

## استهلال

❖ اللَّهُ نُورُ السَّمَوَاتِ وَالْأَرْضِ مِثْلُ نُورِهِ كَمِشْكُوتٍ  
فِيهَا مِصْبَاحٌ الْمِصْبَاحُ فِي زُجَاجَةٍ الزُّجَاجَةُ كَأَنَّهَا كَوْكَبٌ دُرِّيٌّ  
يُوقَدُ مِنْ شَجَرَةٍ مُبَارَكَةٍ زَيْتُونَةٍ لَا شَرْقِيَّةٍ وَلَا غَرْبِيَّةٍ يَكَادُ  
زَيْتُهَا يُضِيءُ وَلَوْ لَمْ تَمْسَسْهُ نَارٌ نُورٌ عَلَى نُورٍ يَهْدِي اللَّهُ  
لِنُورِهِ مَنْ يَشَاءُ وَيَضْرِبُ اللَّهُ الْأَمْثَلَ لِلنَّاسِ وَاللَّهُ بِكُلِّ  
شَيْءٍ عَلِيمٌ ﴿٢٥﴾

## Translation Verse 35:24

God is the light of the heavens and the earth, the allegory of his light is that of a pillar on which is a lamp. The lamp is within a glass. The glass is like a brilliant planet, fueled by a blessed tree, an olive tree, neither eastern nor western. Its oil would almost illuminate, even if no fire has touched it. Light upon Light. God guides to His Light whomever He wills. God thus cites the parables for the people. God is cognizant of everything.

## Dedication

This thesis is dedicated to my Father, who taught me that the best kind of knowledge to have is that which is learned for its own sake. It is also dedicated to my late Mother, who taught me that even the largest task can be accomplished if it is done one step at a time.

## Acknowledgement

With the name of ALLAH, Praise is to ALLAH, Glory is to him, who has enabled me to complete my studies successfully. I must not fail to acknowledge and show gratitude to my research Supervisor in person of Dr. Mohannad Hassan Ismaeil Taha and entire staff of college of graduates' studies, Sudan University of Science and Technology for their technical assistance during my studies.

My sincere gratitude goes to Mr. Nura Umar of Department of Mathematics and Computer Science, Umar Musa Yar'adua University (UMYU) Katsina, for guiding me on statistical analysis.

My gratitude goes to my immediate family and Mamman Dee's families for their endless prayer and support given to me during the studies period.

Moreover, my gratitude also goes to my Wife and our three (3) children for standing firmly by my side and bearing a life without me (father) closer to them during the studies period.

My gratitude goes to Tertiary Education Trust Fund (TETFUND) for sponsoring me to further my studies.

My gratitude goes to the Management of Isa Kaita College of Education and working colleagues for their prayers and encouragement.

Last but not the least my gratitude goes to Friends and well wishers for their prayer and endless support given to me during the studies period.

## Abstract

Computer Aided Drafting has been available to the industries in practically useful form for a close to a century. It has evolved from being a complicated simulation tool available to mainframe computers and exclusively by experts working on special “CAD projects” to being accessible to any interested individual on personal computer. CAD plays a vital role on industries and academia in recent years. The aim of this thesis is to presents the findings of a research on The Impact of Computer Aided Drafting Technology in North West Nigeria Industries. The geographical area of the study is North West Nigeria zone which comprises seven (7) states, while the area of the study is three (3) selected states from the zone. The study sample is forty eight (48) computer operators in industry where purposefully selected. The instrument was face – validated by three (3) CAD experts in Kaduna Polytechnic. Cronbach’s alpha was used to establish the reliability and validity coefficient of 0.83was obtained. . Computer aided design is a modern method of design which has a shortage of personal to handle the program, the collected data was analyzed by using SPSS 16.0 versiona simple survey research design was use for the research work, The result shows that (1) All CAD operators surveyed in the study have different types of Educational background it depend on the types of industries or firm they work for, but it revealed that most of the operators of the CAD were usually trained CAD Draftsman and Draftsperson retrained for CAD. In conclusion (1) CAD should be approach as a necessary skills for a wide variety of occupations and not as a vocation in itself, this would require a conscious effort to open secondary school drafting to all students, not just in industrial programs.

## المستخلص

إن الرسم بمساعدة الحاسوب مستخدم في الصناعات بشكل عملي تطبيقي لما يقرب من قرن من الزمان، وقد تطورت هذه التكنولوجيا من كونها أداة محاكاة معقدة متاحة لأجهزة الحاسوب المركزية وتستخدم حصرياً من قبل الخبراء الذين يعملون على "مشاريع CAD" خاصة لتصبح الآن في متناول أي شخص مهتم على أجهزة الحاسوب الشخصية، ويلعب الـ CAD دوراً حيوياً في الأوساط الصناعية والأكاديمية في السنوات الأخيرة. الهدف من هذه الدراسة هو التعرف على تأثير تكنولوجيا الرسم بمساعدة الحاسوب على الصناعة بشمال غرب نيجيريا، غطت الدراسة ثلاث ولايات مختارة من المنطقة الجيوسياسية في شمال غرب نيجيريا، اعتمدت الدراسة على المنهج الوصفي «المسحي» باستخدام الإستبانة كأداة لجمع البيانات من عينة تم اختيارها عشوائياً وبلغت (48) من المصممين الذين يطبقون الرسم بمساعدة الحاسوب، كما تم حساب معامل الصدق والثبات للإستبانة (ألفا كرونباخ) والذي بلغ 0.83. تم تحليل البيانات باستخدام برنامج التحليل الإحصائي (SPSS)، وأظهرت النتائج أن: (1) جميع مشغلي CAD الذين شملتهم الدراسة لديهم أنواع مختلفة من الخلفية التعليمية تعتمد على أنواع الصناعات أو الشركات التي يعملون بها، لكنها كشفت أن معظم مشغلي CAD كانوا مدربين على CAD، لكن هنالك عدد من غير المدربين. (2) الطريقة المناسبة لتلقي تدريب على CAD هو من خلال مؤسسة تعليمية، لأن المؤسسة التعليمية لديها متطلبات التعليم والمدربين المؤهلين، كما أن المؤسسة التعليمية توفر بيئة تمكّن النظرية والعملية بناءً على تلك النتائج توصي الدراسة بـ (1) أن يكون نهج CAD كمهارات ضرورية لمجموعة واسعة من المهن وليس كرسالة بحد ذاتها، وهذا يتطلب جهداً واعياً لفتح مدارس ثانوية تقنية متخصصة في الـ CAD، وليس فقط ضمن البرامج الصناعية. (2) كما ينبغي على المعلمين، المدرسين، والأساتذة المختصين في الـ CAD أن يتعرفوا على المتغيرات والمستحدثات التكنولوجية في المجال بما في ذلك الإتصال بمؤسسات التدريب البعدي وممثلي المؤسسات الصناعية.

# Table of Contents

Title page	
Declaration page	
Declaration to CGS copy right	
Examiners approval page	
Introductory page .....	i
Verse translation .....	ii
Dedication .....	iii
Acknowledgement .....	iv
Abstract (English) .....	v
Abstract (Arabic) .....	vi
Tables of contents .....	vii
List of tables .....	xi
List of figures .....	xiii
List of Symbols/Abbreviation .....	xiv
List of Appendices .....	vxi

## Chapter one

### Introduction

Background of the studies .....	1
Statement of the problem .....	4
Purpose of the study.....	4
Objectives of the study.....	4

Research question.....	5
Significance of the Study.....	6
Area of the study.....	6
Brief history of Kaduna State .....	6
Brief history of Kano State .....	7
Brief history of Katsina State .....	9
Limitation of the study .....	9
Definition of terms.....	10

## **Chapter two**

### **Literature review and Previous Study**

CAD in Manufacturing Industry .....	12
CAD Improvement .....	12
CAD Benefit .....	13
Acceptance of CAD by industries .....	14
CAD/CAM in Automotive industry .....	14
CAD Training requirement by industry .....	15
Categories of computer aided drafting software .....	19
CAD Expertise area .....	21
CAD Concept and theory.....	22
Basic Computer Literacy.....	23
Graphic software .....	24



2D CAD .....	24
3D CAD and Visualization.....	24
Previous studies .....	26
Summary.....	29

## **Chapter three**

### **Research Methodology and Design**

Introduction .....	30
Research design .....	30
Population of the study .....	30
Sample of the study .....	31
Sampling techniques .....	31
Instrument for data collection .....	31
Validation of the instrument .....	32
Reliability of the instrument .....	32
Procedure for data collection .....	32
Procedure for data analyses .....	33
Equation for Chi – square value .....	33

## **Chapter four**

### **Data presentation and analyses**

Percentage analyses .....	48
Results of the studies .....	55
Summary of the findings .....	56

## **Chapter five**

### **Conclusion, Recommendation and Suggestion for**

#### **Further study**

Conclusion .....	58
Recommendation .....	59
Areas for further studies .....	60
References .....	61

# List of Tables

Table 2.1,CAD software categories .....	16
Table 2.2, Graphic software categories.....	17
Table 4.1a, Analyses of items 1 to 5 on the questionnaire which translate research question Number 1.....	35
Table 4.1b, Chi – square distribution test table of research question number 1.....	36
Table 4.1c, Value of chi – square run by spss software .....	37
Table 4.2a, Analyses of items 6 to 10 on the questionnaire which translate research question Number 2 .....	38
Table 4.2b, Chi – square distribution test table of research question number 2 ...	39
Table 4.2c, Value of chi – square run by spss software .....	40
Table 4.3a, Analyses of items 11 to 15 on the questionnaire which translate research questionNumber 3 .....	40
Table 4.3b, Chi – square distribution test table of research question number 3....	41
Table 4.3c, Value of chi – square run by spss software .....	42
Table 4.4a, Analyses of items 16 to 20 on the questionnaire which translate research question Number 4.....	43
Table 4.4,b Chi – square distribution test table of research question number 4....	43
Table 4.4c, Value of chi – square run by spss software.....	44
Table 4.5a, Analyses of items 21 to 25 on the questionnaire which translate research question Number 5.....	45
Table 4.5b, Chi – square distribution test table of research question number 5 ...	45
Table 4.5c, Value of chi – square run by spss software .....	47

Table 4.6, Percentage analyses of questionnaire items 1 to 5.....	48
Table 4.7, Percentage analyses of questionnaire items 6 to 10.....	49
Table 4.8, Percentage analyses of questionnaire items 11 to 15.....	51
Table 4.9, Percentage analyses of questionnaire items 16 to 20.....	52
Table 4.10, Percentage analyses of questionnaire items 21 to 25.....	54

## List of Figures

Figure 4.1, Graph analyses of questionnaire items 1 to 5.. .....	49
Figure 4.2, Graph analyses of questionnaire items 6 to 10.....	50
Figure 4.3, Graph analyses of questionnaire items 10 to 15.....	52
Figure 4.4, Graph analyses of questionnaire items 16 to 20 .....	53
Figure 4.5, Graph analyses of questionnaire items 21 to 25.....	55

## List of Symbols/Abbreviations

CAD: Computer aided drafting/ design

CAM: Computer aided machining

U.S.A: United States of America

2D: 2 Dimensioning

3D: 3 Dimensioning

AUTOCAD: Auto computer aided drafting/design

ArchiCAD: Architectural computer aided drafting/design

W: Chi – square statistic

R: Rejection region

$r_i$ : Represent total of row

$c_j$ : Represent total of column

$i$ : Row

$j$ : Column

$n$ : Number of interval

$o_i$  : Observed frequency

$e_i$ : Expected frequency

$o_{ij}$ : observed frequency values in row

$e_{ij}$ : expected frequency value in column

$\alpha$ : Alpha

$\Sigma$ : summation

$\geq$ : Greater or equal to

>: Greater

M: number of parameters estimated from the sample

n: sample size

N: Finite population

e: Level of significance or limit of tolerable error

# List of Appendix

Appendix A: Industries surveyed using computer Aided Drafting software .....	65
Appendix B: Questionnaire Sample.....	67
Appendix C: Typical 2D floor plan done using traditional method .....	69
Appendix D: Typical 3D drawing done using traditional method.....	70
Appendix E: Typical 2D drawing floor plan done with AUTOCAD 2010 .....	71
Appendix F: Typical 2D drawing (Elevation) done with AUTOCAD 2010.....	72
Appendix G: Typical simple 3D drawing done using Revit Architecture.....	73
Appendix H: Typical simple 3D drawing done using ArchiCAD.....	74
Appendix I: A Drafter using computer for his drawing with CAM software.....	75
Appendix J: Manual drafting tools; Scales rules, compass, pencil, clutch pencil And tracing paper .....	76
Appendix K: Drafter using Drafting tables for his drawing.....	77
Appendix L: Drafting tables with movable arm .....	78
Appendix M: Floor plan drawn manually by using drafting tools.....	79
Appendix N: Dimensioning and Furniture drawn manually with aid of template..	80
Appendix O : Manual Drafting tools; Set square 45 <sup>0</sup> , 30 <sup>0</sup> by 60 <sup>0</sup> , scale rule, Tee square, pencils and drawing paper.....	81