lens of five companies and the NCDMB. Recommendations were made to the companies from the backdrop of the literature review, the interviews and the intervention.

The insider action researcher must deal with issues of preunderstanding, role duality and managing organisational politics (Coghlan and Brannick 2005).

The knowledge that I as an industry insider have prior to the research include: knowledge of the organizations’ everyday life, jargons, what is legitimate or taboo to talk about, what occupies colleagues’ minds, how the informal organization works and whom to turn to for information and gossip, the critical events and what they mean within the organization and the ability to see beyond objectives which are merely window dressing. These are referred to as preunderstanding (Coghlan, 2011). Being a member of the industry I used this to my advantage by, for example, using internal jargons in interviews to obtain rich data. However, I also guarded against the disadvantages of preunderstanding such as assuming to know too much and thus not probing enough, thinking I know the answers and thus not exposing my current thinking to alternative re-framing.

3.5 Chapter Summary

This chapter explains how the two aspects of the research – the empirical study and the AR intervention were carried out. The chapter also describes how social constructionism, qualitative inquiry and phenomenology were arrived at as the most appropriate philosophical position and worldview, methodology, and approach respectively for the empirical study. It explains how hearing directly from those experiencing the phenomenon would best serve my purpose of understanding in detail the extant organisational learning practices in the companies. I detailed how the fact that qualitative, phenomenological studies don’t necessarily require large sizes led me to choosing the sampling size I used. I explained that the method of data collection was semi-structured, audio-taped interview
that took place after informed consent was received from participants. Data analysis was both manual and by using the NVivo 10 software. Continuous reflexivity was maintained at all steps. The AR intervention, the detail of which is given in Chapter 5 took place in a temporary organisation.

The next chapter presents the results and the findings from interviewing the participants in the qualitative phenomenological study.
CHAPTER 4 EXAMINING ORGANISATIONAL LEARNING IN THE COMPANIES

FINDINGS

4.1 Introduction

This section of this chapter presents the findings from the empirical study’s interviews. The empirical study examined the extant organizational learning practices in the engineering design companies. The results are followed by discussion and the evaluation of findings. The findings are related to the literature reviewed in Chapter 2. The results yielded implications for the action research intervention. The research added to the body of knowledge by identifying strategies that could increase organizational learning in engineering design companies and built upon the work of earlier researchers. It shone light on the deficiencies regarding organisational learning in the companies. The chapter concludes with a summary.

The overall research problem was: How can the companies in the engineering design sector of the Nigerian oil and gas industry improve their organisational learning? The research attempts to answer this question in two steps: (1) Based on the outcome of the relevant literature review, conduct a phenomenological empirical study to gain detailed knowledge of the extant organizational learning experience in the sector and (2), implement the recommendations as an action research and discuss the result.

The empirical study used a face-to-face semi-structured interview of a purposeful sample of 12 participants employed at five engineering design companies in the industry.

The research questions are:

Q1. How do engineers describe their experience of the type of leadership that obtains in their company?

Q2. How do engineers describe their experience of the type of organisational culture that obtains in their company?

Q3. How do engineers describe their experience of learning and organisational learning in their companies?

Q4. What do engineers say about their experience of industry’s collaboration and contribution to learning?
4.2 Overview

The participants were from 5 industry prominent engineering design companies which have been in existence for between 8 to 25 years. The years of experience in the industry of the participant engineers range between 3 years and 12 years; most have between 7 and 12 years in the industry. All but one of the engineers have minimum of the BSc/BEng in the various engineering disciplines, while one has the HND degree. The profiles and distribution of the participants according to companies is as shown below using pseudonyms for both the companies and the employees.

Table 4.1 Participants profiles and distribution

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Gender</th>
<th>Company’s Pseudonym</th>
<th>Participant’s years of experience with company</th>
<th>Participant’s Discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED</td>
<td>M</td>
<td>Alpha Engineering Company Ltd.</td>
<td>24</td>
<td>Executive Director</td>
</tr>
<tr>
<td>Ade</td>
<td>M</td>
<td>Alpha Engineering Company Ltd.</td>
<td>12</td>
<td>Civil</td>
</tr>
<tr>
<td>Joy</td>
<td>F</td>
<td>Alpha Engineering Company Ltd.</td>
<td>12</td>
<td>Civil</td>
</tr>
<tr>
<td>Ben</td>
<td>M</td>
<td>Alpha Engineering Company Ltd.</td>
<td>9</td>
<td>Piping</td>
</tr>
<tr>
<td>Saro</td>
<td>M</td>
<td>Beta Engineering Company Ltd.</td>
<td>12</td>
<td>Project</td>
</tr>
<tr>
<td>Sade</td>
<td>F</td>
<td>Beta Engineering Company Ltd.</td>
<td>11</td>
<td>Piping Stress</td>
</tr>
<tr>
<td>Moruf</td>
<td>M</td>
<td>Theta Engineering Company Ltd.</td>
<td>7</td>
<td>Lead Engineer</td>
</tr>
<tr>
<td>Bala</td>
<td>M</td>
<td>Theta Engineering Company Ltd.</td>
<td>7</td>
<td>Project/Mechanical</td>
</tr>
<tr>
<td>Uche</td>
<td>M</td>
<td>Gamma Engineering Company Ltd.</td>
<td>7</td>
<td>Instrumentation</td>
</tr>
<tr>
<td>Eno</td>
<td>F</td>
<td>Gamma Engineering Company Ltd.</td>
<td>12</td>
<td>Instrumentation</td>
</tr>
<tr>
<td>Wale</td>
<td>M</td>
<td>Zed Engineering Company Ltd.</td>
<td>3</td>
<td>Pipeline</td>
</tr>
<tr>
<td>MD</td>
<td>M</td>
<td>Zed Engineering Company Ltd.</td>
<td>8</td>
<td>Managing Director</td>
</tr>
</tbody>
</table>
In line with earlier stated methodology in Chapter 3, I abided with the ethical practices: telling the participants about their right to decide whether or not to answer any question or withdraw from the interview at any time if they so wish; ensuring confidentiality and anonymity; abstaining from projecting my own point of view; and I obtained from them a signed written permission for the interview.

The transcriptions of the recorded interview were sent to the respective participants for their perusal and correction or further elucidation. Only three came back with minor comments.

4.3 Data Analysis

I transcribed the audio recordings, the process of which substantially increased my “dwelling” with the data (Finlay, 2011 p. 229). I listened to each recording a minimum of three times and read each transcript four times stopping and lingering over selected portions as advised by Wertz (1985 cited in Finlay, 2011 p. 229). While doing these, I took all the precautions mentioned in Chapter 3 such as bracketing and avoiding role of critic. In addition to bracketing, interviewing until saturation of data (which was achieved at around the eighth interview), using an appropriate sample (Section 3.3.3) and identifying negative cases helped fulfilled verification which is the first step in achieving validity (Creswell, 2007, pp. 270-271). Validation, the second step towards validity was fulfilled through continuous within project evaluation and participants’ check.

The analysis process that I employed was that of the simplified version of the Stevick-Colaizzi-Keen method discussed by Moustakas (1994):

1. Reading through the transcripts and effecting bracketing.
2. Horizonalisation – listing significant statements.
3. Clustering of meanings – grouping the statements into larger units of information, called “meaning units” from which themes emerge.
4. Textural description – writing a description of what the participants experienced with the phenomenon, including verbatim examples.
5. Structural description – describing how the experience happened; that is, the context or setting in which they experienced the phenomenon.
6. Integrating the results into an in-depth, exhaustive description of the phenomenon. That is, writing a composite description of the phenomenon incorporating both the textural and structural descriptions.

The NVivo qualitative data analysis software program was employed to organize, analyze and develop the final themes. This helped me in articulating the results, analyses and discussion later in this chapter.

The data analyzed were the participants’ responses to the research questions and the contents of discussions with them. While in majority of cases responses were related and it was not difficult to generate clusters from them and establish themes, there were occasions when data were at such variance that this was difficult thereby leading to tensions in the data. This was especially so with the responses from the participants from Zed Engineering when compared with those of other companies. These tensions in the data are explored individually below in Section 4.4 - Result Summary.

Identifying themes and/or sub-themes was based mainly on whether or not they capture something important about the data with regards to the research questions and not just on the number they occurred. The coding method used was the data-driven inductive approach (Boyatzis, 1998). I started coding by identifying significant statements and organising them into groups. Regardless of using the NVivo10 qualitative data analysis software, I looked through the whole data systematically, giving equal attention to each item and identify interesting aspects that could form bases for themes. I first imported the interview transcripts into NVivo SOURCE, then opened and explored them one after the other. I created a node for each interview sub-question and gather responses. These nodes were not \textit{a priori} themes; I only used them to gather what a participant said concerning a question. Simultaneously with this I was memoing to record my observation, discoveries and ideas. I coded the extracts of the data with their surrounding so that the context was not lost. I aligned them within meanings or sub-themes. I opened and explored each of these meaning nodes and coded again at emerging themes by sorting and collating all the relevant coded data extracts within the identified themes. I used a table with the potential themes as headings and their related code in column under them.
In order to confirm their viability I carried out a review of the themes. I read again all the code data extracts (significant statements) to ensure that they formed a coherent pattern and that they belonged to the themes under which they were written. This allowed me to establish the appropriateness of the themes. This exercise led to the creation of a new theme “facing one’s business” from an old one “coming together”.

A total number of 246 significant statements were identified and 17 meanings formulated. Five themes emerged from these meanings.

Analysis of the participants’ responses showed that responses to research questions Q1 and Q2 focused on existing practices, customs and traditions in the companies; accordingly the significant statements from them clustered under the theme “the way we are”. The responses to question Q3 portrayed how learning in the companies was largely individualistic with the significant statements and formulated meanings suggesting the theme “you are on your own”. Responses to Q4 centered on the imperative for the IOCs to focus on their core business of operation rather than engineering design and the necessity for the design companies to come together and collaborate among themselves; thus from here emerged the themes “facing one’s business” and “coming together”. The theme “lull in the industry” emerged from the three research questions.

Below is a presentation of the results of the study. Data tables are used to show the emergent themes and associated meaning units with number of occurrences, and a representative sampling of interview responses. These themes are explored below.

4.4 Result Summary

4.4.1 Theme 1: The way we are

This theme emerged from a group of 95 significant statements – constituting 38.62% of the total number of 246 - extracted from the verbatim transcripts. They gave insight into participants’ experience with respect to leadership, management accessibility, communication, motivation, openness, power distance, respect and equality, goal achievement and competition, management-employees relationship, teamwork, innovation and creativity and staff participation in decision making. They also gave indications of the shared values, myths, rituals, beliefs and artefacts. The participants described here how their companies were or the nature of the companies which was characterized by the
culture and leadership therein. Accordingly, the discussions were with respect to the research questions Q1 and Q2. The following meanings or sub-themes were formulated from the significant statements: hierarchical structure; lack of trust, non-sharing; communication; market values (deliverables); authoritarian (discouraging innovation). The dominant meaning unit for this theme is “Hierarchical structure” representing 28.42% of the responses for the theme and 10.98% overall. The theme and overall percentages for the other meaning units are: lack of trust (28.42 and 10.98); communication (23.16 and 8.94); market values (20.00 and 7.72); authoritarian (5.26 and 2.03).

Representative significant statements for the dominant formulated meaning are shown in Table 4.2 below.

<table>
<thead>
<tr>
<th>Meaning</th>
<th>Representative statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hierarchical structure</td>
<td>... he (employee) reports to a supervisor who reports to his HOD, the head of department, the head of department now reports to a director ... ... it is a hierarchical structure. –EDO</td>
</tr>
<tr>
<td></td>
<td>“… we have the various HODs, all the discipline are reporting to the head of department who now report to the Head of Operation and Head of Operation reports to the M.D” (Eno).</td>
</tr>
<tr>
<td></td>
<td>You have senior management, middle-level management, you have the engineering team which is split into six or seven teams and those six or seven teams have responsible heads called “Leads” who oversee the other staff. So there is a clear three-level management where you’ve got the engineering teams with the leads, you’ve got the middle management which is the engineering manager and all other managers ... it is hierarchical (Sade)</td>
</tr>
<tr>
<td></td>
<td>There is also a leadership problem I feel, from my own perspective, where management seems not to be so accessible; you cannot easily access top management to have a word with them one-on-one because there seem to be a kind of power distance between the management</td>
</tr>
</tbody>
</table>

Table 4.2  Theme 1 Dominant meaning and representative significant statements
Leadership was discussed with respect to hierarchical organisational structure mostly, followed by communication, accessibility, trust and motivation.

All participants except Ade and MD who were from Zed Engineering said their companies had a hierarchical pyramidal structure. The structure was such that between the CEO and the design engineers there were multiple layers of supervising positions like EDO, managers, heads of department and leads. The engineers believed that the structure impeded not only direct communication between the top management and the workforce, but also informal relationships; it thus minimizes open communication and knowledge sharing amongst all.

The Zed Engineering executive participant (MD) described his company’s structure as not hierarchical but flat non-pyramidal and that the culture there was participative. He said:

... And the structure is such that it is also... I will say it is not hierarchical, it is flat, we try to encourage that people can walk over to other colleagues so they can help them to be able to overcome it. (MD)

Wale supported this stand; he confirmed that the Zed Engineering’s structure was team-based and theirs was an open-door policy which made communication easier and more effective and where every employee is free to walk to a superior to ask questions and get answers.

There was an obvious divergence between the responses of the participants from Zed Engineering and those from the other companies; the tension created by this is discussed below.

Lack of trust was an issue. While all the participants, safe Uche, Wale and the two executives, professed lack of trust between employees and management, there was no consensus on trust among the employees themselves. With regards to interrelationship between management and the staff, Moruf said that his company management tried to be transparent and earn the trust of the workforce by discussing issues concerning the company with them, but the latter were not ready to understand: “many floor members feel the interests of the company are in other areas other than the welfare of the personnel. Then I think the issue of trust might not be ... it’s not something we can say; it fluctuates between less-than-average and average”. Joy opined that their management were not trustworthy,
“The management is not selfless; they are so selfish that when you say something, it ends there”.

Lack of mutual trust among the employees resulted in minimal knowledge sharing. Some engineers would resolve a colleague’s problem themselves rather than showing him/her how to do it, “I used to have a friend that no matter how you tried, you have to stand up from your system for him to do something for you for you to continue your work. He would never tell you what to do” (Joy). Some ascribed this to survival tactics, “I think I will say, everybody is just trying to survive. The way I see that is more like we are called …., you understand but I don’t think there is enough to go round. So when something comes up people try to keep to themselves so that they don’t get stabbed in the back” (Ben).

The companies’ preoccupation was only on delivering the projects, meaning that the culture was that of market values. The engineers asserted that management can go to any length, even at the detriment of the staff to achieve organisation’s goal. Sade said “Everything is all about we need to get the job done.” Joy also added “the management is only interested in making money and this making money is not because you are delivering your job or you are improving yourself; it’s just because you are somewhere and as far you are there they will get paid”.

However, Wale from Zed Engineering stated that “… The management here actually puts into consideration not just the business fact; it’s not just about making money from the whole venture; the management here looks at the people making the money as well; looking at the welfare of the people; how to make everyone happy”.

Along the same line MD (also of Zed Engineering) stated:

Another thing that also I’ll say we try to embed into our culture is a culture where everybody is supportive of each other; our performance management system, we try to deemphasize the individual rewards. We do give individual performance targets, but rewards we try to tie to team achievements so that way we do not have what would be destructive competition that people try to hoard knowledge and try to see that they are achieving at the expense of other (MD)
Majority of the participants believed that their companies do not encourage creativity and innovation from their staff. Saro said that the hierarchical system in his company made engineers believe that their contributions were not valued.

Sade explained that one was not encouraged to make a proposal about what one thinks was a way forward “Because the system doesn’t appreciate ... is not very receptive to it; it does not appreciate that form of approach. Everything still needs to come from the senior management to the ... management; and if you can’t impinge it in a clear cohesive manner with the senior management or your supervising team, then you have a problem. When you have a supervisor that is not as open minded as you, you already have a problem; your ideas get tucked where you are”.

A statement made by the first executive participants portrayed his company as one that might be discouraging creativity and innovation. When asked about how his organisation takes mistakes or errors committed by engineers, he said “Well we have to look at it from the point of view, first of, all how did the mistake happen? Was it negligence? Was it deliberate? Is it a wilful, just, it depends on how the mistake was committed. But mistakes must be investigated properly and ensure at the end of the day it doesn’t happen again”. ‘Negligence’, ‘deliberate’, ‘wilful’ – these are strong words that would discourage people from suggesting new ideas.

However, the second executive participant asserted that innovation is part of the company’s culture and that they encourage staff to stretch their own limits. “One of our core values is innovation, and innovation means that you have to challenge even what it is that has been widely assumed to be the status quo; to innovate, you must come up with something new”.

There were tensions between responses from Zed Engineering participants and those from other companies’ participants and this was prevalent. These are discussed below under Discussion and the peculiarity of the Zed Engineering Company is discussed below in the Section Zed Engineering.

There are two types of tensions in data with respect to this theme: (1) between management and employees’ responses; (2) between companies’ responses, in this case,
between Zed Engineering and the other companies. It is necessary to examine these tensions while using the data used to establish the themes.

The tension between management and employees’ responses is that while management claimed that it was accessible and concerned with the welfare of the employees, which was what both ED and MD claimed, all the employee participants, except Wale, claimed that management was only interested in work completion. This is a characteristic of ‘market values’ culture (Schimmoeller, 2010; Fard et al., 2009). This fact also constitutes the tension between companies’ responses – all other companies’ participants assert ‘market values’ culture in their companies, but Wale and MD don’t, thereby suggesting tension between Zed Engineering and all other companies.

The tension between companies is resolved in accepting that Zed Engineering, as shown later in the study, differed from the other companies being more progressive than them; its outlook and viewpoint were different. I actually was inadvertently dealing with two types of companies: one more progressive and the other less progressive. Having differences between management and employees’ opinions is not strange, especially on issues concerning workers’ welfare. However, in such issues, the employees’ opinion is stronger (Stewart, 2007 cited in Abu-Jarad et al., 2010). Regardless of these tensions, validity underscoring credibility is demonstrated in that triangulation is achieved in the homogeneity of the responses of eight of the ten employees.

Another tension between companies’ responses was with respect to leadership structure. The ED and all other companies’ participants constituting the majority claimed that their companies had hierarchical organizational structure while MD and Wale, both of Zed Engineering claimed that their company’s organizational structure was flat and team-based with an open-door policy which made communication easier and more effective and where every employee was free to walk to a superior to ask questions and get answers. The above explanation about differences between the two types of companies also resolved this tension.

4.4.2 Theme 2: You are on your own

This theme emerged from a group of 88 significant statements – constituting 35.77% of the total number - extracted from the verbatim transcripts. They gave insight into the
situations of organisational learning in the companies; thus the results were with respect to the third research question Q3. The following meanings were formulated: the meaning of organizational learning (i.e. understanding organisational learning); strategy (i.e. training needs identification, training course programmes and talent management); trust (openness, knowledge sharing and individual efforts); the use of expatriates; and learning environment (risk aversion, no motivation for innovation and creativity, access to archives and management support). The dominant meaning unit for this theme is “The meaning of organizational learning” representing 30.68% of the responses for the theme and 10.98% overall. The theme and overall percentages for the other meaning units are: the meaning of organizational learning (30.68 and 10.98); strategy (17.05 and 6.10); trust (23.86 and 8.54); the use of expatriates (17.05 and 6.10); and learning environment (11.36 and 4.07).

Representative significant statements for the dominant formulated meaning are shown in Table 4.3 below.

<table>
<thead>
<tr>
<th>Meaning</th>
<th>Representative statements</th>
</tr>
</thead>
</table>
| The meaning of organizational learning | “My understanding of organisational learning is whatever it is you do as a trade you should have maybe procedures that are more like generic and which you can now adapt on as given basis on your projects and the rest of it; and like I mentioned earlier, whatever it is you do there should really be a company culture to have those things stated” (Moruf).  
The company is such that training is very key, and we even track the amount of training hours each employee is doing, any time it is that they go off a project, we ensure that they are on training because when they are on a project they may be too busy, but once it is that they are in between projects we make sure that they do training (MD).  
The organisation has a clear structured programme of learning. If we recruit, let me take for example, bring in a young engineer into... |
the system, the first thing we do is to have an induction, tell the
person about the company, what we do, what our cultures are,
the dos and don’ts of the company. And from then we have a
structured programme of learning for the person … we provide
training along that line, both classroom training and on-the-job
training (ED).

Organisational learning was described by the participants, both the executives and
the engineers, mostly as planned training events only. It was not understood in terms of
having its facilitation being inherent in the culture or structure of the organisation. Both
erroneously believed that when individuals learn then the organisation automatically learns,
too. The management saw organisational learning as individual learning during organized
training courses or learning sessions for knowledge sharing. The ED thus said “At the end of
these trainings they are expected to come up with a report of what they have learned. And in
some cases we also do what we call sharing … knowledge sharing sessions and these
knowledge sharing sessions … is a session not just open to the engineers themselves, but also
to the HODs and directors chair these sessions together” (ED). On his own part Ade when
asked about his understanding of organizational learning he went on to describe how his
company sent people to grossly inadequate external and in-house training. Evidently there
was some misconception of organizational learning in the companies. Thus the formulated
meaning: “understanding the meaning of organisational learning”. The definitions of
organisational learning given by the various participants constituted only fractions of the
definitions given by scholars as mentioned in Chapter 2 Literature Review (e.g., Garcia-
Morales, Jimenez-Barrionuevo and Gutierrez-Gutierrez, 2011; Nevis, DiBella and Gould,
1995). The result of all these was that their efforts towards implementing organisational
learning were faulty. The strategies for learning were steered largely toward individual
training. Management sent employees on training courses which often were hardly relevant
to their tasks. Employees attributed this to management’s lack of commitment and support
for learning. Saro explained that “He (manager) doesn’t believe in training, he doesn’t
believe in developing, he just believes that people should be kitted and should be ready to
follow their job description so long as they are paid for it” (Saro).
While the management (ED and MD) might think that workers shared knowledge freely among themselves, the employees thought otherwise. They described how lack of trust coupled with the fact that only few jobs were around created an environment deficient in openness, cooperation and collaboration leading to the scuttling of knowledge sharing. Employees thus learned “on their own” individually and were reluctant to share their knowledge. Wale said “As per organizational learning, as I said earlier, most people do individual learning. You try to do self-development and most time on-the-job training. .....” Sade also said: “When an individual gets up and does it by herself, she keeps and hoards the information to herself; she never wants to pass it on as learning over the period of work. I’ve seen situations where individuals have asked individuals to come on Saturdays for extra tutorials at a cost outside the organisation” (Sade). Bala also said “I must say that at this point the knowledge dissemination is at the discretion of the owner of such, I mean, the custodian of such knowledge. At his discretion because he gives the knowledge to who he or she is comfortable with not somebody that is likely a threat (Bala). All these formed part of what informed the theme: “You are on your own”.

Despite this poor interrelationship among the employees, the design office was still physically a learning environment. Both the executives and all the employees described a conducive, open and ergonomic environment with necessary knowledge management enabling IT facilities and where engineers could easily walk up each other to seek assistance. “It’s an open office arrangement, no locked offices; the project group sits together as a task force, and then ehm, that is the arrangement that we have and we believe it is very very effective in learning because it allows people to see what others are doing.” (ED). The MD Zed Engineering equally described their office environment as one that is air-conditioned and not stuffy so that people will not feel sick; painted in bright rather than dull colours that make peoples’ mood depressed; and with florescence lighting rather than sodium lamps so that people can feel energetic. Ninety percent of all the participants believed they had adequate physical facilities for successfully carrying out the tasks and learning “The office structure sitting arrangement is fine; it’s what could obtain in any part of the world in terms of arrangement in the office and work environment. It is open office, a typical engineering office; each person has a workstation and with his computer and everything he needs to work with; the organisation has invested in such infrastructure in getting such things ready”
However, most participants said that archive servers were not properly managed making them unreliable and inaccessible. Employees developed own archives locally, thereby limiting employees’ access to general company knowledge gained on previous projects.

The use of contract staff especially expatriates who were brought in to compliment the companies’ staff knowledge and capabilities was criticized by 75% of the participants because at the end of their stay the people often went away with the knowledge they brought and the one they learned on projects without really impacting any on the company engineers. Ade said: *What I’ve seen is individual efforts in trying to learn from the personnel in question and not an organisational activity that kind of archives the experience of the personnel and that way all of the experiences that have been gotten on a particular project are being lost almost immediately that project, especially if you lose the personnel that worked on such projects (Ade).*

While expatriates were brought in by companies for many reasons ranging from: to carry out special assignments, establish on the ground a new unit, strengthen a project team to complete assignments within schedule, the main reason behind all these was the transfer of knowledge to the local engineers.

Though the executive participants said that bringing in expatriates did yield expected benefits, the employee participants asserted that it was only the companies that benefited from using expatriates because they made more money on them due to the higher hourly rates commanded by the expatriates. Bala explained that “*There are higher rates for the expatriates, so when we have them on board we earn more. But technically, we found out that there are no rules, neither are there guidelines that could hold or bond the expatriates to transfer this technology to the engineers that work with them.*”

The MD Zed Engineering gave a detailed description of how his company used a new learning model to benefit from the use of expatriates. He inverted the usual model and made the locals primarily responsible for doing the work while the expatriates would mentor them by looking at what they were doing. Because he still held the expatriates accountable for any failure, they had to watch closely what the locals were doing and didn’t allow them to go too far astray before telling them where they could improve. The MD
referred to this as proactive rather than the reactive traditional system. He said people suddenly started becoming competent and started doing things in dramatic ways.

It is necessary to examine two sets of tensions in data here: (1) between management and employees’ responses and (2) among employees’ responses.

Management (MD and ED) claimed that learning and organizational learning were well organized and made available to employees while the employees claim learning was mostly individual effort. Even Wale of Zed Engineering said “As per organizational learning, as I said earlier, most people do individual learning … …”. The fact is that, safe for Zed Engineering, the management of other companies did not follow closely employee learning. Furthermore, the ED understood organisational learning only as sending people on training, something that is different from organizational learning.

Another management-employees’ responses tension was on the use of expatriates which the management claimed helped learning, but which the employees claimed was only for making money for the companies, thereby still leaving them on their own with respect to learning. Again, the employees’ opinion is stronger (Stewart, 2007 cited in Abu-Jarad et al., 2010) since they were the ones mostly involved in the learning, so they should know better how they were acquiring the knowledge they had. Credibility is also supported here through triangulation and data saturation in that the responses of the employees were uniform and those of the management were also uniform.

There is also tension among employees’ responses to the issue of knowledge sharing. 20% (Wale and Ben) of the participants said there was knowledge sharing while other 80% said otherwise. Ben and Wale being a small minority, it can be said that while there might be sharing, it was limited and the employees were still largely on their own with respect to learning.

**4.4.3 Theme 3: Facing one’s business**

This theme emerged from a group of 25 significant statements – constituting 10.16% of the total number of 246. Participants’ responses produced significant statements that pertained to issues about the engineering companies working closely together and cooperation from the industry stakeholders, especially the IOCs. They gave insight into participants’ experience with respect to collaboration and regulation in the industry. They
address the fourth research question Q4. The responses queried why, rather than facing
their core business of operation the IOCs were carrying out engineering design which should be for the design companies. The theme “Facing One’s Business” emerged here. The meanings formulated were: industry regulation; industry collaboration; in-house design team. The dominant meaning is “Industry regulation” representing 40% of the responses for the theme and 4.07% overall. The theme and overall percentages for the other two meaning units are: industry collaboration (40.00 and 4.07); in-house design team (20.00 and 2.03).

Representative significant statements for the dominant formulated meaning are shown in Table 4.4 below.

Table 4.4 Theme 3 Dominant meaning and representative significant statements

<table>
<thead>
<tr>
<th>Meaning</th>
<th>Representative statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry regulation</td>
<td>As a matter of fact, I have said that … one of the things I think need to be improved is in industry regulation. Industry regulation needs to … is really about setting standard for the industry. (MD)</td>
</tr>
<tr>
<td></td>
<td>I think the regulators should start with … should not just be content or satisfied with the fact that an indigenous company is executing the job or carrying out the job, but they should take it a little further than that to see that indigenous companies are not been starved of opportunities to carry out jobs and to ensure that there is a proper learning program or learning plan for every job that is been turned out. By so doing, we will be able to measure the (learning) progress that is been recorded in this industry. (Bala)</td>
</tr>
<tr>
<td></td>
<td>The agencies in charge of local contents should be proactive and ensure that companies adhere to this procedure, they should have time to check how many engineers are trained on the job, and they should have a schedule at the starting, middle and ending of the project. (Eno)</td>
</tr>
</tbody>
</table>
The responses from the participants showed that the influence of other industry actors goes a very long way in the Nigerian oil and gas industry. Organisational learning requires the collaboration of the other stakeholders such as the international oil companies (IOCs) and the regulatory bodies. Both the executive and employee participants felt very strongly about the role of the other industry actors in supporting organisational learning.

“Collaboration with the IOCs, for example, is actually a good way; not just with the IOCs, but probably with other international companies because we are looking at ourselves as a world class company and we are trying to be on the international level” (Wale).

There was not enough industry collaboration. Collaboration will reduce to the minimum certain practices by the IOCs that constitute encumbrances to design organisations being engaged for longer periods to give them opportunity to learn because the longer they work the more they would learn. The IOCs favoured taking work to outside the country; requesting for expatriates position on contractors teams even when this is not necessary; and carrying out engineering design work in their offices thereby turning the local engineering design companies into just manpower supply organisations. The participants alleged that some IOCs would take the staff of these engineering companies and make them work in their own offices without those engineering companies knowing exactly what their engineers were doing in these IOCs’ offices; all they would know was that their hours were paid for at the end of the month. But as a corporate body, what project it was they never knew. All the participants demanded that the IOCs should face their operation which was their core business and leave alone engineering design for which they were not set up to do.

The first executive participant (EDO) explained:

*Because currently what is happening is that you find the IOCs having their own in-house (engineering design) team, and rather that the contractors themselves doing the jobs in their own offices they just provide the resources for them. So as a corporate body registered to do engineering, procurement and construction, as the case may be, they do not have the jobs that will make you as a company to have a corporate experience. If in terms of providing your corporate profile, all you say is that you provided manpower supply to one IOC A or B or C, which I don’t think is proper for engineering companies to develop in this country. The right thing to do is that these jobs should be done by registered companies and supported by the IOCs.*
The IOCs have not been registered to do this businesses (i.e. engineering design) in the country, so I don’t see why they should be doing that kind of job in their offices ... they should face their core business - operations. Operations is what they are registered to do and that’s what they should do, otherwise the Nigerian engineering companies, procurement companies will never grow, especially engineering because the one that bears the brunt more are the engineering companies. Where they do all these engineering in their offices, maybe as time goes on they will start to do construction by themselves, but definitely it is not at all good for the industry (ED)

The participants were of the opinion that more learning will occur if the regulatory body Nigerian Content Development and Monitory Board (NCDMB) made more effort in regulating the industry to ensure that work that should be carried out in-country are not taken outside and that all identified agreed upon technology and knowledge transfer whether on projects or in operation are duly carried out appropriately.

4.4.4 Theme 4: Coming together

Participants’ responses also produced some significant statements pertaining the coming together of the engineering design companies for a stronger collaboration among them. A total of 27 significant statements representing 10.57% of the total 246 responses produced the theme “Coming Together”. The responses suggested that increased linkage among the companies and their coming together to execute jobs would increase learning in the different organisations. The responses here also address the fourth research question Q4. The following meanings were formulated: joint project teams, unhealthy competition and trust. The dominant meaning unit for this theme is “joint project teams” absorbing 57.69% of the responses for the theme and 10.57% overall. The theme and overall percentages for the other two meaning units are: unhealthy competition (30.77 and 3.25) and trust (11.54 and 1.22).

Representative significant statements for the dominant formulated meaning are shown in Table 4.5 below.
### Table 4.5 Theme 4 Dominant meaning and representative significant statements

<table>
<thead>
<tr>
<th>Meaning</th>
<th>Representative statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint project teams</td>
<td></td>
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</tbody>
</table>

> It’s quite obvious that when organisations come together to work together, there is obviously a lot of things to learn. Organisations A and B are working together; A learns some things from B and B learns some things from A. there are practical experiences, practical examples currently in this our business and I think it is just over labouring the obvious, you know, it’s clear that it will help learning in this business. (ED)

> But there is an example of collaborating. I notice that when eventually the project came down, there are 3 companies actually working in the same office and collaborating to deliver the same thing. (Saro)

All the participants advocated linkage and more collaboration among the engineering design companies themselves. They said engineering design companies should come together and jointly execute jobs thereby pulling together their various strengths. The EDO and the MD opined that increasing the linkage among the companies to form a common front would help address issues facing them, including organizational learning, as a team and not individually. This will also remove the cut-throat competition that existed amongst them.

### 4.4.5 Theme 5: The lull in the industry

This theme which was a significant finding emerged from a group of 22 statements representing 4.88% of the total number of 246 statements. It was not envisaged at the beginning of the study. Participants pointed out that there had been lull in the nation’s oil and gas industry for the past couple of years. The resulting paucity of jobs had affected learning in the companies. The meanings formulated were: paucity of jobs, lack of funds and learning by doing. The dominant meaning unit for this theme is “paucity of jobs”
representing 41.67% of the responses for the theme and 2.03% overall. The theme and overall percentages for the other two meaning units are: lack of funds (41.67 and 2.03); learning by doing (16.67 and 0.81).

Representative significant statements for the dominant formulated meaning are shown in Table 4.6 below.

**Table 4.6 Theme 5 – Dominant Meaning and Representative Significant Statements**

<table>
<thead>
<tr>
<th>Meaning</th>
<th>Representative statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paucity of jobs</td>
<td>...the jobs are not forth coming. So the little once we have we barely struggle to make do with the resources that we get from them. So that’s why I said that we are really struggling to stay afloat (Ade).</td>
</tr>
</tbody>
</table>

Within the limits of available funds the company wants to look at excelling first before looking at individual staff development.  
(Bala)

When there is no job, for instance, some organization may not be growing because the people are not working and hence are not learning, but there is nothing they can do about that (Joy).

The participants all pointed out that for the past couple of years activities in the nation’s oil and gas industry have been at the lowest. This had two direct effects: (1) very few projects to deploy people on and (2) reduced funds for company’s operations. Lack of projects contributed to employees seeing one another as threats and also reduced learning on projects. Lack of funds also meant reduced spending on training and learning. The unhealthiness of the companies’ financial situation adversely affected plans to send engineers on training courses. Lack of projects meant there were no projects to do learning by working. These are parts of the prerequisites for organizational learning because individuals have to learn for the organization to learn.
4.4.6 Overall Research Problem

The four research questions were used to answer the overall research problem: How can the companies in the engineering design sector of the Nigerian oil and gas industry increase their organisational learning? From this exercise emerged five themes consisting of seventeen sub-themes or formulated meanings in all. Table 4.7 below shows these sub-themes and overall percentages with respect to the total number of significant statements in descending order.

Table 4.7 Overall meaning units or sub-themes

<table>
<thead>
<tr>
<th>Sub-theme</th>
<th>Overall %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust/openness/sharing</td>
<td>18.70</td>
</tr>
<tr>
<td>Hierarchical structure</td>
<td>10.98</td>
</tr>
<tr>
<td>The meaning of organizational learning</td>
<td>10.98</td>
</tr>
<tr>
<td>Communication / Management accessibility</td>
<td>8.94</td>
</tr>
<tr>
<td>Market value culture / Transactional leadership</td>
<td>7.72</td>
</tr>
<tr>
<td>Strategy (shows lack of: mgt commitment; motivation)</td>
<td>6.10</td>
</tr>
<tr>
<td>The use of expatriates and contract staff</td>
<td>6.10</td>
</tr>
<tr>
<td>Joint project teams / Organisational Linkage</td>
<td>6.10</td>
</tr>
<tr>
<td>Industry regulation</td>
<td>4.06</td>
</tr>
<tr>
<td>Learning environment / Available facilities</td>
<td>4.06</td>
</tr>
<tr>
<td>Industry collaboration</td>
<td>4.06</td>
</tr>
<tr>
<td>Unhealthy competition</td>
<td>3.25</td>
</tr>
</tbody>
</table>
The topmost four prominent sub-themes were trust, hierarchical structure, the meaning of organizational learning and communication. They represented the top 49.6% of the responses. Hierarchical structure and the meaning of organizational learning were reported upon and discussed earlier.

**4.4.6.1 Trust.** Trust though did not come out topmost in any of the five themes; it was present in three of them with its cumulative number of statements being 46. This is the maximum and it represented 18.7% of the total number of statements. Trust, actually, lack of it adversely affected knowledge sharing and therefore organizational learning. The culture was that of lacking trust, sharing and collaboration. Employees were not eager to ask colleagues for assistance and those who knew something were careful of whom to share it with, if they did at all. There was very little trust between the management and the workforce. This was largely blamed on large power distance between them resulting in management inaccessibility. Trust in the companies has been largely described in related themes above.

**4.4.6.2 Communication.**

Discussions on communication were with respect to large power distance between the workforce and management exacerbated by the organisational structure. All the participants, safe the two from Zed Engineering described the structure of their companies as being hierarchical, i.e. pyramidal. Information from management to the workforce passes through three or four organisational levels, and vice versa. This structure impedes line of direct and rapid communication between the management and the workforce.
Furthermore, it also impedes ease of access by the workforce to management. The engineers believed that management had created a sort of power distance that encumbers avenues through which employees could air their opinions. They proclaimed lack or paucity of management accessibility, motivation, support and openness. Ade of Alpha Engineering said that “Management has not created any avenue through which employees could use to air their opinion on issues that affect them especially on trainings.” Lack of effective communication actually affected interrelationship between the employees and management as seen from Bala’s statement “even though management says that they are accessible, but quite a number feel that is just by words of mouth not really by actions because they fill that they might not really be listened to when they go to management to raise issues”.

The Zed Engineering participants described a flat organizational structure that not only enhanced access to management, but also promoted open communication and knowledge sharing among engineers.

DISCUSSION AND EVALUATION OF FINDINGS

4.5 This discussion is on the findings from the empirical study. Five themes consisting of 17 formulated meanings or sub-themes regarding design engineers’ lived experience of organisational learning emerged from the four research questions. The first theme “The way we are” emerged from the findings from research questions Q1 and Q2; the second theme “You are on your own” emerged from the findings from research question Q3; the third and fourth themes “Facing one’s business” and “Coming together” emerged from the findings from research questions Q4; the fifth theme was an unexpected significant finding. In this section, the findings are evaluated in the light of existing literature about organizational learning. The discussion is carried out by evaluating the research questions and the prominent formulated meanings.

4.5.1 Research Question Q1: How do engineers describe their experience of the type of leadership that obtains in their company?

The findings suggested that in four out of the five companies the leadership was non-supportive and with large power distance resulting from a hierarchical pyramidal organizational structure. The organization’s structure and power distance discouraged true
dialogues that lead to mutual exchange of ideas. The large power distance took decision making further away from the average organisation member; this reduced their participation in the decision-making process thereby reducing their responsibility and ownership of change imperatives for achieving predetermined objectives such as learning. Organisational learning is engendered by challenging others’ opinions even if these are those of more senior members. However, the ability to do this is influenced by the organisational structure (Al-Gharibeh 2011; Sampe, 2012; Sections 2.3.1, 2.4). In this case the hierarchical structure restricted this ability.

The pyramidal structure engendered a bureaucratic system that frustrated communication, accessibility and two-way conversation between the workforce and the leadership. Poor communication and accessibility between management and the employees fostered room for gossips and the spread of false information and debarred employees from asking questions thereby creating mistrust between management and the workforce. Lack of effective communication made it difficult for the management to get the workforce identify with them and their mission and vision which is an important requirement for the organisational learning process (García-Morales, Jiménez-Barrionuevo, and Gutiérrez-Gutiérrez, 2011). The reported poor organisational learning in these organisations was consistence with the suggestion of scholars (e.g. Crawford et al., 2009) that a hierarchical structure was an agent of reduced organizational learning (Section 2.3.1).

Easy access and rapid communication were promoted between leadership and employees at the fifth company (Zed Engineering) where the two participants reported flat organisational structure and supportive leadership. The company had an open door policy that facilitated communication between the leadership and workforce. The reported better organisational learning in this company aligns with scholars’ suggestion that leaders, through clear and effective communication, can create an environment of openness and transparency where team members willingly share information, experiences, and knowledge and also develop trust amongst themselves and in their leader, too (Section 2.3.1; Anantatmula, 2010). This encourages innovation and organisational learning

Engineers at the other four companies (Alpha, Beta, Theta and Gamma) were reluctant to take risk and learn from mistakes because of lack of management support and possibility of sanction. Employees take risks to learn from mistakes when have their leaders’ support
Contrarily, the executive director of one of them (ED) categorically stated that an engineer’s mistake would be investigated for negligence or whether it was deliberate or wilful. This discouraged the workforce from being creative and innovative.

At Zed Engineering, leadership recognized that a local practice engrained in people where “younger people don’t speak when older ones are speaking and the former almost always conceding to the latter” could delimit communication and, as MD put it, he “had to work on it”. So leadership took the pain to fashion out procedure that facilitated employees speaking out and speaking up without being disrespectful which really was what the culture forbids. This not only improved communication, but also the workforce’s perception of management support. The organizational learning literature clearly points out that supportive participative leadership by top management facilitates higher firm performance by fashioning out organizations that learn (Jung and Takeuchi, 2010).

It was clear that those participants who professed lack of organisational learning in their companies (and they were in the majority) blamed it mainly on their leadership and the few that professed its healthy existence in their companies praised their leadership for it. The findings actually substantiate what is found in the literature (Crawford et al., 2009; Magnier-Watanabe and Benton, 2011; García-Morales, Jiménez-Barrionuevo et al. 2011; Cheung, 2012; Sampe, 2012) that there exists a strong relationship between leadership and organisational learning.

4.5.2 Research Question Q2: How do engineers describe their experience of the type of organisational culture that obtains in their company?

Organizational learning occurs not in a vacuum, but under specific conditions and consistent with the culture of the organization (Section 2.3; Chang and Lee, 2007; Cook & Yanow, 1993). The occurrence of organisational learning is influenced by the values, beliefs, norms, customs and structure that constitute organisational culture. These notions all have appreciable influences on the prerequisites of organisational learning, such as, trust, sharing, transparency, mutual support and communication (Wang, Su and Yang, 2011).

Consensus is being reached more and more that those organizations that make the effort to introduce a culture which encourages dialogue, creativity and risk taking, and
motivates members to question fundamental beliefs and work patterns, will achieve a conducive working atmosphere for the development of their learning capability (Chang and Lee, 2007).

The responses from 82% of the participants described an organisational culture that lacked mutual trust, participation and openness; that emphasized control and efficiency but whose characteristics impeded learning that produced efficiency. In the companies, it was always about deliverables and not the workers. It was a market/competitive culture which was not the best for organisational learning. Employees were not provided time during the working hours to explore new knowledge; they spent all the time trying to complete their project tasks. So they had no time for sharing knowledge; the norm was to concentrate on getting one’s own job done regardless of others’ participation leading to reduced transparency and openness. Shared meaning is enhanced by trust and openness. A firm with a culture that is open and encourages free dialogue and debate will engender communication and knowledge sharing among its members (Magnier-Watanabe and Benton, 2013).

The culture, as experienced by the participants, stifled openness, communication, cooperation, members’ participation, and trust thereby hindering knowledge sharing, creativeness and innovation, and organisational learning in general. Colleagues were not forthcoming in helping one another; and when they did they did it, it was not done transparently. The organisational learning dimensions of knowledge acquisition, dissemination, exploitation and organisational memory (Wang, Su and Yang, 2011) require openness; cooperation, trust, creativity and innovation. Again, the statement by the ED from Alpha Engineering that mistakes must be properly investigated to see whether they were deliberate, wilful of act of negligence did not portrayed an organization that encouraged creativity and innovation.

At the fifth company – Zed Engineering people demonstrated higher level of trust and cooperation facilitating mutual accessibility. The office arrangement was not only access-enabling open office, real access was present. The culture was that of adhocracy and characterized by trust, sharing, creativity and innovation. Employees’ ideas and suggestions were often requested for way forward. In the discussions with MD, he acknowledged the importance of open discussions in which both the management and the workforce
participated and during which engineers were urged to speak out because innovation being their core value, status quo must be challenged.

However, real understanding of a learning culture was still to a large extent absent. For example, the implication of openness and transparency with respect to organizational learning was not appreciated. In my discussions with them, Wale and MD who were from this company never mentioned any of these notions. Learning culture is more than providing assistance; the way tasks are carried out should facilitate learning by others by being open and transparent.

4.5.3 Research Question Q3: How do engineers describe their experience of learning and organisational learning in their companies?

4.5.3.1 Understanding and implementing organisational learning

The overall findings from the interviews showed that all the companies had a limited understanding of organizational learning. The meanings they attached to organizational learning were at variance with what is in the literature. Both the executives and the engineers saw organisational learning mainly as going on training programmes. Accordingly, the executive participants talked largely about trainings such as induction and discipline courses and how they arranged dissemination of the knowledge gained through knowledge sharing sessions. The employees talked about how they were being sent for trainings, which were not even related to their tasks. Organizational learning is more than presentations at sessions or sending people for training. It is a “process through which an organization continuously acquires new knowledge and adjusts in order to successfully adapt to external and internal environmental changes and to maintain sustainable existence and development” (Chen, 2006). It is a cumulative and continuous process that happens at all levels of the organization simultaneously (Section 2.2.1).

The companies’ approach to learning did not leave room for collective learning. Scholars (e.g. Cook and Yanow, 1993; Easterby-Smith et al., 1999) distinguish the cognitive and social perspectives of learning. The social is the organisation learning as a collective. The findings from the interviews showed that the companies had issues with both cognitive and social learning. It was either the employees were not sent for training at all, or, often, they were attending irrelevant trainings. The Human Resources and Learning Department had the last
say on what course the employee attended often with the employee having little or no say. So cognitive organisational learning was hindered, even though, the employees tried learning on their own. Furthermore, lack of trust and openness also hinders collective learning.

It is pertinent to note that organisational learning fears better in the younger and smaller Zed Engineering Ltd. While this confirms previous research findings that smaller firms have more intense organisational learning-performance relationship (Jimenez-Jimenez and Sanz-Valle, 2011), it also contradicts findings that older firms have same. Jimenez-Jimenez and Sanz-Valle (2011) opine that age allows companies to develop organizational routines that help them to become efficient in their activities and, therefore, obtain better performance”. However, the findings in this present research seem to show that the closer ties and enthusiasm among members in younger firms are more effective in enhancing organisational learning. This could the focus of further studies.

4.5.3.2 Knowledge sharing

Knowledge sharing was not a strong characteristic of the companies. There was little or no peer-to-peer learning contrary to the literature suggestion that transfer of knowledge was best accomplished on a peer-to-peer level (Dierdorff et al., 2011; and Pentland, 2012). It was, in fact, accepted that one might not share knowledge. The employees believed that if rather than the company giving learning, it was the employee on his/her own struggling to acquire knowledge, then he/she had right to do whatever with the knowledge, including not sharing it. The current lull in the nation’s oil and gas industry had produced among the workforce extreme competition for inadequate available positions resulting in lack of mutual trust. Knowledge sharing is enhanced by trust, openness and collaboration. The basis of converting individual knowledge to collective knowledge is sharing (Lloria and Moreno-Luzon, 2014); without this both the epistemological and ontological dimensions of Nonaka’s (1994) model would be difficult to achieve. Socialization, the conversion from tacit knowledge to tacit knowledge requires a culture of trust, sharing and collaboration among organisational members. The companies were poor in these characteristics and thus were not performing well with respect to this. Converting tacit knowledge to explicit knowledge in externalization was private because when individuals surfaced their knowledge, they did so in a guarded way, only to solve their own problem at hand and not to share with
colleagues. Combination, converting from explicit to explicit knowledge was also diminished due to lack of trust and collaboration. However, the employees perform well in integrating knowledge; they acquire whatever little knowledge made available for sharing and internalize it.

4.5.3.3 Learning environment and available facilities

Generally, participants’ responses portray availability of the required working facilities and physical environment. This enhances organizational learning. However, the archiving systems were not effective; accessibility to them was difficult and they were not being maintained and updated. So the employees could not optimally use this facility that should be the first point of call when looking for help to complete a task. Generally, each engineer tried to create their personal archive which was not the best.

A learning environment requires more than physical facilities; it also required is a psychologically safe environment where workers can afford to fail in order to learn (Chapter 2). Also an environment which encourages employees’ participation in decision-making process advances organizational progress (Andert et al., 2011). However, the environments described by the participants were not consistent with this thinking.

4.5.3.4 Contract staff and expatriates

The companies made minimal or no gains in organizational learning and knowledge transfer through the use of expatriates and contract staff. The workforce attributed this to the reluctance by the latter and inadequate attention from their managements. However, scholars have suggested that the characteristics of knowledge to be shared may have a significant impact on the knowledge sharing behaviours. The tacitness, explicitness, or codifiability of the knowledge affects its sharing behaviour. For example, tacit knowledge involves more effort to share than explicit. It’s also more dependent on individual skills and the sharer may even need some assistance (Sergeeva and Andreeva, 2016). Design knowledge is largely tacit in nature. In terms of ease of transferring and absorbing, the depth and scope of knowledge to be transferred also play important role and must be given good consideration.

There is also the issue of motivation on the part of the sharer. Studies have shown that sharer’s motivation is influenced by factors like peer and supervisor sanction (Egan, Yang
This literature reference is substantiated by participants’ assertion that they gained little from contract and expatriate staff because management did not adequately monitor the latter’s’ activities.

The responses show that the expatriates also struggled to complete their project tasks like other engineers. They had little or no time to mentor anyone since they also needed to accomplish their deliverables. There were no agreed plans regarding expatriates’ work methodology with respect to knowledge transfer. One participant said that from personal experience he believed that expatriates have just come to work in this country like others.

4.5.3 Research Question Q4: What do engineers say about their experience of industry’s collaboration and contribution to learning?

Industry collaboration among industry stakeholders would normally be expected. Findings from the study show that stakeholder’s collaboration may not be presumed for the Nigerian oil and gas industry; this probably may also apply to other industries, too. The major stakeholders in the Nigerian oil and gas industry are the operators who are the IOCs and NOCs, the service providers to which the engineering design companies belong and the regulatory bodies. The IOCs were the primary customers of the engineering design companies. There were two industry collaboration issues brought up: (1) collaboration between the design companies and the IOCs and (2) collaboration among the design companies themselves.

Collaboration between the engineering design companies and the IOCs was poor. The IOCs had little trust in the former. They were doing engineering design work in their own offices in conjunction with their home offices rather than giving them out to the local design companies. This practice had adverse effect on learning in the local engineering design offices. There was minimal understanding and collaboration between the two and these resulted in impediment for organisational learning. This aligns with the literature provision that lack of mutual understanding and collaboration will not enable stakeholders to pool resources and use complementary capabilities to achieve results. The extensive interconnection among stakeholders enables easy information exchange and building of common understanding leading to a long-term positive effect on performance such as learning (Soda et al., 2004 cited in Savage et al., 2006).
The employee participants including an executive participant demanded that the IOCs should cooperate and face their core area of business which was operation and not engineering design. While it is true that this would provide the design companies more work and opportunities for organizational learning the IOCs believed that they had appreciable in-house capacities in oil and gas design which qualified them to also do some work on their projects. Oil and gas projects pass through multiple phases – from conceptual design through basic design, FEED to EPC. Due to dwindling resources the IOCs wanted to do as much as possible in-house, and also to ensure that the external consultants understood the real question. Shirman (2011 cited in Cochran, 2013) advocates that the old notion of business knowing best needs adjustment to include that the customer is also knowledgeable and want the business to understand the real question. Muha (2011 cited in Cochran, 2013) posits that when company’s engineers collaborate directly with the customer’s engineers, confusion in the translation of technological information is reduced and a common dialogue and mutual understanding is gained. Ospanova & Siegele (2010) identified the facilitating of multi-stakeholders dialogue as a key issue of local content. Multi-stakeholder dialogues are means of bringing together different stakeholders by engendering effective communication to create collaboration that leads to decision making. While the term multi-stakeholder refers to “different groups, each of which has different aspirations and hopes related to what it can expect from the organisation’s activity” (Wood and Gray, 1991), collaboration should mean creating a win-win situation.

There were practically no linkages between the engineering design companies themselves. All the participants expressed this opinion. They advocated for inter-firm linkage and cooperation in form of joint project execution and/or networks which would positively affect their organisational learning. This is inter-organisational learning. Mariotti (2002) and Holmqvist (199) point out that different companies coming together to work in an ‘imaginary organisation’ jointly create collective knowledge - inter-organizational learning. This joint knowledge which is initially exclusive to the collaboration and independent of any single organization’s knowledge (Holmqvist, 1999) will later be internalized by the various companies.

The companies could not talk of trust existing between them; they all were doing their things separately apart from a recent occasion mentioned by ED when some of them came
together to do one job. In inter-organisational learning, the issue of trust is very important and organisations must realize this (Section 2.3.4). They therefore must be ready to build mutual trust where it does not exist. As mentioned earlier in Section 2.3.4, this can be done by, for example, having clarity of purpose and objective; resolving power differences and imbalances; sharing workload fairly; having equal ownership and effective communication (Vangen and Huxham, 2003). These would not only aid successful execution of joint projects, but would also enhance learning during the project.

4.6 Zed Engineering Ltd

An important finding was that the culture in one of the companies – Zed Engineering Ltd. was different from that of the others. The organisational culture in the other companies was one where there was no trust both between employees and management and amongst the employees themselves with poor or no collaboration making inter-personnel knowledge transfer very difficult. The leadership was pyramidal and autocratic with hierarchical structure and did not encourage employees’ participation thereby limiting creativity and innovativeness. However, at Zed Engineering it was a culture of trust, cooperation, sharing, and transparency and with a flat organizational structure where leaders were designers, teachers and stewards.

This company was considerable younger than the other four; it was 8 years old while the others were between 15 and 25 years old. There were various reasons for differences in the organisational cultures and leadership of different companies ranging from age, size, who the founders were, the recruitment style, etc. While these were seen to be working well for Zed Engineering, the reasons for the differences were not investigated due to lack of enough time for the study. This could be a focus for another research.

Zed Engineering’s progressive organisational learning practices were due to the strategies used by their management to promote organizational learning. These strategies included (1) use of flat organizational structure to enhance rapid and open communication; (2) creation of safe learning environments; (3) encouraging creativity and innovation; and (4) knowledge sharing. This produced a friendly and informal environment conducive to learning; people were creative and not afraid to experiment or make mistakes; and
knowledge was shared. However, the social and behavioural aspects of organisational learning were still not fully appreciated in the Zed Engineering Company, too.

4.7 Implications for the action research

While the literature research in Chapter 2 focused on the theoretical issues on implementing organisational learning, the empirical study above in this chapter focused on the extant issues confronting or enhancing it in the engineering design sector of the industry.

The literature review examined the debates surrounding organisational learning and identified the prominent factors influencing it – culture, leadership, structure, trust and learning strategy. Identified as enabling factors are: culture of openness, mutual trust, collaboration and participation; supportive leadership that is that of designer, teacher and steward and participatory; organisational structure that is non-pyramidal, with little power distance and that enhances accessibility and communication; and climate of mutual trust, autonomy and good personal interaction; strategies not based only on cognition, but also on sociological perspective.

The results of the empirical study show that the success or failure of organisational learning is a function of factors such as leadership, management support, strategy, environment, etc. The empirical study further revealed deficiencies in aspects of leadership, organisational culture, structure, learning strategy and industry collaboration. Brief narratives of these follow.

4.7.1 Leadership

Non-supportive leadership with hierarchical pyramidal organizational structure creating large power distance and reducing management accessibility that discourages dialogues, all leading to risk aversion and employees not being creative. (1) Would employees speak out and be innovative if they had management support? (2) Were there hidden reasons why they perceived that they did not have management support?
4.7.2 Organisational culture

The outcome portrayed a competitive structure where colleagues were not open and ready to disseminate knowledge. Was it the characters of the people that created this environment in these companies or was it the other way round? For example, would the engineers be more forthcoming to pass knowledge to each other if they had a little more time for reflection and if those seeking assistance had certain minimum knowledge?

4.7.3 Organisational learning strategy

Participants saw organizational learning strategy only as attending training courses even when the courses might not be relevant to their tasks, and archiving knowledge gained from past projects in organisation’s servers even when the servers were maintained or easily accessible to them. They did not see it as being built into the fabric of the organization as leadership, culture, structure, etc.

4.7.4 Industry collaboration

The design companies did not give adequate consideration to linkage among themselves and the possible learning that result from it; they neglected inter-organisational learning. They also neglected possible learning from collaboration with the IOCs who were their main clients. They still held on to the old notion of business knowing best, whereas, current realities had made it imperative for the IOCs, too, to acquire some design capabilities.

I argue that though the literature suggests prerequisites for increasing organisational learning, the possible reasons why, at times, organisational learning culture and imperatives are not implemented have not been adequately examined. The main underlying issues behind these would differ from place to place. A further examination of the issues through AR would give more insight. The characteristics of AR made it suitable providing more insight and in-depth understanding of the experiences of the engineers.

During action research interventions, the real issues are surfaced. For example, in the empirical study of this research participants felt that colleagues hoarded knowledge. But they could only guess why because they did not ask why. Some proffered self-security as the reason. However, during the intervention, more reasons as to why people “hoarded”
knowledge were revealed (See section 5.3). In addition, because they often don’t reflect on what they do and say, people are usually unaware of gaps between their espoused theories, those that they believe they follow and their theories-in-use, those theories inferred from their actual behaviour (Argyris and Schon, 1996; Thorpe and Holt, 2010). The AR intervention would help expose participants’ theories-in-use, thereby shedding more light on the real issues as against what they say during the empirical study. In the process of an AR, true reasons come out. Since there could many of them, it was my expectation that the intervention would bring to the surface the real issues underlying the various observation during the empirical study. The AR was implemented through the FPSO project in the next chapter.

4.7.5 Replications in the intervention

From the above, the requirements and specific actions to be implemented in the action research are:

1. Ensuring of the true factors that enhance a learning organisational culture which at times is also referred to adhocracy (Magnier-Watanabe and Benton, 2013; Schimmoeller, 2010) such as trust, sharing, employees’ participation, creativeness and innovation, transparency, collaboration and seeking help. This study revealed trust to be a strong driving force in sharing, therefore systems and conditions that build and maintain trust need to be created. When a company’s internal processes encourage healthy inter-relationship between people and groups, shared understanding, truth and transparency, voicing out opinions and/or concerns (Wang, Su and Yang, 2011), then its members would have achieved most of the prerequisites for organizational learning.

2. Implementing a less pyramidal organisational structure in the least, or out-rightly establishing a flat organisational structure which improves accessibility and communication between leadership and workforce through reducing the power distance (Sampe, 2012).

3. Creating opportunity for participants to gain better understanding of the essence of organisational learning and therefore useful strategy for it because it is not just about sending employees to training; organisational learning is more than this
(Garcia-Morales, Jimenez-Barrionuevo, et al., 2012; Boateng, 2011). It is part of the action research to inculcate the real essence of organisational learning into the participants by giving them the opportunity to live it.

4. Creating a vehicle (the intervention) to extend organizational learning beyond the internal boundaries of the organization leading to inter-organisational learning and exposing participants to collaboration among the engineering design companies. This would present to the participants, in real life, the opportunity to develop mutual understanding and trust and create dialogue that enhances organizational learning (Lloria and Moreno-Luzon, 2014)

4.8 Chapter Summary

The chapter presents the execution and results of the empirical study. The discussion of the results and findings provides understanding in more details of the extant organizational learning efforts in the companies and suggests implications for the action research. The results were related to the literature reviewed in Chapter 2. The analysis of participants’ responses yielded five themes consisting of 17 formulated meanings or sub-themes which emerged from the perceptions of the participants. The emerged themes were (1) the way we are, (2) you are on your own, (3) facing one’s business, (4) coming together and (5) lull in the industry.

The results indicated that mutual trust, whether between management and the workforce or among the workforce, didn’t exist in the companies. Communication, especially between management and workforce was poor. The hierarchical organization structure coupled with the management’s authoritarian attitude created a large power distance between it and the workforce that hindered rapid transfer of information. While the required physical working and learning facilities were available, employees did not have the feeling of psychological safety; they were discouraged from experimenting because of the fear of failure. A learning environment where knowledge was shared did not exist. Industry collaboration and organizational linkage between the design companies were insignificant. Finally the companies lacked a correct understanding of the meaning of organizational learning.
The findings showed that it was necessary to improve the organizational culture in the companies to that where: employees’ creativity and contributions are welcomed to enhance knowledge acquisition; there is climate of trust, openness, sharing and team work to aid knowledge dissemination; and confidence in employees’ entrepreneurship, innovation to aid knowledge utilization. There should be improved collaboration amongst the engineering design companies.

In the next chapter, the implications are played out in an action research intervention using a temporary organization of an FPSO design project team.
CHAPTER 5  THE FPSO PROJECT

5.1  Introduction

This chapter describes the execution of the action research intervention project based on the literature review and findings from the empirical study. The literature review in Chapter 2 indicates best practices in organizational learning while the qualitative phenomenological study in Chapter 4 indicates how organizational learning existed in the engineering design companies.

The purpose of the intervention was to facilitate understanding in detail and then to increase organisational learning in the engineering design sector using an inter-organisational joint project organisation characterised by trust, openness, sharing, cooperation, good communication, creativeness and collaboration. The findings from the literature review and the empirical study revealed the issues for replication during the intervention (Section 4.7).

While there may be differences between inter-organisational learning and intra-organisational learning, most of their characteristics are similar in that: (i) learning occurs simultaneously at both the individual and the collective levels, (ii) it is the individuals that are learning first at the collective level (i.e. at the group, intra-organisational and inter-organisational levels) and (iii) the learning at the levels is dependent on the conditions of the individuals and the organisation (Sections 2.2.1, 2.3.1) A better understanding of learning in an inter-organisational setting will enhance the improvement of organisational learning. A jointly executed project by different companies coming together is a setting for inter-organisational learning. Such a setting can be referred to as a “temporary organisation” or an ‘imaginary organisation’ (Holmqvist, 1999) where people learn through working together to achieve a common goal. The FPSO detailed engineering design team is such a temporary organisation. This temporary organisation is a multi-firm joint FPSO design project described below in Section 5.5.

Through working with others, participants develop new insights that help them to learn about themselves as individuals, as a team and as an organisation. Working with others helps individuals to develop by making it possible for them to put theories into practice
through discussions with other participants. Bringing together various companies in a conducive environment is bound to enable creative discussions that lead to change and learning on the part of individuals as well as their organisations.

5.2 The Action Research Cycle

I employed the action research cycle presented by Coghlan and Brannick (2010, p. 8) comprising a pre-step (context and purpose) and the four basic steps of: (i) constructing, (2) planning action, (3) taking action and (4) evaluating action.

5.2.1 Pre-step: context and purpose

As earlier discussed in Chapter 1, developments in the Nigerian oil and gas industry such as the enactment of the Nigerian Content Law have made it imperative for organisations in the industry, which include its engineering design sector to raise their learning and capabilities. These organisations are trying various learning approaches. However, these approaches are not yielding good results; thus, the necessity to do research on learning in these organisations. In the industry, companies at times come together to form a joint inter-organisational team to carry out some of the big industry design projects. My action research was implemented on one of such projects - an FPSO detailed engineering design project.

5.2.2 Constructing the action

I started with the articulation of practical and theoretical foundations of actions (Coghlan and Brannick, 2010, p. 9). From the backdrop of the pre-step confirming the desirability and driving force for the exercise I started thinking about the framing. I looked at the objects of study as issues rather than problems.

Action research involves change. The desired change here is increasing the learning ability of the organisations. The need for this change is expressed externally in the imperatives from the enactment of the Nigerian Content law (as discussed in Chapter 1) and internally by companies’ employees seeking to acquire professional knowledge. This change is a second-order change (Palmer, Dunford and Akin, 2009, p. 86) in that since exiting
learning practices are not yielding good results, the fundamentals and bases of the learning practices must be changed.

As this step should be a collaborative dialogic venture (Coghlan and Brannick, 2010, p.9), I also liaise with colleagues, both from the NCDMB and the engineering design companies, in looking at the whole exercise in a systemic manner from the viewpoint of our practical experience. I chose to use an engineering design project because of my experience in the engineering design sector. I explained to and convinced the IOC client, the engineering design companies and my office, the NCDMB how the intervention would yield the desired benefits and outcomes leading to increase in organisational learning. The prime participants are the Project Leader, some of the engineers who earlier participated in the empirical study and other design engineers from the companies.

5.2.3 Planning the action

In this second step of the cycle, part of my planning included the literature review which indicated how to carry out the empirical study and the action research, and how to execute the proposed intervention in the action research. Liaising with stakeholders and industry colleagues who were experienced project people, I obtained their views and also a vehicle for carrying out the action research intervention was agreed upon. This was a joint multi-firm project for the detailed engineering design of an FPSO owned by one of the IOCs in the industry. Earlier on when I was starting the empirical study I had discussed with and received a positive nod from the client and NCDMB the possibility of using this project whose kick-off activities were being finalised then.

As it is necessary to plan data gathering and analysis at the planning step, I put together my plan. It’s noteworthy that in action research, rather than speak of data gathering it is more fitting to talk about data generating because engaging a participant for inquiry is not only assembling data but also generating learning data for both the researcher and the participant (Coghlan and Brannick, 2010, p.74). My plan for data generation included:

1. Attending some project meetings which included the kick-off meeting, monthly progress meeting, non-schedule meetings and the project team internal meetings
2. Discussing issues arising from the interventions and other project problems being resolved
3. One-on-one discussions and group discussions.

The analysis of data obtained from this action research followed the same pattern as in the empirical study.

At this juncture, I noted that I would need to document my reflections during the meetings that I attended with regards to behaviours, reactions and comments of various stakeholders. I further noted that this would not arouse suspicion because people usually take notes at project meetings. I also noted that any interview would follow the same mode as earlier described in Chapter 3.

5.2.4 Taking action

The plans were implemented and interventions made collaboratively during the FPSO detailed design project (See Section 5.3 below).

5.2.5 Evaluating Action

This last cycle is for reflecting on the outcomes and making sense of the intervention. The outcomes of the actions, both intended and unintended, are examined with a view to seeing how the intervention has increased the learning ability of the temporary organisation based on participants’ comments, actions and observed changes (See Section 5.4).

5.3 The FPSO Project

Towards improving learning in the engineering design sector of the Nigerian oil and gas industry, the NNPC through its subsidiary NAPIMS together with the industry regulating body NCDMB negotiated with an IOC client to engage a joint team of three engineering design companies to execute, as a consortium, the detailed design of a Floating Production Storage and Offloading (FPSO) vessel topsides. One of these three companies – Alpha Engineering had three of its engineers who participated in the empirical study (Joy, Ade, and Ben) on the project. The lead company on the project was Alpha and it produced the Project
Manager. The project office was located at Beta Engineering building. The technical partner of Beta served as the foreign partner to the joint venture.

While still busy with the empirical study during the months preceding the FPSO project’s kick-off scheduled for the first quarter of 2015, I started discussing using the project as the vehicle for the intervention with the project stakeholders – the IOC owner, NNPC-NAPIMS, NCDMB and the contractor. Issues about additional costs and keeping schedule were raised by all, however I allayed their fears: there would be no additional costs or over-run of schedule as a result of the intervention. I was able to convince them of the merits and benefits of such endeavour for the industry, and how it would not adversely affect the project. My cognizance of the industry, and not the least, being the head of capacity building at NCDMB that superintends over the entire industry helped support the stand that I knew what I was talking about. The expected duration of the project was twelve months.

I present below the intervention story. I abided by Coghlan and Brannick’s (2010, p. 147) advice to distinguish the actual non-disputable events which took place from the meanings I attributed to them. Accordingly, I adopted their suggested technique of using, at intervals, a reflective pause box where I write my reflections to events, i.e. my reactions, interpretations and action planning.

In this action research section I used narrative analysis rather than thematic analysis as in the previous chapter. Action research is based on a collaborative action relationship between researcher and participants where the participants not only tell, but also act their out their experiences with the researcher spending time with them to gather their stories through multiple types of information (Hunter, 2010). In addition to the spoken word, the data include the participants’ character, actions, tone, and demeanour; emotion of the moment and the latent meaning being communicated by the participants. Though narrative analysis has been criticised for not being “theoretical enough” it can capture the above type of data better than thematic analysis. It involves more observation, reporting, conversations, interviews and storytelling. Rosenthal and Fisher-Rosenthal (2004 cited in Hunter, 2010) argue that narratives must be based on some form of perception or observation of real events. What were happening during the action research were real events, the stories of which were being documented.
My first meeting with the project manager

After obtaining permission from the project owners I met with the project manager. The leader of the project, referred to as Project Manager (PM), was from Alpha Engineering where I had earlier worked before being seconded to the NCDMB. He had a good experience in project management. I met with him before the project kick-off meeting. Though he was aware of my study on organisational learning I still explained to him in more detail the essence of the study and the connection with his project. I explained that the aim of the intervention was to understand in detail how organisational learning occurs in the sector using an inter-organisational joint project characterised by trust, openness, sharing, cooperation, good communication, creativeness and collaboration. I further discussed how carrying out the intervention will also help his project objectives - a project team characterised by openness, trust, cooperation, mutual accessibility will achieve its goals without disrupting normal project management system; and that the objective was that by the end of the intervention the team members including him would have gained understanding of collective learning and how to create environment where organisation learning would thrive. I explained to him what I wanted from him was a supportive leadership which would be accessible to the team members and that I would be guiding him along the way. He agreed to work with me.

At the end of this discussion I asked him what he thought about the possibility of implementing such interventions; the possibility of learning on such a project and what challenges could be faced. The questions I posed to him are on Appendix E. Generally he was more positive than negative:

“**I believe people always learn one thing or the other on projects and there are more opportunities to learn much more on joint inter-organisational projects due to the multiple sources of new knowledge made available by the participating companies. The question is how to make use of these opportunities as much as possible**” (PM).

“**From my point of view, it’s possible to implement the intervention on the project. The intervention doesn’t have to affect the project’s quality, schedule or cost**
for these are what could create concerns for the client and the main contractor. So what is required is to explain this to them” (PM).

“One obvious benefit from the success of the intervention is that it will promote more joint inter-organisational project execution in the sector” (PM).

The project kick-off meeting

The FPSO project started with a kick-off meeting in the first quarter of 2015 in the offices of Beta Engineering Company Limited which served as the project office. Two other engineering design companies involved were Kappa Engineering and Alpha Engineering the latter being the Lead Company in the inter-organisational team. The lead persons from these companies were present at the kick-off meeting. Also present were the representatives from the client or the owner of the project, NNPC-NAPIMS, NCDMB and the main contractor, all of whom were stakeholders in the project. These representatives made brief contributions at the meeting. The agenda for the kick-off meeting included:

1. Welcome  
   a. Safety moment  
   b. Introduction
2. Organisation  
   a. Main contractor’s organisational structure  
   b. Engineering design organisational structure
3. Scope of work  
   a. Topside engineering design scope  
   b. Learning  
   c. Execution methodology
4. Schedule  
   a. Overall project schedule  
   b. Engineering design schedule
5. Project priorities and expectations
6. Message from team leaders
As could be seen from the agenda, the essence of the kick-off meeting was to present the project, its purpose and expected goals and deliverables; the main actors and their structures; and the direction the project was expected to take. It was to energize the project team and establish a common purpose toward completing the work and to bring everyone up to speed, and not to discuss every item in detail.

Two instances from the meeting were noteworthy for me and merited being reflected upon.

First, under the agenda No. 2 when the engineering design organisational structure was presented, I noticed that, though it had minimum hierarchy, it was largely flat and not bureaucratic, indicating a flat organisation without large power distances. This was already a plus for organisational learning.

<table>
<thead>
<tr>
<th>Reflective pause 1:</th>
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<td>The organisational structure of the project team is not pyramidal but flat. And it was discussed in a matter-of-fact way, without any issue; the managers were at home with flat organisational structure. It was apparent in the discussion that project progress was enhanced by easy access and rapid communication between project leadership and the design floor. I thought: if these managers could see their organisations as projects they might consider less pyramidal structure.</td>
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However, implementing flat organisational structure would have implications and challenges. It involves removing some intermediary management levels which create gaps in the existing command chain, requiring (1) a redistribution of power and responsibility, (2) remaining managers to supervise more employees and (3) that employees becomes more autonomous, therefore more responsible and more quality conscious. In addition to these, there is how to manage the resentment from the managers whose positions were eliminated. For these reasons, some authors (e.g. Hilmer and Donaldson, 1996 in Palmer,
Dunford and Akin, 2009) advise that caution must be exercised in getting rid of old organisational practices like hierarchy. A plan whereby the new is gradually integrated with the old is advised. I presumed that the fact that these companies, on their projects employed non-pyramidal structure meant that actually issues would be limited.

The second instance was when discussing learning under agenda No. 3 and in messages from team leaders in agenda No. 6. The NNPC-NAPIMS and NCDMB representatives as well as the PM were very enthusiastic about expected learning opportunities on the project noting it as a key success factor. The PM made mention of creating a learning environment that would facilitate project team members’ learning during project execution. He indicated that apart from the NCDMB-mandated trainings the project would endeavour to promote organisational learning through accessible leadership and culture of openness, trust, transparency and sharing. All these were from the backdrop of my earlier discussion with him. However, the client representative, though acknowledging his awareness of the plan and not being against learning, was not that enthusiastic. He emphasised keeping to schedule, cost and work quality, and called the attention of the PM to these.

**Reflective pause 2:**

*I gathered from their speeches that clients on one hand, and the representatives from NNPC-NAPIMS, NCDMB and the engineering design companies, on the other hand, entertained different views about learning on the project. I perceived that the client – a major IOC was not enthusiastic about learning on the project, even though they tried not to show this.*

*From my experience in the industry, I sort of expected this; I knew it might be a source of concern. IOCs’ main concerns on their projects are quality, schedule and budget and they are critical of their projects being used for training.*
Even though we had earlier submitted a brief explaining the diagnosed problems and the intervention plan with justification to him, I together with the PM and the NCDMB representative later met with the client representative to allay his fears and to re-iterate to him that the intervention rather than affecting the project negatively would affect it positively by creating an environment of openness, transparency and mutual trust which enhances information flow and make cooperation more natural among the engineers. He said that he understood, but he just didn’t want his project to become some sort of guinea pig, especially, as we all knew that there were two other NCDMB-mandated training programmes, even though those had their allocated manhours and costs and would not affect the project progress. We convinced him of no adverse effect on the project and the discussion ended amicably.

**Reflective pause 3:**

_I reflected that the client would rather have exploitotive than explorative learning (Holmqvist, 2002; Section 2.3.4) on his project. This was understandable; achieving the time-to-first-oil is most important in the oil and gas industry and clients are wary of any additional burden like a study that may delay it. So I noted down that the project schedule should not be exceeded as a result of the study._

However, after more reflection, I concluded that, though, inter-organisational learning produces mainly explorative learning (Section 2.3.4; Mariotti, 2003), in this project the setting was such that learning could not be said to be hundred per cent explorative in that the learning company was not alone, but together with the knowledge-sharing company for whom the knowledge being learned was exploitative. The implication here is that in certain context like inter-organisational collaboration learning doesn’t have to be either exploitative or explorative, it could be both at the same time. This is an extension to the existing “either or” theory. Furthermore the team was not necessarily producing new knowledge, but only disseminating among the team members a knowledge already acquired by one of them.
Accordingly, the knowledge was not completely new to the whole team, but only to a part of it. What is referred to as creating new knowledge in inter-organisational learning is often the transferring, complementing and combining of individual organisation-specific knowledge into a new joint knowledge (2.3.4), rather than searching for a completely new knowledge, which truly, could be a concern for the project owner. I noted that the client should be made to understand this. I together with the project manager regularly liaised with the client representative throughout the exercise to clarify issues.

**Discussions with the three former participants after the kick-off meeting**

Three of the engineers who participated in the earlier empirical study (Joy, Ade and Ben) were members of this project team. I decided to interview and discuss with them before the start of the project. Each discussion lasted for about fifteen minutes. Basically, I asked them the same questions I asked the project manager (Appendix E): what they thought about the possibility of implementing such interventions, possibility of learning on such a project and what challenges could be faced. Generally they were more positive than negative, too. Their concern was the “you are on your own” attitude of the people. Ade commented: “The major issue as I see it is how to convince our engineers to be more trusting and share knowledge more freely among themselves” (Ade).

**The first project team internal meeting**

After the kick-off meeting, the project started off in its phase 1 which was the phase of mobilisation of engineers from their respective companies to the project; it was also the phase of learning to know one another. By the end of two weeks into this phase, the project manager finalised the project’s ‘Coordinating Procedure’ document. About this time first internal project team meeting was held. As the NCDMB was seen a proponent of local capacity building, its members were seen as part of the team. I attended these meetings mostly as an observer, but the NCDMB representative on the project did make contributions at the meetings. In summary this meeting discussed the strategies for successfully delivering the project and also the expectations from the perspectives of: (1) the clients, (2) the regulators – NAPIMS and NCDMB and (3) the engineering design companies. For the clients,
the expectations were quality work, completion within schedule and budget. For the others there was an additional expectation of learning.

The setting was that of the customary project gathering with people sitting and talking among themselves while waiting for the start. After a brief introductory remark by the PM, everyone introduced themselves and stated their expectations from the project. The common theme of their expectations was that they hoped to gain more experience working amicably together. Joy, one of the engineers who participated in the empirical study went further to explain that it was not enough to hope to gain more experience, but to also resolve to do those things that will make this possible, like being open, cooperating and trustworthy. The PM further discussed elaborately on learning and exhibiting learning culture on the project.

| Reflective pause 4: |

| It could be that Joy’s previous encounter with the organisational learning notion during the empirical study had put her (and probably the other two participants) a step ahead of other project members with respect to learning on this project. |

| I further noted that these former participants were more knowledgeable about organisational learning and were in good shape for the intervention; they were aware of the kind of environment we wanted to create in the project team organisation and how they would contribute to achieving it. |

| This reflection informed me that it would serve our purpose to give the project team a sort of preparatory talk on aspects of the intervention and expectations from the exercise. I noted this down to discuss this with the PM. |

The PM also explained to the team the strategies for delivering the project which was basically what was in the coordinating procedure.

The PM explained the communication plan as explained in the procedure.

- Disciplines meetings (as agreed among themselves)
• Weekly project status meeting
• Weekly project meeting with clients and the main contractor
• Monthly project meeting

The expectations on learning were discussed with the team at some length by the PM and the NCDMB’s representative.

According to NCDMB directives, there were two types of learning mandated on projects in the nation’s oil and gas industry. The first was project training for new and young graduates attached to work with the team on the project, but with no design responsibilities. The second type was formal classroom-like training, especially in software and design for which trainers were brought from the outside.

The PM took time to explain that the first priority of the project was to deliver to the client a high quality project within budgeted cost and on schedule, the realisation of which was the responsibility of the whole project team; then followed by fulfilling the NCDMB-mandated trainings which was more of his own responsibility. The third achievement of the project was the additional advantage of group learning which must be maximised through deliberate actions by all project team members. He continued, this was a type of learning which was informal and which was engendered by the team members being open, transparent and cooperating in interrelations with one another. The PM explained that this third type would also enhance the NCDMB-mandated two types of learning earlier mentioned. The third type was the focus of the action research.

He took time to explain the importance of teamwork and to reinforce the need for participants to look out for one another. He reiterated that the objective is to complete the project successfully and also acquire knowledge, i.e. to learn, and it is up to everyone to do their part and to help one another. He basically elaborated on what we discussed during my first meeting with him. I added that all project members should contribute with their experience into the mission and work hand in hand in order to achieve values for themselves. To create openness and trust within the team, members were encouraged to include sensitive issues in their discussions.
Some engineers commented that the pressure of work and deliverables deadlines would not allow them to have time to explain things to others since everything was based on man-hours. However, Ade explained that even just being open and cooperating would go a long way in engendering learning by others.

**Reflective pause 5:**

*I thought to myself: some engineers were already finding reasons why sharing may not be easy. However, it was pleasing to also see that some others (especially, those who participated in the empirical study) were already buying into the attitudinal change drive when they suggested how it could be achieved.*

I also noted to myself that I should watch out for any changes in the team’s thinking during the next meeting. I did this in many instances to see what changes or developments occurred before the next gathering.

There was later some discussion about working conditions. The meeting also discussed other activities like ‘Thank God It’s Friday’ (TGIF) and Team Building outings.

**Meeting with the project manager before the second project team internal meeting**

I met with the PM to touch base two days before the second project team internal meeting and to discuss next lines of action. I discussed with him about intimating the project team on issues in inter-organisational learning and organisational learning in general (Reflection pause No. 4). I explained that it would be a brief discussion but one that would put the team in better shape for participating in the intervention. We agreed upon this and accordingly the next project team internal meeting was dedicated to discussing issues like trust, openness, asking questions, communication, cooperation and knowledge sharing.

The PM informed me that the team members were still mobilising with 85% of the required mobilisation for that point in time already achieved. Personnel mobilisation would normally continue throughout the project duration; not all members will mobilise at the
beginning. Usually, mobilisation in this kind of project builds up in a ramping manner peaking around the one-third point of the project schedule; it’s like a trapezoidal shape, but with the smaller parallel side at the top. This would have implications with respect to the culture that the team was building in that some team members would join near the middle and thus might not be familiar with the newly developed team culture. They therefore might be laggards in imbibing the culture of openness, transparency, knowledge sharing and cooperation, etc. being advocated for or already gaining ground. We deliberated on how to deal with this issue. Should we assume that those who mobilised late would on their own blend with the culture on ground or should we call their attention to it by, for example, including among the safety posters (Fig 5.1 below) on the design office walls some posters advocating knowledge sharing, etc. or should the project manager just talk to them about it? We decided to infuse among the safety posters learning posters that were sublime, but not pompous so that the clients would not think that training rather than delivering the project was being made the main objective. In addition the PM would talk to the newly mobilised and they would also blend on their own.

Reflective pause 6:

At this point in time I reflected on how better it would have been if the client could be better convinced that deliberate learning culture would not jeopardise project quality, budget or schedule. Part of his neutral stance would have been supportive.

*This actually turned out to be the case as I gathered from his speech toward the end of the exercise.
The second Project Team Internal Meeting

This project team internal meeting was held on the same day with, but after, the first overall project monthly meeting which was attended by many stakeholders including the client, the main contractor, NNPC-NAPIMS, NCDMB and some management staff from the three engineering design companies. The project monthly meeting, being the first, took some time. It was supposed to be finished with the lunch, but participants had to go back again after lunch for another one and a half hours session.

Thus, the project team internal meeting started a bit late and the team members were already a bit agitated. The PM welcomed everybody to the meeting. He informed the meeting that since the last two weeks many members had come to him to complain about colleagues not being open and helping and not being ready to share knowledge. (He had earlier mentioned this to me and we had agreed on the explanation to give to the team. At the time I noted that: his management was accessible, for team members to freely stroll into his office to talk about issues). He continued to explain that this was not strange at these early days in the project because members were just settling down and getting to grips with the project requirements and so had much on their tables to sort out, getting used to the project design documents such as the design brief, design basis, client’s design specifications and also some industry guides. He further explained that while this did not mean that some knowledge sharing could not happen, it should not be the preoccupation now and not even in future. He explained that this was because, as everyone knew, there were two other training programmes on the project mandated by NCDMB as earlier explained. The group learning, though intended, should happen more or less naturally. The meeting agreed that the aim was to successfully complete the project work and assignments while being open, transparent, cooperating to engender knowledge sharing and acquisition that would lead to group learning.

The PM initiated discussion on the learning environment by asking the team members what they saw as the gains from multi-firm joint project execution like this. Various members gave their opinions which can be grouped into three categories: (1) pulling local capacities together to be able to deliver the project since not one of them could single-
handedly handle all aspects of the project; (2) sharing the remuneration across a number of local companies and (3) increasing the experience of the different participating companies.

One of the engineers said:

“We know that the different companies have different areas of speciality, for example, some are good in general designs and don’t know much about things like HVAC or fatigue analysis, and vice versa; bringing companies together in one team will allow the team to be able to handle almost all aspects of the project. Furthermore, no single local company has the manpower to complete the required manhours within the stipulated duration.”

Another gain as suggested by another engineer was that engineering design companies would be able to add the FPSO project on to their CVs as part of their corporate experience.

I commented that the above mentioned gains were correct, but added that another important gain was the inter-organisational learning through engineers from various companies working together side by side. By working with others different perceptions will come about and will help members to see things and ideas in a new light resulting in deeper understanding. And this learning would be enhanced if there was a climate of trust, openness, transparency and sharing (Section 2.4; Wang, Su and Yang, 2011). Learning is contextual and as such requires real situation to experiment these ideas. If problems are real, then the theory behind them could even be improved by the way the problems are resolved (Section 2.1). Now we have the opportunity of having a real situation to act and learning in organisations is more a question about acting together. Bringing together three companies in a real project environment is bound to enable creative discussions and interactions that would lead to change on the part of individuals as well as the companies. Our overall aim is to challenge existing attitudes of the participants and to stimulate new thinking and behaviour with respect to collective learning.

The PM added that the question of learning together required all team members to work cooperatively by contributing their experience and knowledge. The next segments of the discussions dwelled on the concepts of trust, openness, collaboration and sharing. The
discussions, though brief, were lively with team members taking active part and positively, too.

The concepts were discussed simultaneously because they were inter-linked; trust enhances collaboration which leads to openess and transparency both of which engender sharing. Fear is also an important issue. The discussion showed that almost all the team members were of the same perception with regards to these concepts. They explained how they feared being replaced on the project if they carelessly exposed any shortcomings by seeking help from engineers from other companies, especially when they knew they might not even receive the help. One of them said:

“There are three engineering design companies on this project and we all know they are looking for opportunities to increase their allocated manhours on the job. I don’t want to be in a situation where if I asked for help from someone from another company it would be termed that I don’t know my work and I would be replaced by someone from another company resulting in manhours loss for my company”

Another person said: “How would I be sure that I would receive the same level of collaboration from colleagues because I know that some people only like receiving but don’t like giving?”

The PM gave an immediate guarantee that no one would be adversely affected for seeking help from colleagues. I added that, anyway, one had to take the risk; in order to develop trust, one needed to take a risk first (Section 2.3.4); however, from the statement of the project manager above this would be a calculated risk. I further added that when providing assistance members should not think of immediate reciprocal action. It should be noted that while everyone would have one thing or the other to give, actually, sharing involves dissimilarly endowed partners (Powell et al., 1996).

The PM further pointed out that differently from previous practices where each company had their own modules or aspects of the project which they worked upon, on this project engineers from different companies worked together on one module or an aspect of the project thereby needing to share knowledge to archive their joint goal.
Another engineer commented that:

“I believe it is a matter for the leadership. If the project manager would guarantee that people would not be negatively affected by it, then they would be open to seeking assistance from team members from other companies”.

Two thoughts occurred to me worth reflecting upon at this juncture.

**Reflective pause 7:**

_I noted that, though they were now one team, the level of trust among team members of different companies was low, but could be improved by the actions of the project manager. That is, positive leadership does enhance trust among workers. Apart from being necessary for OL in general, trust is very essential for inter-organisational learning. This is where the quality of the leader as a trust builder comes into play._

**Reflective pause 8:**

_It occurred to me that no discussion on leadership had taken place. I took note to have this done as soon as possible._

_In addition to allowing the team to know the type of leadership they had on the project and thereby developing faith in it, such discussion would also enlighten the PM more about his leadership duties._

What followed was a short but to-the-point discussion about building trust and improving communication through closer interaction among team members. It is necessary to willingly communicate over a range of issues in order to build trust; communication helps in building trust because it engenders continued interaction (Powell et al., 1996). There were activities in team building sessions specifically for fostering closer interaction. Members were enjoined to participate and take advantage of these. Other activities such as
members’ birthday marking and TGIF (Thank God It’s Friday) also foster closer interaction among members.

It was pointed out that to initiate collaboration, some trust was required (Webb, 1991) and that a certain minimum level of trust is essential for any strategic alliance to be formed and to function (Das & Teng, 1998). It is from here that trust will then gradually develop as the parties get to know one another better; through ongoing interaction members would learn about each other and develop trust.

**Meeting with the project manager before the third project team internal meeting**

I met again with the PM one week after the second project team internal meeting. This was in the third month of the project. The objective of this meeting was to continue the discussion on the strategies for grounding the interventions, that is, entrenching openness, trust, sharing attitudes, and generally good interrelationship among the project team. This was necessary because as pointed out earlier in Chapter 2, engineers first turn to colleagues (Cross et al., 2001; James-Gordon and Bal, 2003) for help and learn through conversation with colleagues and vicariously by copying them. They also share knowledge by solving together common problems. In addition to having an environment of openness, trust, etc. it is also necessary to have an environment where members feel safe and not afraid of contributing their own ideas in case those ideas are wrong. The strategy should include (1) how to make known to others what one knows and (2) how to enhance the absorption of the knowledge made available.

Looking at the organisation of the engineering design office, we could see that it had inherent learning characteristics. This project office was a big open rectangular space. Along one side of the rectangle were the offices of the project manager, project control officers, document control officers and quality assurance/quality control officers with transparent glass partitioning walls and doors which were always open. Along the opposite side were the offices of the clients, NNPC, and the main contractors also with transparent glass partitioning walls but with doors that were at times closed.

The design engineers were seated in the open area in groups not according to their companies of origin, but according to their engineering disciplines – process, mechanical,
piping, civil/structures, instrumentation, electrical, corrosion, etc. It was easy for one engineer to walk across to another to seek for clarification or assistance, or to his/her lead engineer, or for that matter, to the project manager. Thus the power difference was small and interrelation was enhanced. Engineers could easily see what colleagues were doing. In addition, the infrastructure – information technology system consisting of computers, servers for storage, printers, etc. - to assist the engineering design process was integrated into the office. Apart from enhancing the learner’s absorptive capacity, credibility and quick accessibility to knowledge, these also provide a system to store knowledge both of which increase engineer’s learning (Sections 2.3.1 and 2.3.4; Peansupap and Walker, 2009).

Regardless of all the above, the project team members should take steps to share knowledge themselves. To encourage this, we decided to inform the team that members who transfer knowledge and those who gain knowledge would be appreciated and given points at every project team internal meeting. A member “A” who gained knowledge from member “B” would describe it and how it happened; member “A” would be awarded one point and member “B” two points. At intervals or at the end of the project members would be appreciated according to the number of points they acquired. A system that reward staff for knowledge contribution encourages more learning (Section 2.4). I hoped that this incentive would increase the sender’s willingness to share and also the receiver’s willingness to seek.

I also discussed with the PM my Reflective pause No.8, about there not having been any discussion on leadership and we agreed that this would be done during the coming third project team internal meeting.

The third project team internal meeting

The meeting started with a short welcome address by the PM. The lead engineers gave brief reports on their disciplines and the project control engineers also gave reports on progress of work. A slight slip in schedule was noted, but this was not attributed to knowledge sharing among the engineers. With respect to knowledge sharing which was the objective of the intervention, most members acknowledged a better cooperating and transparent environment that encouraged learning from one another. They said this even
before the project manager talked about the incentives for learning which we earlier discussed.

One engineer said that she was able to have a fruitful discussion for about fifteen minutes with another engineer on parts of the structural design basis dealing with *wind loading directions*. She said this was encouraging because from past experience people were always complaining of no time.

Another engineer commented:

“I did not expect it to be that easy, just by sitting down with Segun (not real name) at his terminal and him taking me through a section of the stress analysis on the Caesar II software made everything much clearer to me”

One engineer informed the meeting that, unusual for him, but based on the stimulus from discussions, he summoned courage during one lunch time to ask a colleague from another company for a clarification on a problem he was having. He said the colleague gave him and option to try which he did and it worked. Most agreed that it was not only for colleagues to be disposed to providing assistance, others, too, must be willing to ask for help; nobody knows everything. I noted that the view by some participants that sharing would be difficult was changing and people were becoming less pessimistic.

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**Reflective pause 9:**

*I noted that the notion of “you are on your own” might partly be due to the fact that most people were not asking for help because they did not expect to receive any or were afraid to show that they did not know.*

*I, however, also noted that on this project people were getting over this and were asking for and providing assistance to colleagues. I felt that people should talk more on this issue and signalled to the PM to allow more testimonies, whether positive or negative.*

*This is part of reflection – being open to vulnerability, sharing one’s doubts and surfacing one’s position* (Raellin, 2001). See 5.4 below.
Two members did say, however, that they were disappointed by the attention given to them by those they asked for assistance. No one asked for the names of the people they sought help from. But Ade commented that:

“Before requesting for assistance, we should know that the other guy might actually at that point in time be dealing with a personal design issue and thus have minimum time, so we should be ready to put in more effort on our side by being ready to receive answers such as “try this way or that way” and go and try the ways suggested.”

The NCDMB representative reminded the team that members could learn from each other through interaction not only in the design office, but also during lunch breaks and team building sessions.

Then the PM informed the team about the incentives for knowledge sharing as we earlier discussed; that is; members who transfer knowledge and those who gain knowledge would be appreciated and given points at every project team internal meeting. This was welcome by the team members.

To conclude the meeting a brief discussion on leadership ensued. This discussion was not about presenting a lot of theories on different leadership aspects, but about jointly and together with the team arriving at leadership requirements for learning on the joint project. The discussion was honest and open; members came up with similar understandings of what was required. Leaders should be accessible, strong, active, collaborating and be committed to learning if team members were going to learn optimally. Leadership commitments mean supporting learning and providing resources needed and also celebrating learning success (Section 2.4.1). Leadership also means the ability of the manager to cope when trust is lacking and to build trust where it is possible Section 2.3.4) like the PM has been doing - building trust from the initial situation of no trust to this moment where there was some trust. That the PM’s leadership was not doing badly in all these was something the whole project team could agree upon. It was also agreed that some other team members were also in leadership positions, for example, the discipline lead engineers. Some of these persons came to realise some deficiency in their knowledge and
practice of leadership from this discussion. Such team members were enthusiastic to learn from this.

**The fourth project team internal meeting**

At the fourth project team internal meeting, it was pleasing not only to me, but to the entire team, too, to listen to many learning opportunities that were successfully utilised. But there were also stories of challenges. One engineer said that while he appreciated and believed in helping and sharing knowledge, his schedule was so tight and work load so heavy that he just couldn’t have time for any other person. “I have so much to do that I only manage to go on break. I guess people understand my situation because nobody asks me anything. I would like to share too, but I just don’t have the time, for now”.

Another member still complained that while he understood the concerns with the knowledge sender’s time for sharing, he believed that a sender did not accord him time at all to explain an issue to him. The concerned sender, though not requested to do so, explained that the said clarification had to do with *fatigue analysis* which required certain prior knowledge on the part of the receiver and which the latter lacked. So the exercise was difficult for both of them. This generated discussions on learning equilibrium and the learn-ability of certain knowledge. Learning equilibrium has to do with both the sender and receiver of knowledge appreciating the level and stage of learning at which the receiver is so as not to overwhelm him/her. The kind of knowledge shared also influences the knowledge sharing process. Characteristics of knowledge such as demonstrability, tacitness, explicitness, or codifiability impact on the knowledge sharing behaviour (Sergeeva and Andreeva, 2015).

Also, the depth, scope, and bases of different knowledge types play important roles in their sharing process in terms of ease of transferring knowledge and absorbing them. For example, fatigue analysis mentioned above has a deep mathematical base and thus requires some formal classroom learning. It was noted that such learning might be included in the NCDMB-mandated learning earlier described above. The sharing of some certain knowledge depend more on individual skills to share and could even require a special trainers to make it happen as in some NCDMB-mandated trainings.
The team members played active role in these discussions and it was obvious that few others also had this problem. One engineer, for example said “I think that it is satisfying to listen to other people recounting similar problems like yours; you know you are not the only one with such problem”

We concluded that the attributes of the knowledge being shared might influence the sharing process and thus must be considered in arranging for the sharing.

<table>
<thead>
<tr>
<th>Reflective pause 10:</th>
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<tbody>
<tr>
<td>I noted that distinguishing among knowledge attributes to assess their transferability would enhance learning on projects.</td>
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<tr>
<td>I also noted that this presupposes that NCDMB needs to look more closely at transferability even in their mandated learning on project before proposing them.</td>
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The fifth project team internal meeting

At the fifth meeting, members spoke strongly about their experiences so far. They acknowledged that while there were challenges, the gains were much more. There were improved comradeship, collaboration, communication, trust and learning.

One engineer pointed out that “I see more people engaging in discussions on this project than on any other project I have been”. Another engineer said “I have the feeling that ‘we are in it together’; I find interacting with others easier”. It occurred to me that adopting and using another company’s method (approved by the project, though) did not give rise to the usual concerns of using new methods that one is not familiar with, and this was due to the fact that the colleague from whom the method was being adopted from and who had used it many times was still present with the new user on the project. So while the method might be explorative for the adopter, it really wasn’t for the project as a whole.
Reflective pause 11:

I noted that some learning on inter-organisational projects could be explorative for some engineers, but actually not explorative for the project thereby raising no issue for the client.

One engineer explained that she had developed appreciable improvements in her interaction with colleagues. She now had more confidence to ask them questions and she was more receptive to their questions, too. Participants actually expressed optimism that once relations developed, discussions would be better, and there would be more rewarding interaction.

The PM commented that while there were some schedule slippages, they were not due to design work, but to extraneous things like delays in obtaining vendors’ information. He said that submission of design deliverable was actually enhanced.

A team member pointed out that it was not only new design skills he was acquiring, but also a learning environment attitude which he would take back to his company.

One engineer called attention to the challenge that the environment in their home companies was not exactly like on this project. Discussions around this pointed out that it was for the project team members, especially the lead engineers present, to endeavour to inculcate this culture in their respective companies; this was one of the main objectives of the intervention.

I noticed that participants were now reporting more or less same thing indicating that my project had yielded sufficient learning. Accordingly I decided that the next meeting will be for a round-up and evaluation of the intervention.
5.4 Evaluating action

The last AR cycle of evaluating action was for reflecting on the outcomes and making sense of the intervention. This cycle was thus to infer from the outcomes (the participants’ comments and actions and observed changes) how organisational learning was enhanced through the intervention. It was therefore also for judging if and how the desired outcomes were achieved, and for examining any outcome that might happen. Further than this, it was where the lessons learned from the whole process were discussed, analysed and evaluated by the project team and recommendations agreed upon. The cycle in short was about how the participants and I made sense of experiences. Sensemaking is the process by which people in and through interactions generate plausible versions as to what they are confronting and how best to proceed (Thorpe and Holt, 2010, p. 197). It is a continuous process of acquisition, reflection, and action. In order to integrate experiences into their understanding of the world around them, people continually and routinely go through sensemaking. Reflection provides the opportunity for sensemaking. Reflection is “the practice of periodically stepping back to ponder the meaning to self and to others in one’s immediate environment about what is happening or what has recently transpired” (Coughlan and Brannick, 2007, p. 301). Though this action research cycle is retrospective, it should be noted that sensemaking and reflection are not retrospective processes only, they could also be collaborative and concurrent with the whole exercise (Coughlan and Brannick, 2007).

Reflection-in-action is defined by Schon (1983, 1987, 1991) as the ability to mirror a reflective process in the action itself, that is, a way of assessing action in the process of acting (Greenwood and Levin, 2007, p. 122). It takes place during actions when one asks about what one is doing and what is going on around one (Coghlan and Brannick, 2010, p. 19). It results in immediate outcome of adjustment of ongoing action. Reflection-in-action took place throughout the process of the whole of this study.
Reflection-on-action is the reflective practice being engaged in this cycle. It involves working through experiences gained from actions after the fact (Greenwood and Levin, 2007, p. 122). However, Raelin (2000) goes further to argue that reflection must be brought into the open so that it goes beyond privately held taken for granted assumptions and helps executives to see how their knowledge is constructed; it is the key to learning as it enables executives to develop the ability to uncover and make explicit to themselves what they have planned, discovered, and achieved in practice.

Sensemaking is also the process by which people give meaning to experience. Meaning-making is helping a group to make sense of what they are doing when they work together (Raelin, 2003 p.191). Sensemaking and meaning-making constitute a continuum of working together of a group. They both involve both the leader and the followers jointly deciphering happenings, whether retrospectively – sensemaking or forward-looking – meaning-making. Though sensemaking is performed jointly by people to produce required knowledge for action, it is largely influenced by those involved in it. It is, however, a process that is highly collaborative, effective for organizational growth and planning in both the short and long term, and highly dependent on interpretation (Weick, Sutcliffe, & Obstfeld, 2005).

The sixth project team internal meeting

The sixth project team internal meeting was held near the end of the third quarter of year 2015 and was dedicated to reflection, sensemaking and meaning-making. I adopted McTaggart’s (1997) advice that while the report writing on the action research is my responsibility, the confirmation should always be collective (McTaggart, 1997, p.11). The sixth meeting provided the vehicle for us (both the participants and myself) to do this and arrive at ways forward with respect to organizational learning in the engineering design companies by reflecting on and giving meaning to our experiences, especially what we have learned not only on learning in organisations, but also on the processes of action research. At the fifth meeting I had informed the team about what we would be doing at this meeting. At the end of action research interventions, their effects on participants are often investigated by asking the questions about what the participants have learned with respect to the subject of the intervention and action research; if any and which of their previous views, values or understanding have changed; and what could have been done better or
differently. I informed the participants to prepare to answer these questions. I explained to them that the essence of this meeting was to discuss all our feelings by looking back at our various experiences during the exercise and giving meaning to them. So there would be no holding back on how we felt, what we have learnt and the changes in our outlook and values that have occurred.

The sixth project internal meeting and the last I would have with them started as usual with welcome address from the project manager. After this I gave a brief introduction to the business of the day during which I appreciated their performance. I also appreciated the project manager whose cooperation in enacting the befitting leadership style made us achieve more or less the intended outcome. I then announced the team members who came first, second and third in the knowledge acquisition contest. I congratulated them and the team clapped for them.

I restated the queries to be addressed: (1) “What have we learned with respect to organizational learning and the process of action research?” (2) “Which of our previous views, values or understanding has changed?” and (3) “What could we have done better?”

The PM opened the floor. He said one important thing he gained was the knowledge of action research in which he was participating for the first time and what he liked most was the collaborative and democratic nature of the process: “Though it was initially not easy because people were sort of shy, but they soon took cue from the few proactive members and started opening up, asking questions and collaborating”. A team member commented that people were initially afraid of being labeled ignorant, and that we should remember that when they were assured by the PM that there was no such thing they relaxed.

The PM also admired the way learning and knowledge sharing happened among the team members which made him change a previous view. He said:

“I used to think that people learn their discipline work like piping, structures or instrumentation on projects, but what we have achieved on this project shows that people can also learn how to learn on projects; and this knowledge will be taken back to members’ respective organisations for adoption”.

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He further mentioned that though the team members received briefing along the line during the exercise, he had initial briefing from me that was more detail than what the team members had and that he was also aware that three other members also had more prior ideas. He believed that that was why he and the three members were more forthcoming than the others. He suggested that in future, arrangement should be made by NCDMB with other stakeholders to have a two-day pre-project briefing on this type of learning. Sequel to this various members suggested different ways of briefing and/or preparing the team members. However, most agreed that the two-day initial briefing and the continuous briefings during the project team internal meetings would do.

After this the team members were asked to make their own contributions. They were reminded that there was no holding back and that they could bring up all issues whether with respect to themselves, the PM, their organisations or even me. It was quite pleasing to me to see how much vigour they put into this and the interest it stirred in them.

5.4.1 What team members have learned with respect to organizational learning and the action research process

Developing organisational learning: The participants understand better the prerequisites for organisational learning. “The ability to grow organisational learning is rooted more in the organisation’s nature and character such as members’ interrelations, openness, leadership, trust, etc., rather than in formal trainings programmes and the like. So from our experience here, it behoves on us to adjust accordingly.” (Project Manager)

Discipline knowledge: Team members gave instances of knowledge they have acquired which would not only improve the quality of their work, but also optimise their design efforts. “As a designer working with Femi (not real name), I gained from him specific knowledge in piping layout principles which will help me in my journey to becoming a piping design engineer; he explained to me why I have to draw a layout in a certain way and not another way.” (Piping Engineer)

Meeting the schedule: “I realised that being open and sharing helped our module group to get our deliverables submitted on time. We decided in our group to practise as much as possible what the PM preached with regards to openness, sharing, collaborating and so on.
This helps the different disciplines in the group to understand each other’s work better thereby reducing the period of inter-discipline check and other subsequent reviews.” (Process Engineer)

Knowledge transfer issues: “I learnt that knowledge transfer is not a one dimensional issue of just transferring knowledge from one person to another, but one with multiple dimensions of demonstrability, tacitness, explicitness, or codifiability of the knowledge and the level of the transferee’s own knowledge.” (Electrical Engineer)

Knowledge about action research: “I am conversant with capacity building through formal training, on-the-job training, lessons-learnt sessions, but I did not know about action learning or research prior to this intervention. I can see that it is a powerful method for learning capability of organisations.” (Project Manager)

5.4.2 Changed Views, Values or Understanding as a Result of the Intervention

Changes occur when people dispense with their old normative orientation and gain commitment to new ones (Palmer, Dunford and Akin, 2009, p. 29) and these changes “involve not just in their knowledge and information, but in their attitude and values. Changes involving shifts in perspectives, assumptions and values are termed as double-loop learning (Chapter 2). They are important changes in the participants which we should explore (Shotter, 2010).

Assumption about maximising manhours for company: In multi-firm joint project like this in the industry, the assumption is that what is uppermost in participants’ mind is securing as many manhours as possible for their own companies. A lead engineer explained that he doesn’t ascribe to this anymore. “When initially mobilising on the job, my priority was not to optimize learning even though I knew some learning would take place; my priority was to maximize manhours for my company. But this view has changed because I have seen that both can be achieved.” (Lead Mechanical Engineer)

Assumption about sharing knowledge: The projects in the industry are generally schedule-driven and tasking, so engineers are always under pressure. Accordingly the assumption is that people will have no time for others and thus concentrate on their work alone. Some
participants jettisoned this assumption. One engineer said: “My stand used to be that companies are paid to do a good job and deliver a project on schedule and within budget, therefore I endeavour to do my work properly and as required, others, too, should find ways of doing theirs without disturbing others. But this view has changed. Sharing knowledge may be as simple a thing as telling them to try one thing or the other, or just giving to them a useful spreadsheet.” (Structural Engineer)

Assumption about Inter-company collaboration: “I always believed that it would be difficult to get help from others from other companies because of the competition among the companies. However, I have learned two things from this intervention. First, that a group consisting of engineers from different companies is to some extent forced to collaborate among themselves in order to achieve their deliverables. Second, with the right leadership like that of our PM, and a favourable environment as we try to create here, the collaboration is increased thereby augmenting knowledge sharing and learning.” (Lead Engineer)

5.4.3 What We Could Have Done Better or Differently

Majority of the participants believed that a preparatory seminar of one or two days for participants as mentioned above by the PM should have been held. During such seminar more information about the intervention would have been given to the team members and they would have been more prepared. I welcomed this suggestion, though where to charge the manhours during these two days will have to be worked out; the project owner may not accept that they be charged to the project.

The participants after deliberations generally agreed that the meetings for the intervention should have been separated from those of the project proper. The believed that separating the meetings would give us more time to discuss the intervention issues. Part of my debates was that we did not want it to look as if we were running a parallel project and that we wanted to take as little of the project time as possible.

There were debates on incentives. Participants remarked that the simple congratulatory message given to the first three team members in the knowledge acquisition contest was
not encouraging enough. It was agreed after debates that book prizes would have been better.

I would say that it was quite pleasing for me to see the amount of interest and eagerness shown by the team members during the whole discussion. This demonstrated to me that that the intervention has been well received by them and it achieved its aim.

5.5 Chapter Summary

The pre-step to the action research cycles shows the necessity and desirability of the project in the enactment of the Nigerian Content Law that made it imperative. The first action research step through dialogic activities yielded as the issue - increasing the learning ability of the companies. In the second action research step, the FPSO project was identified as the vehicle for the intervention. The third cycle detailed the execution of the intervention. The philosophy behind the intervention was to get the project team to work in an environment of trust, openness, collaboration and sharing, and where the management is accessible and encouraging. This was accomplished by attending project team internal meetings during which the team members were engaged on issues concerning knowledge sharing and collective learning. In every project internal meeting there was a mixture of reporting, group-talk and discussions.

At the beginning, team members were not all that forthcoming; this was not surprising. However, by the second meeting they started relaxing and moving from a state of initial pessimism into one of optimism in knowledge sharing and organisational learning. The fourth action learning step evaluated the outcomes of the exercise through reflection and sensemaking.

The implications of the findings from the intervention for theory, practice and industry are discussed in the next chapter – Chapter 6.
CHAPTER 6 DISCUSSION AND IMPLICATIONS FROM THE ACTION RESEARCH

6.1 Introduction

As exemplified by Reason and Marshall’s (1987) popular notion of three research audiences “all good research is for me, for us and for them; it speaks to three audiences ... ...” (Coghlan and Brannick, 2010, p. 6), the implications for this action research intervention include for the three audiences of first, second and third persons. The intervention’s first-person research implication is expressed in assisting me to achieve one of the objectives of this work – to gain deeper theoretical and professional understanding of organisational learning and transform me into a more knowledgeable scholar-practitioner through self-learning in action, learning to reflect and learning to deeply examine my assumptions and practices. This is discussed in more detail in the next chapter. The second-person implication was precipitated from inquiring into and working with the project team through our face-to-face dialogues, discussions during the project team internal meetings and actions thereafter. Project team members’ reactions and feedbacks about changes in their assumptions and views on learning on projects and learning in organisations and their realisation of this not being difficult to achieve when the right environment are provided were bases for generating the second-person implications. The third-person implication is in taking those of the second-person further to impersonal audiences like the industry at large and the AR community through dissemination and extension of the learning for possible implementation. The second and third-person implications are presented inside implications for practice and theory below in this chapter.

The discuss above is in consonance with the stand that action research has to do with developing practical knowing through a democratic participation with others; it aims to bring together action and reflection, theory and practice in the pursuit of practical solution to pressing concerns to people (Reason & Bradbury, 2001). The popular Kurt Lewin’s (1951) observation goes: ‘there is nothing so practical as a good theory’. With AR, not only does theory inform practice, practice also informs theory, i.e. theory should be generated from practice (Brydon-Miller, Greenwood and Maguire, 2003).
Change is a necessary result of action research. Change involves people giving up their old knowledge and information, attitude and values and becoming committed to new ones (Palmer, Dunford and Akin, 2009, p. 25). These are also the outcome of AR. AR leads to: (1) Action, and taking action differently from previous, (2) Knowledge and learning, i.e. acquisition of new knowledge and (3) Behavioral change. We indeed are talking about (1) learning in action, (2) change in perspective and (3) change in the way of doing things, i.e. change in process or process innovation. It is with respect to these that I will discuss the action research implications for theory and for practice and the industry.

6.2 Implications for Practice and Industry

6.2.1 Learning in Action

In addition to saying that trust, openness and accessible leadership enhance organizational learning, it is also important to talk about how to effectively share knowledge in specific situations, for example, when deliverable deadlines put everybody under pressure. However, this has not been dealt with in the literature. Second-person learning-in-action was shown to have occurred when participant’s contributions at one of the internal meetings alluded to the fact that they became aware that there was an element of timing in collaboration, and this a fact that team members should realize. They also inform the meeting of their realizing that under such situation, too, collaboration and sharing might just be limited to work (e.g. design) being prepared transparently, meaning that collaboration and sharing may take an unexpected form. The participants became more knowledgeable about organisational learning and the AR methodology.

6.2.2 Change in Perspectives

The project team members’ initial perspective with respect to projects was one where the engineer’s main objective was to try as much as possible to mop up all the manhours allocated to his/her company without any much thinking about learning. This perspective changed. The new view now is that thinking about whatever learning one can get is also as important; and efforts should be made to make this possible.
From this backdrop, the industry stakeholders should have a positive attitude toward the possibility of collective learning on projects. A way to encourage this is by requesting all contractors and consultants to describe in their project execution plan how collective learning will be engendered during the project. This is in the purview of the NCDMB who is the industry regulator.

6.2.3 Process Innovation

The intervention brought new ways of doing things in the design office. The design process change by one engineer through deliberately making his design more transparent and traceable is noted here. This makes it easier for others to learn from his work. This actually support the campaign in design offices that transparent designs allow the checker to be able to check one’s work more quickly thereby improving on the turnaround time of the design document. I was not surprised at his development for it was an outcome of the participants’ behavioural change that led to change in the process of interaction among themselves which now is based more on mutual trust and collaboration.

Another potential process change is the inclusion of pre-project talk or seminar on learning before or immediately after the kick-off meeting or projects.

6.3 Implications for Theory

6.3.1 Learning in Action

The project team members learned about, and experienced in practice, participatory action research. They witnessed how their contributions and feedbacks influenced what was discussed at the internal meetings and the direction of the intervention. This supports the theory that AR is democratic and collaborative (Section 3.40). They also gained more knowledge about organisational learning; majority of them had earlier been erroneously equating this to other types of learning on projects like project attachment or software training.

Furthermore, while the literature describes distinctly exploitative and explorative learning in inter-organisational joint ventures, it does not consider some learning being both and thereby reducing the concern that is normally associated with explorative learning. The
point here is that a knowledge newly acquired on the project by company “A” from company “B”, though is explorative to the A, is to the project not explorative but exploitative since the company “B” is present on the project (Section 5.5). This contributes to inter-organisational learning theory on exploitation and exploration learning (Mariotti, 2003).

6.3.2 Change in Perspectives

Action research theories, rejecting the notion of an objective, value-free approach to knowledge generation in favour of an explicitly political, socially engaged, and democratic practice (e.g. Brydon-Miller et al., 2003) affirm that in participatory intervention projects as this one, not only does learning take place, but changes in participants’ attitudes, values and perspectives also occur. One of the outcomes of this intervention was change in the team members’ perspectives on organisational learning and on the notions of trust, openness, interrelation and sharing on joint multi-firm projects. By implementing in their day-to-day activities the advices and agreements jointly reached during the internal meetings on the said notions, they found that their previous perspective that viewed these notions as being difficult to establish on projects was erroneous (Section 5.4). In fact, it doesn’t require much to implement them, especially with a supporting and accessible management. Their perspective of “you are on your own” changed to “we are in it together” (Section 5.5). Also, their perspective that one cannot learn much on joint project changed. This was due to their newly acquired perspective on organisational learning – that by engineers just being transparent, open and trusting, organisational learning can flow by itself; it doesn’t necessarily have to be through some formal arrangement. These new perspectives were arrived at democratically and as a result of their giving meaning to their own experiences during the intervention. This goes to support the stand that reality in action research is socially constructed and situational.

This change in perspective is also required of management in the engineering design companies which used to see learning in organisation only from the point of view of formal learning or on-the-job training, but not in the form of invisible transfer of knowledge enhanced by environment conducive to learning.
6.3.3 Process Innovation

The notion of how we could have done things better has some latent tension with respect to AR. The messiness of AR is a distinguishing factor between it and other social science research. "Messes are complex, multi-dimensional, intractable, dynamic problems that can only be partially addressed and partially resolved (Brydon-Miller et al., 2003). Messes are demonstrated in the recognition of the limitations and weaknesses of single discipline knowledge and in collaboration with others. If we action researchers try not to avoid messes and in fact seem to tolerate them as posited by Brydon-Miller et al. (2003), one might wonder why think about what could have been done better. This thinking is in tension with the fact that there can always be improvement in the processes that are central to AR, like participation, democracy, inclusiveness and dealing with power relation. AR goes further than “doing good” to doing things well (Brydon-Miller et al., 2003). Therefore any means of improving the processes of the intervention and building on the existing theory would be desirable. In this intervention exercise, one such means having implications for AR theory is with respect to facilitators for temporary organisation learning interventions.

For effective inter-organisational learning in an ‘imaginary organisation’ or ‘temporary organisation’ of which the multi-firm joint project is a type, the literature emphasises as facilitators: the ability to develop and sustain valuable resources; absorptive capacity; combinative capability; trust and collaboration (Chapter 2). All these happen during the intervention itself. This theory is built upon here by the recognition of another facilitator of such intervention - a preparatory briefing before the intervention to acquaint participants with what to expect and what is expected of them (Section 5.5, Reflection pause 4). This allows the participants to get in tune with the intervention more quickly. This is a contribution to knowledge on learning through imaginary or temporary organisations (Mariotti, 2003; Holmqvist, 1999).

6.4 Chapter Summary

This chapter discusses the implications for the second and third audiences of the research. These discussions are from the perspectives of (1) learning in action, (2) change in
perspectives and (3) process innovation, all the three with regards to (1) implication for theory and (2) implication for practice.

It is seen that cognitive and behavioural changes have happened. For example, the participants changed from the perspective of “you are on your own” to that of “we are in it together”; they developed new perspectives and ways of executing design work which improved the process of organisational learning. They gained the appreciation of the fact that on projects a particular learning can be both explorative and exploitative. The dissemination of these second-person implications to the industry and community at large constitutes the third-person implication.

The first-person implication relates to me the researcher; it is not discussed in this chapter, but it forms the major part of the discussions in the next chapter (Chapter 7).
7.1 Introduction

This chapter describes my personal reflections, my development as a scholar-practitioner especially as an action researcher and my self-improvement in general. It includes also the research first-person implications. It is my reflection on my own learning as an action researcher (Coghlan and Brannick, 2010, p. 11). In this chapter I endeavour to connect my learning pre- and post-scholar-practitioner development.

7.2 My Perception of the Content of the Issue

The concern here was my understanding of the notion of organizational learning with regard to that of learning organization. It was essential that the subject matter that I presented as the content of the issue actually depicted organizational learning. There is some lack of clarity about the meanings of these two notions and the interrelation between them; and this affects not just me, but many scholars, too. While some believe that the two concepts can be used interchangeably (e.g. Moilanen 2005; Song, Joo et al. 2009), others see the two concepts as being different (e.g. Wilson and Beard, 2014; Yeo, 2005). I have been able to distinguished that organizational learning is a concept describing the types of learning activities that take place in an organization (Wilson and Beard, 2014), while learning organisation is a particular type of organization where learning consciously takes place (Yeo, 2005; Senge, 1993). Because both concepts aim to explain how organisations acquire, share, store and utilize knowledge to improve performance and become more competitive, their characteristics are very similar. Therefore, in constructing the content of the issue in this study, the characteristics portrayed had to be about organizational learning and not a about organisations where learning happen.

7.3 My Increased Insight into Action Research

Prior to this research I was not knowledgeable about AR. My knowledge of research was that of traditional research; as expressed by Coghlan and Brannick (2010, p. 5) “doing research on third persons and a report for other third persons”. I gained a more complete vision of research as presented by AR, in the sense that, I encountered also the first and
second person perspectives. I made distinction among first-person, second-person and third-person research and practice. In the first person research, I delved into areas which were unusual in my previous studies – I inquired into my own assumptions, intentions and beliefs. This enabled me to learn to reflect and monitor my own learning and development. The second person research gave me the opportunity to learn how to inquire into other peoples’ world working with them collaboratively and democratically through dialogue and joint action on issues of mutual concern. These really are valuable learning for me.

Action is an integral part of AR. The concept of an intervention involving me in an active role collaborating with other organisational participants was novel and enlightening to me. I witnessed how such collaboration brought about changes in the participants; this was active or mode 2 learning in practice. I also experienced how theory informed and was informed by action in the process of building theory. I learned the skills of being patient, persistent and supportive which helped me as the intervener to create the space in which the sort of action science inquiries leading to changes in group processes could be processed. I also developed such AR skills as reflexivity.

7.4 Dealing with Challenges

The interaction of individuals and groups in the intervention needed to be managed. The intervention had four levels of analysis: individual, group, intergroup and the organisation. There were two types of groups; the first is based on the project work and the second on individual home companies. Though the latter was not formal, it was all the same present and should be acknowledged. The organisation was the project team. As pointed out by Coghlan and Brannick, 2010, p. 81), dysfunction at any level can lead to dysfunction at any of the others.

During the intervention, when the statements about some members not contributing to knowledge sharing, suspicion was that it was directed at people from certain companies. Truly speaking, some members could not give much because their companies were less knowledgeable than the others while some because they came from companies more ingrained in a culture lacking trust and openness. These participants started aligning more with their company-based groups rather than the project-based groups. Less cooperation
ensued in the latter. Since the project-based groups are where most knowledge was being shared there appeared a dysfunction which of course would affect the other levels, as explained above. This was a challenge and was successfully managed using the discussions around team interactions at the project team internal meetings (Section 5.5).

7.5 **Rigour and Relevance**

Rigour and relevance have been understood to have an either/or relationship. This perception is misleading as producing a research that is both rigorous and relevant is desirable and practicable (Davison, Martinson and Kock, 2004). Argyris et al. (1985 in Greenwood and Levin, 2007, p.224) referred to the so-called conflict between rigour and relevance as false and based on Lewin’s view that the best way to understand something is to try to change it, they argue that the road to rigour lies in the attempt to apply social theory to social action. For AR, rigour should mean “the correct use of methods and analyses appropriate to the task at hand (Davison, Martinson and Kock, 2004). Thus the question: what determines what is correct and appropriate? Sets of principles that address this have been proposed, for example, the five-point principle of Davison, Martinson and Kock, (2004) and Lau’s (1999) principle of foundation (see Section 7.5.4 below). I explain in Section 7.5.4 below how I have been guided by these principles in ensuring rigour in this study.

Relevance is an attitude of research that surfaces findings relevant to practice (Zmud, 1996). It is with regards to various actors, such as the clients, the participants, the academic community and the wider community. The relevance of this research to the engineering design companies lies in their desire to improve learning in their organisations and understand a better way of doing this. The individual participants also seek to acquire more knowledge as this provides them a sense of better job security in the industry. For the industry, better organisational learning will support the drive for quality and cost-effective projects. For the regulating bodies like the NCDMB this study is relevant to the drive for increased local content in the industry.
7.6 Chapter Summary

This chapter presented my reflection on my journey to becoming a doctoral-practitioner and on my own learning about and also on the subject of organisational learning. My development and learning are expressed in the deepened insight I have acquired on organisational learning and improved knowledge of action research projects, thereby fulfilling my first-person research objective.

In the next chapter (Chapter 8) I present the overall conclusion to the study.
CHAPTER 8  IMPLICATIONS, RECOMMENDATIONS AND CONCLUSIONS

8.1  Introduction

The overall objective of this research was how to increase OL in the community of the sector of the engineering design companies of the Nigerian oil and gas industry. The contribution of the local engineering design companies remained little. A sound strategy for increasing OL did not exist. Accordingly, it became necessary to fashion out a strategy that will contribute towards rectifying this situation.

The purpose of the qualitative research was to explore and understand in detail, the OL experience of engineers working in local engineering design companies of the Nigerian oil and gas industry and identify strategies that may increase their OL and subsequently improve their contributions in the industry. The results of the study provided first-hand data about learning practices in engineering design sector of the Nigerian oil and gas industry. In addition the results contribute to the body of knowledge on OL applicable to engineering design and related sectors.

The empirical study (Chapter 4) investigated the issues with OL in the sector using a phenomenological study which was based on the social constructionism philosophy (Chapter 3). The focus of the study was on the lived OL experience of the participants. The study diagnosed problems of leadership, organizational culture, the understanding of the meaning of OL and lack of inter-organisational linkage in the sector. It was wrongly believed that OL was just about sending people on training courses and doing lesson-learned-sessions after projects. The leadership structures in the sector were pyramidal and bureaucratic. The organizational culture did not stimulate communication, trust, openness, collaboration and sharing.

The second part of the project was the AR intervention, also underpinned by the philosophical tradition of social constructionism. The intervention was participatory together with independent collaborating participants and with whom meaning making was done. This was compatible with the social constructionism tradition stand that knowledge is the product of human creation and that reality is socially constructed and given meaning by people. In this intervention I drew upon Coughlan and Brannick (2010) focusing on iterative
action research cycles of constructing, planning, acting and evaluating. AR advocates replacement of the current unsatisfactory conditions and situations of social organisation (Coghlan and Brannick, 2010, p.6; Davison, Martinson and Kock, 2004). Scholars have emphasized the indivisibility of action and change; the intervention is aimed at producing change. This was at the back of my mind right from the start during constructing and planning in order to ensure that the intervention was appropriate and designed not only to address the diagnosed problems and its specified causes, but also to take place in the natural environment. Changes at both individual and group levels were seen to happen as reported in Chapter 5. Changes at the organisational level are expected to happen when the participants return back to their companies.

I discuss next below the implications of the findings of the study.

8.2 Implications

The analysis of the data, the clarified results, and the emergent themes discussed in the findings provided several literature supported implications for this research. The implications are presented below at the research question level.

Research Question 1. How do engineers describe their experience of the type of leadership that obtains in their company? The analysis of data resulting from the responses of the participants to Research Question 1 implied that leadership had a significant impact on OL. This is consistent with the literature (e.g., Magnier-Watanabe and Benton, 2011; García-Morales, Jiménez-Barrionuevo et al. 2011; Crawford et al., 2009). The analysis identified as very important the organizational structure employed by the leadership, in this case the classic hierarchical structure at four out of the five companies. This structure was pyramidal and bureaucratic. Communication, access and interaction with the leadership were described to be limited contributing to the lack of trust in the leadership by the workforce. The implications include discouragement of responses from the workforce to management; impediment to rapid communication and increased probability of misunderstanding information from the leadership. It contradicts Andert et al.’s (2011) suggestions that the close proximity of leadership to the first line performers promoted OL. Also described was autocratic paternalistic leadership where employees were excluded
from decision making. The implication is that this negatively affects engineers’ creativity and sense of responsibility and negates numerous advocacy in the literature for the inclusion of workers in decision making (e.g., Wong and Cheung, 2008).

The flat-lined structure described by the two participants from the fifth company - Zed Engineering, substantiating the literature (Anantatmula, 2010; Crawford et al., 2009), reportedly created an informal climate, and therefore promoted open communication and knowledge sharing among the employees in a conducive learning environment. The participants described communication as direct, rapid, and void of false embellishment or understatement of information. This engendered OL in the company.

**Research Question 2. How do engineers describe their experience of the type of organisational culture that obtains in their company?** The participants attributed the dismal OL in their companies partly to the culture in their companies which they described as a culture that stifled openness, communication, cooperation, members’ participation, and trust thereby hindering knowledge sharing, creativeness and innovation, and OL. This aligns with what was found in the literature (Wang, Su and Yang, 2011). This culture with large power distance made it difficult for the shared vision of the leaders to be engrained in the daily activities of the workers resulting in employees’ reduced commitment. The implication was consistent with the literature that leaders who successfully communicate a shared vision gain a more committed workforce (e.g., Magnier-Watanabe and Benton, 2013).

At the first four companies engineers felt discouraged from engaging each other. The lack of mutual trust made knowledge sharing difficult and practically eliminated the climate of openness that often would result in interaction and sharing. Engineers needed to think about it first in order to decide whether or not and with whom to share knowledge. The implication is contrary to Bandura’s suggestion that an inherent sense of pride, satisfaction and accomplishment often accompany knowledge sharing. The participants from the fifth company (Zed Engineering) acknowledged the importance of innovation and described open discussions and knowledge sharing sessions.
Research Question 3. How do engineers describe their experience of learning and OL in their companies? One of the implications from the analysis of data propounded by the responses of the participants was the fact that the understanding of the meaning of OL was deficient; this being the case, its implementation was also faulty. OL was not seen as being engrained in the culture and structure of the companies, but majorly as sending workers on formal training courses. The implication is that while individual learning might happen, collective learning would be hampered.

The described climate of lack of trust, openness and collaboration impeded knowledge sharing. The implication coincides and fits the findings of scholars (e.g., Lloria and Moreno-Luzon, 2014)

The implication that a constrained environment lacking mutual trust between leadership and the workforce suppressed OL was demonstrated by the Alpha Engineering executive director who said that errors and mistakes would be investigated for wilfulness or carelessness. Such stand as this discourages workers from generative learning and innovation (Mariotti, 2002).

Implication from the responses of the Zed Engineering MD implied that learning environments could be created. The flat organizational structures at Zed Engineering created a casual atmosphere and established a workspace for easy interaction, creativity and idea generation. Consequently, this company experienced lesser issues with implementing OL. The implication further is that OL could be managed through the provisions of open communication and enhanced learning climate.

Research Question 4. What do engineers say about their experience of industry’s collaboration and contribution to learning? The synthesis of data propounded by the responses of the interviewees to research question Q4 implied that industry collaboration was a critical component to OL in the oil and gas industry. The described atmosphere was that of ineffective communication among the stakeholders and where the come to “the negotiating table with different truths and with unequal power relation” (Section 4.5.4 above). Lack of collaboration and deficient multi-stakeholder dialogues impeded the
building of common understanding. The implication was consistent with the literature (Wood and Gray, 1991; Ospanova & Siegele, 2010).

The implication was there was lack of linkage and networks between the companies and limited inter-firm cooperation. This resulted in the companies not pursuing opportunities for internalising inter-OL to increase their intra-OL (Holmqvist, 1999; Mariotti, 2002).

8.3 Recommendations

The analysis and evaluation of the data, emergent themes and the literature review led to five recommendations. The engineering design companies currently face challenges in implementing OL. A sound strategy to increase OL is necessary in these companies. The implementation of the recommended strategies may increase OL in these companies and consequently aid them in improving their contribution to the local content in the industry.

**Recommendation 1: Organisational structure that improves communication.** Organisational leaders must make the organisational structure less pyramidal in the least, or out-rightly establish a flat organisational structure in order to make power distance shorter thereby improving the member-management communication (Al-Gharibeh 2011) and as a result increase OL. Implications of the study suggested that the companies whose managements implemented a flat-lined organizational structure experienced rapid communication that enhanced improved OL. Furthermore, leaders should be less autocratic and welcome employees’ opinions and suggestions. This can be achieved by having doors leading to all offices (except some designated ones) open. Some offices were already doing this, so it won’t be difficult to do. This will promote and increase mutual accessibility and knowledge sharing.

**Recommendation 2: Working climate and culture of trust.** Company leaders must establish organisational culture where mutual trusts and cooperation exist and where employees’ participation, creativeness and innovation are encouraged. The working climate should be one where employees feel psychologically safe not only to voice their opinions, but to also experiment. This study revealed trust to be a strong driving force in sharing, thus systems and conditions that build and maintain trust need to be created. The companies’ management could increase flexibility and adaptability by removing rigid rules and focus on
getting out the best from employees. For example, in certain situations flexible resuming and closing times could be considered because of the perennial traffic jams in Nigerian cities. This is easily achievable because people driving their cars to work usually stay till late before leaving, anyway. As management is already externally focused, in the pursuance of man-hours and deliverables, it should become more internally focused; for example, such activities as team building that bring employees together would be welcomed by them and should be held regularly.

**Recommendation 3: Understanding the true meaning of OL.** The implication of the study suggested that the companies – both management and employees- did not have a good understanding of the meaning of OL. There is need for, especially, the companies’ management to be better appraised about and gain better understanding of the essence of OL because it is not just about sending employees to training; OL is more than this (Garcia-Morales, Jimenez-Barrionuevo, et al., 2012). The first step towards increasing the understanding of OL could be, for example, by managers attending training courses on OL and then followed by cascading the gained knowledge down the line by practicing what is learned. The engineers should also attend such courses. This will improved their understanding of organisational learning. Since training courses are usually desired by all, this will be a welcomed idea for everyone.

**Recommendation 4: Extending learning beyond the boundary of the organizations.** More collaboration among the engineering design companies themselves will engender knowledge transfer among them and improve mutual understanding and trust thereby creating dialogue (Boateng, 2011). Accordingly, the fourth recommendation is for the companies to extend the knowledge search beyond the internal boundaries of their organisations through inter-organisational linkages and networks that would lead to inter-OL. Already little steps towards this are being taken due to the initial recommendations from this study to the companies and the NCDMB. The NCDMB has started putting together modalities to reward tenders indicating collaboration among indigenous companies. However, the pace needs to be increased.

The implication of this study also suggested that the companies saw themselves as experts who had nothing to learn from clients and other customers (Section 4.5.3) thereby
abandoning the potential of learning from external sources. External linkages could also be achieved through the attendance or hosting of workshops and/or seminars in conjunction with other industry stakeholders like the other service providers and the IOCs. Both management and employees should attend these events. The knowledge and experiences gained from these events should subsequently be shared with the workforce

**Recommendation 5: Monitoring:** The NCDMB should step up their superintending activities in the industry and supervise the multi-stakeholders dialogue in the industry to ensure that the IOCs patronize the local companies more and provide more assistance to the engineering design offices as they normally do to foreign ones. The NCDMB should expedite on the two initiatives from this study upon which it has embarked and which are: (1) improving on dialogue with all stakeholders to ensure that their project execution plan includes strategies for increasing OL during their projects and (2) modalities for rewarding companies who in their bid proposals promote inter-organisation collaboration among indigenous companies such as joint project execution.

### 8.4 Implementing the recommendations

These claims that have been passed on the companies and NCDMB are justified by the change in the perspectives of the participants and the knowledge sharing and learning engendered during the intervention.

While implementing these imperatives may be involving, it is not expected to be greatly difficult. Restructuring the organizational structure from pyramidal to flat may take a while, but meaningful progress can be made quickly by having a policy whereby every employee has direct access to management and executives regardless of their positions. It is expected that when the participants practice their acquired culture (from the action research intervention) of trust, openness, collaboration and sharing, it will diffuse quickly throughout their companies if there is management support; some of the participants were lead engineers with middle level management authority. Training both management and employees on the true meaning of OL will be welcomed since people like attending training courses.
However, a wider enlightenment is required to change the misconception of the vast majority about OL. For my part, this would be from two angles: (1) NCDMB and (2) conferences and workshops.

Presently, the Nigerian Content Development and Monitoring Board (NCDMB) inadvertently lays more emphasis on individual training; it requests companies to submit lists of trainings their employees attend. With this, it can only monitor individual learning. The recommendation is for the body to start laying emphasis on OL too. This can be achieved by monitoring the annual man-hours worked by companies’ own local staff in new knowledge areas, and also, as mentioned above, requesting them to submit their strategy for OL on projects as part of their project execution plan. Furthermore, there would be a new section in project tender documents requesting bidders to describe their plan for OL on the projects for which they are tendering. As mentioned above this recommendation and the modalities for encouraging inter-organisational collaboration are already being worked upon.

Secondly, I personally will draw attention of the industry to OL practices by presenting papers on the subject at conferences and workshops and encourage the organizers of such conferences and workshops to solicit for papers on the subject.

8.5 Reflection on the whole AR process in the first, second and third person terms

For me in the first-person terms, the important learning aspects include: deepened knowledge about OL; increased knowledge of the AR processes; managing challenges of the AR settings; and managing the research project involving getting people to participate. I have discussed all these in Chapter 7 which was dedicated to my self-improvement (see Chapter 7).

In the second-person terms, the participants learned to change their perspectives with regards to trust, openness, collaboration and sharing (see Section 6.2 where this is discussed in more details), and this they took back to their respective companies. They also gained better understanding of the meaning of OL. The companies and clients also learned that learning on projects will not necessarily adversely affect it. The NCDMB gained more
impetus with regards to their emphasis on learning on projects and learned about how to improve on their requirements for learning on projects.

In the third-person terms, this work adds to the body of knowledge in OL (see Section 6.3 *where this is discussed in more details*), especially with regards to the Nigerian oil and gas industry context. It contributes to the academic community in that people will gain more insight into OL when they read this thesis.

### 8.6 Limitation to the study

There are limitations to this study. The first one is the size of the sample. While the size was fitting for the research design, there is possibility that it may not be a true representation of the thinking of all design engineers working in the Nigerian oil and gas industry; the participants were representatives of only five engineering design companies. Consequently, the findings should not be loosely generalized, but rather should be understood first and foremost as the representation experience of those interviewed. AR projects are situational and do not aim to create universal knowledge. However, while there is lack of generalizability, some extrapolation from a local situation to a more general situation is possible.

### 8.7 Future research

This research was conducted by interviewing 12 participants working in the engineering design sector of the Nigerian oil and gas industry. This is first of such research in the industry and as such there are several prospects for future research. While the goal is not to generalize but to explore the life experiences of the engineers regarding OL, follow-up researches using a larger sampling population would improve transferability. Though the depth of the phenomenological study engendered the surfacing of themes that would be unlikely to appear in a quantitative questionnaire since the questions on such questionnaire would be dictated by the researcher’s review of relevant literature, as against surpassing it by asking open-ended questions. Still, a quantitative study with a larger sample size aimed at testing the results of this study would add to the literature.
It is important also to examine the experience of more diverse population, especially with respect to age of company. A purposeful sample of the engineering design companies was chosen based on their prominence in the industry, but it turned out that the youngest of them all had views different from the older ones signifying that maybe age of company too could have been considered in sampling. The age difference might have influenced the participants’ experiences.

Finally, the study should move beyond the Nigerian oil and gas industry. For example conducting similar study in the Nigerian construction or power industry may further advance the literature on OL in the country.

8.8 Conclusion

The problem addressed in this study was the inadequacy of OL practices in the Nigerian local engineering design companies in the oil and gas industry. The purpose of the qualitative study was to explore and identify ways of improving OL and subsequently help the companies in increasing their performance in the Nigerian local content. Strategies were identified and the purpose of the study was accomplished.

The variables associated with the problem were identified and the research questions formulated. The study utilized semi-structured interviews to examine the experiences of twelve engineers - ten employees and two executives. The responses to the research questions answered question regarding the overall research problem: How can the engineering design companies in the Nigerian oil and gas industry improve their OL in order to enhance performance and elevate their contribution to the Nigerian Content in the industry? Themes emerged through the descriptions, opinions, and views of the participants; latent OL issues were surfaced during the AR intervention. These helped to fashion out strategies for achieving the improvement. Strategy of flat organisational structure improves communication and accessibility; strategies of mutual trust, having minimal subject knowledge, timing and providing psychological safety promote knowledge sharing; and strategy of inter-organisational collaboration increases knowledge acquisition and sharing. The implications of the study suggested that the OL experience of the
participants is epileptic. It requires an informed implementation; this is the only way OL can truly take place in the sector.

It is my wish that this research will engender more interest and studies in how the engineering design companies can learn better and improve their performance thereby be better positioned to contribute their own quota of local content to the Nigerian oil and gas industry.
REFERENCES


Nigerian Oil and Gas Industry Content Development Act, 2010.


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Appendix A

Ethical Approval

Evangelia Katsikea <evangelia.katsikea@my.ohecampus.com> 11/
12/
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to Taiwo.elegba, Pascale, Paul.ellwood, Anant, Mohammed

Dear Taiwo,

The DBA Research Ethics committee have reviewed your revised submission and can confirm that you have addressed all the points raised in earlier feedback.

Please take this e-mail as an indication that you have satisfied the requirements of the DBA research ethics review, and you are now able to begin your research.

Best wishes for a stimulating and successful research project.

With Best Regards,

Eva Katsikea
Appendix B

Participants’ Invitation

Dear …………………………,

Further to our telephone conversation, I would like to provide further information regarding my research entitled: Improving Organisational Learning in Engineering Design Companies of the Nigerian Oil And Gas Industry. This research is partial fulfilment of the requirement for the degree of Doctor of Business Administration from the University of Liverpool, UK. The purpose of this study is to gain in-depth understanding of how indigenous engineering design companies in the Nigerian oil and gas industry can leverage on organisational learning to improve their organisational performance and ensure the development of local content. The study aims to achieve this through examining and describing the organisational learning experiences of indigenous engineering design companies and their staff members with three years minimum experience with the organisation. This is a voluntary opportunity in which participants will be interviewed face-to-face. The interview will last no more than one hour and will be conducted at participants’ convenience. If it becomes necessary, one more interview may be required for clarification and further elucidation. With permission and informed consent, the interviews will be audio recorded and then transcribed. This is to ensure that I capture all the discussion during the interview. The participants will receive a copy of the transcription with the opportunity to clarify, change or add information. At the conclusion of the content analysis, a summary of the findings will be provided to participants and yourself if desired. The recorded interview shall be kept confidential, used for only the research and destroyed after finalizing the thesis.

Yours truly,

Engr Taiwo H. O. Elegba.
Appendix C

Informed Consent Form

Background to the research

This research is to study the development of local content in engineering design in the Nigerian oil and gas industry. Findings here will be used to find the best way to improve local content development and knowledge acquisition in the industry. The interview will take about 90 minutes. Your name or that of your company will not appear in any of the document. This is to secure your anonymity and protect confidentiality. Your participation is voluntary and even after starting you may at any time withdraw from participating.

To show that the above is clear to you, kindly confirm by circling Yes / No as necessary below.

. I understand the purpose of this study. Yes / No
. I have read and understood the background information that you have given me about your research. Yes / No
. I understand what the research requires of me. Yes / No
. I understand that my participation is voluntary and that I can withdraw from this study at any time. Yes / No

Signature and date:

............................................................. (Participant) .............................................................

(Researcher)
Appendix D
Interview Guide Questions

Organisational Culture and Leadership

Q1
Please, describe to me the organisational structure in your company; management accessibility and outlook to rules and regulation; power distance, respect and equality.

Q2
Please, describe the gravity with which your management look at (how far will management go on issues concerning) goal achievement, productivity, efficiency, competition, etc.

Q3
Please, describe the relationship between management and employees with respect to trust, loyalty, integration and volunteering.

Q4
Please, what is your opinion about management/employees relationship with respect to strictness, discipline, lazer-faire, familiarity and emphasis on teamwork?

Q5
Please, explain to me what you believe to be your companies take on entrepreneurship, innovation, creativity and knowledge creation; adaptability and flexibility; and staff participation and motivation.

Leadership

Q6
Please, describe your take on your company’s leadership with respect to management-employee relation; management openness and accessibility; concern for organisational growth vis-à-vis same for employee’s aspirations; employee participation in decision making and responsibility. Please, comment also on how these affect job satisfaction, commitment and learning.

Job Satisfaction

Q7
Please, from the backdrop of work environment (such has having all necessary facilities and resources to work, support and team spirit form others), motivation (like management recognition) and compensation (remunerations, career advancement and job security) explain to me the level of job satisfaction in your company. Kindly comment also on employee turn-over rate in the company.

Organisational Commitment

Q8
Please, tell me about how far you can go to exert considerable effort on behalf of the company; how strong your belief is in the company’s goal; and how strong your desire is to remain a member of the company. Do you at times feel like leaving the company, and how strong is this feeling? What does staff turnover look like in the company?

Learning, Organisational Learning and Learning Organisation

Q9
To what extent do knowledge, skills and core competence in your areas of operation exist in your company? Do employees demonstrate deep knowledge, skills and competence?
Q10
Please, explain to me your understanding of organisational learning, including its impediments and enhancements. How does your company engage in organisational learning, especially with respect to acquisition, sharing and storing knowledge?

Q11a
Would you say your body has a body of corporate knowledge? What constitute this and how are they developed?

Q11
Please, describe to me the environment in your company especially with respect to trust, mutual respect, collaboration among members, teamwork. Do people think and/or learn together in your company?

Q12
Please, tell me about your thoughts on whether your company possesses the required resources — finance, equipment, office space, software, hardware, workstations, adequate lighting, references and professional guidance, etc.

Q13
Would you say your company genuinely believe in learning or its main concern is delivering the deliverables? Does it actually carry out planned training programmes or encourage visibly training on the job?

Organisational Performance

Q14
I would like us to talk about your company’s performance now, and we shall look at financial, internal processes, customer/market and learning/development. Please, tell me about profit if you know and the manhours worked in the last couple of years. Also tell me about any new knowledge gained by local engineers, any increase in existing local capability and productivity, and customers’ satisfaction feedback.

General, Industry Collaboration And Support From The Authority

Q15
We are just about done now, I really would like to know if you have any other thoughts concerning your learning experience or organisational learning in your company or the industry at large that have come up for you?
Appendix E

Interview questions for the project manager and the three engineers who participated in the empirical study

What is your take about the possibility of learning in a joint inter-organisational project like this?
Do you think it will be possible to implement these interventions on the project?
What will be your personal gain/benefit if it is successful?
What concerns do you have?
Would you have any other comments?