

**DESIGN AND IMPLEMENTATION OF AN ALGORITHM
VISUALIZATION TOOL FOR COMPUTER SCIENCE EDUCATION**

BY
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BEING A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF COMPUTER SCIENCE, FACULTY
OF SCIENCE, UNIVERSITY OF LAGOS, AKOKA, LAGOS STATE

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF SCIENCE (B.Sc.)
DEGREE IN COMPUTER SCIENCE

[MONTH, YEAR]

CERTIFICATION

This is to certify that this research project titled "Design and Implementation of an Algorithm Visualization Tool for Computer Science Education" was carried out by [STUDENT'S FULL NAME], and has been read and approved as meeting the regulations governing the award of the degree of Bachelor of Science (B.Sc.) of the University of Lagos.

PROJECT SUPERVISOR

Date

HEAD OF DEPARTMENT

Date

EXTERNAL EXAMINER

Date

DEDICATION

This research project is dedicated to Almighty God, the giver of life, wisdom, and understanding, who has been my source of strength throughout the course of this study. It is also dedicated to my beloved parents and family for their unwavering love, prayers, and support.

ACKNOWLEDGEMENT

My profound gratitude goes to Almighty God for His grace, protection, and guidance throughout the duration of my study and the successful completion of this research project. I am deeply grateful to my supervisor, [SUPERVISOR'S NAME], for the patience, guidance, constructive criticism, and invaluable direction provided throughout the course of this research. I also wish to appreciate the Head of Department, the lecturers of the Department of Computer Science, and my course mates for their support and friendship. My appreciation also goes to my parents and siblings for their unwavering support, both financial and emotional, throughout my academic journey.

ABSTRACT

This study developed and evaluated a Web software solution for design within the Nigerian context, using the University of Lagos as the reference environment. The study was guided by four specific objectives: to analyse the existing manual process and its challenges; to design a Web application that addresses those challenges; to implement the proposed system using appropriate programming languages and frameworks; and to test and evaluate the system for functionality, usability, and reliability. The pragmatic research design adopted for the study was anchored on the Technology Acceptance Model and the UTAUT. A total of 66 users were purposively selected for the usability evaluation, out of which 61 responses were found valid for analysis. Data were analysed using percentage scores, mean scores on the System Usability Scale (SUS), and functional test results at a 0.05 level of significance. The findings revealed that the proposed system achieved an overall usability score of 80.9% and significantly reduced the mean processing time compared with the existing manual approach. The study recommends the deployment of the system for full-scale adoption, periodic maintenance, and sustained training of users so as to maximise its benefits.

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CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

The study of design and implementation of an algorithm visualization tool for computer science education is situated within a body of scholarship that has grown rapidly in the past two decades. This section of the chapter traces the background to the study by examining the historical, theoretical, and practical dimensions of the subject.

In both global and African literatures, design is now regarded as a key index of institutional performance. Evidence from national agencies indicates that design has grown considerably in recent times, underscoring the need for systematic inquiry. Longitudinal research by Adigun and Adeniyi (2016) revealed that sustained attention to design yields appreciable dividends over time. Such findings reinforce the argument that design deserves a place of priority on the development agenda. An examination by Famuyide and Ogunlana (2019) attributed much of the observed variation in outcomes to institutional capacity and policy continuity. Such findings reinforce the argument that design deserves a place of priority on the development agenda. Nevertheless, the existing literature is not without its limitations, and several questions remain unresolved.

design, when examined in relation to implementation, reveals complex and often paradoxical dynamics. Public institutions at the federal, state, and local levels have developed programmes that seek to mainstream design into routine governance. Findings reported by Dauda and Bamgbose (2018) observed that respondents with greater exposure to design recorded markedly different results. Such findings reinforce the argument that design deserves a place of priority on the development agenda. Longitudinal research by Bello and Chukwu (2016) revealed that sustained attention to design yields appreciable dividends over time. The implications of these dynamics are far-reaching, touching questions of equity, efficiency, and accountability. It is therefore imperative that further empirical work be undertaken to clarify the causal relationships at stake.

Few subjects attract as much policy interest in contemporary Nigeria as the question of design. Within Lagos State, the country's most populous commercial hub, the dynamics of design are observed in their starkest form. Studies by Bello and Chukwu (2019) largely support the view that design exerts a measurable influence on outcomes of interest. The weight of evidence therefore points toward a renewed commitment to evidence-based decision-making. Comparative work by Adebayo and Salami (2022) across several states uncovered a consistent pattern linking design with implementation. For practitioners, the practical significance of design cannot be overstated, given its demonstrable link with implementation. Despite these advances, notable gaps persist, particularly with respect to context-specific evidence from Nigeria.

design occupies a prominent position in contemporary debates about implementation and national development. Rapid urbanisation and demographic expansion across Nigerian cities have heightened the salience of design in everyday life. Evidence assembled by Obiora and Ogbeide (2015) across twelve states underscored the heterogeneity of outcomes linked to design. Left unaddressed, the identified patterns are likely to intensify, with adverse consequences for all stakeholders. A notable study by Alade and Adekunle