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JERT- Mission Statement

The Journal of Educational Research and Technology (JERT) is a peer- reviewed journal engaged in the publication of professional educational research with emphasis on educational technology, management information technology, professional development, educational enrichment research, academic and administrative information systems, information sciences, management information consulting, advertisements, academic collegiate conferences, and community education development summits to show the advantages and the broad range of possibilities that education, research and technology can offer in the educational and the world community. The journal is equally engaged in organizing and advising on conferences, workshops and seminars on invitation for publishing and presentation of research papers and original manuscripts that promote further research and knowledge in the humanities and the sciences in the USA, Africa and the world at large. The *JERT* is scheduled to be published three times yearly: January, May, and September.

JERT **Editorial Policies and Contributions**

1. ***The JERT*** editors will consider manuscripts that are organized in accordance with the Mission, Journal Publication, Educational Technology, Management Information Technology, Professional Development, Educational Enrichment Research, Academic and Administrative Information Systems, Information Sciences, Management Information Consulting, Advertisements, Academic Collegiate Conferences, and Community Education Development Summits**.** Please feel free to contact us at (469) 534-2720 or E-mail: jesin57@gmail.com.
2. Personal and professional opinions, ideas, recommendations articulated in the ***(JERT)*** do not necessary reflect the views of the Editors.
3. All manuscripts must be accompanied by well-synthesized **Preamble** or abstract of approximately 100-200 Words.
4. Manuscripts must not be less than ten (10) pages and not exceed twenty (20) pages in length, and must have outstanding and innovative educational, research, and technology features.
5. Manuscripts must be typed double-spaced in Microsoft Word version 2003 or 2007 and printed on 20-pound papers (8.5" x 11").
6. ***JERT*** will not consider politically goaded manuscripts for publication.

7. The author of the research manuscript must submit two original copies. Each copy should contain a cover page with the name of author, topic/title. The essay proper should not have any author's name or indication of origin, except for the topic/subject at the top of the paper. This is for blind reviewing.

8. All research manuscripts must be submitted with 15-20 cited references, and 5-10 non-cited references, double-spaced, and arranged in alphabetical order.

9. Footnotes are strongly discouraged but when used should be typed double-spaced, and on a separate page.

10. The basic style of writing is the American Psychological Association (APA), though room will be given for the Modern Languages Association MLA where literature and languages are involved.

11. Papers received shall be acknowledged and those accepted for publication will be notified and instructions given as to the status of the paper (accepted for publication, accepted contingent on specific revisions, and the timeline for all revisions.

12. Copyright must be authorized and surrendered to JERT and expressed usage can only be authorized by the Board of Trustees and JERT Editorial Council.

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PREAMBLE

The Editorial Council is very delighted to publish Volume XV of the Journal of Educational Research and Technology (JERT). The production of Volume XV could have not possible without the persistent tireless efforts of the JERT Editorial Council and the priceless support of Editor-in-Chief, Professor of Emmanuel N. Ngwang and Dr. Anne-Christine Hoff, Principal Editor, and all well-wishers.

Joseph Edet Okon Esin is a Fellow at the Washington Center for Cybersecurity Research and Development (FWCCRD), a professor of computer information systems/cybersecurity, and with 29 years of experience in educational research and publishing, 30 years of academic instruction in computer information systems, networking technologies, management information systems, information security, digital forensic analysis, defensive security, physical security, and principles of networking cybersecurity at undergraduate, graduate and post-graduate levels. 10 years of experience in higher education accreditation processes in accordance with the guidelines set forth by southern association of schools and colleges (SACS) Commission on Colleges. Five years of experience in accreditation processes in accordance with the standards set forth by the council for business schools and program (ACBSP), 17 years of experience in supervising of doctoral dissertations, masters theses and undergraduate senior class project. 15 years of experience in academic and administrative computing and 12 years of experience as a publishing editor of the *Journal of Educational Research and Technology* (JERT). 5 years of experience in grant writing via the National Science Foundation (NSF). Elected by my peers at Jarvis Christian College to serve as the vice chairman of faculty senate for 2017-2018 academic year; re-elected the vice-chairman of faculty senate for 2018-2019 academic year; re-elected third term, the vice-chairman of faculty senate for 2019-2020 academic year.

1. *Education*

Professor Esin holds a Bachelor of Science in Biology from Saint Louis University, Saint Louis, Missouri; a Master of Arts in Theology from the Society of Jesus College of Divinity, Saint Louis, Missouri; and a Doctorate in Computer Education and Information Systems from the United States International University, San Diego, California. The State of California awarded him a Lifetime Collegiate Instructor's Credential in 1989, and in 1996, the United States Department of Justice approved and conferred on him the honor of "Outstanding Professor of Research" in recognition of his contributions to academic excellence. He met the selection criteria for inclusion

in the 1992–93, 1994–95, 1996–97 and 2015–2016 editions of *Who's Who in American Education* for demonstration of achievement and outstanding academic leadership in computer information technology, thereby contributing significantly to the betterment of contemporary society.

Furthermore, he met the selection criteria for inclusion in the 1993–94 editions of the *Directory of International Biography*, Cambridge, England, for demonstration of achievement and outstanding academic leadership in computer information technology, thereby contributed significantly to the betterment of contemporary society. He served as a member of Doctoral Dissertation Committees at Southern Methodist University, Dallas, Texas (1998–2000); Jackson State University, Jackson, Mississippi (2010–2011); and University of Calabar, Nigeria (2014–Current). a Fellow at the Botanical Research Institute of Texas (FBRIT).

2. Professional Backgrounds

From 1988 to 2000, he was a professor of computer information technology, and from 1991 to 2000, he was a director of higher education accreditation operations in accordance with the guidelines set forth by the Commission on Colleges. He served as associate dean of academic affairs and deputy provost at Paul Quinn College, Dallas, Texas, from 1997 to 2000. He is currently a lead professor of computer information systems/Cybersecurity at Jarvis Christian College, Hawkins, Texas. a visiting professor of research at the university at Calabar 2013-2019, visiting professor of cybersecurity at Thomas Edition State University, New Jersey, visiting professor of cybersecurity at University of the Cumberlands, Kentucky, and tenured professor of computer science department at the University of Calabar, Nigeria

3. Book Publications

Professor Esin is the author of Six (6) Books

i. *The power of endurance*. (2008). Bloomington, IN: I-universe. ISBN: 978-595-48299-3.

ii. *The evolution of instructional technology*. (2011). Bloomington, IN: I-universe. ISBN: 978-4620-3212-9.

iii. *The messianic view of the Kingdom of God*. (2011). Bloomington, IN: I-universe. ISBN: 978-4620-2083-6.

iv. *Global education reform*. (2013). Bloomington, IN: I-universe. ISBN: 978-4759-7102-6.

v. *System overview of cyber-technology in a digitally connected society* (2017). Bloomington, IN Author-House. ISBN: 978-1-5246-5706-2.

vi. *Landscape of cybersecurity threats and forensic inquiry (2017).* Bloomington, IN Author House. ISBN: 978-1-5462-1705-3.

vii. *Current research emphasis:* Equity of *Cybersecurity in Education: From High School Through Post-Graduate Studies.*

4. Professional Research Publications

Professor Esin is the author of several professional journal articles:

- "High level of teacher's apprehension (HLTA) about the use of computers in the educational process". (1991). https//www.*jemls.com.*
- "COMPUTER LITERACY FOR TEACHERS: The role of computer technology in the educational process". (1992). https//www.*jemls.com.*
- "Strategies of developing and implementing academic computing in colleges and universities". (1992). https//www.*jemls.com.*
- "FACULTY DEVELOPMENT: Effective use of applications software in the classroom for instruction". (1993). https//www.*jemls.com.*
- "Strategic planning for computer integration in higher education through the year". 2000. (1994). https//www.*jemls.com.*
- "The challenge of networking technologies". (1995). https//www.*jemls.com.*
- "The design and use of instructional technology in schools, colleges and universities". (1997). https//www.*jemls.com.*
- "Decay of Nigerian educational system". (2013). https//www.thejert.com/issues
- "Emerging impact of information technology in education and community". (2013). https//www.thejert.com/issues
- "Balanced salary structure for academic professors and allied educators as a pathway to quality education". (2014). https//www.thejert.com/issues
- "The discovery of computer information technology is an avenue for educational transformation in a changing society of today and tomorrow". https//www.jert.com/issues
- "Integration of technology in education, instruction and learning in a connected society". (2015). https//www.thejert.com/issues
- "Overview of cyber security: Endangerment of cybercrime on vulnerable innocent global citizens". (2016). https//www.thejert.com/issues
- "From analog to digital: Overcoming widespread implementation of wireless information technology on a vulnerable global society". (2016). https//www.thejert.com/issues
- "Cybersecurity Professional Education and Inquiry". (2017). https://www.washingtoncybercenter.com/publications-projects
- "Imminent Cybersecurity Threats and Vulnerability of Organizations and Educational System". (2017). https://www.washingtoncybercenter.com/publications-projects
- "Escalating Outcome of Cyber-Attacks on Healthcare Organizations". (2017). https://www.washingtoncybercenter.com/publications-projects
- "From Historic to Present Day Culture of Social Engineering Attack". (2018).

https://www.washingtoncybercenter.com/publications-projects

- "Eliminating Gender Disparity in Cybersecurity Professions through Education". (2018). https://www.washingtoncybercenter.com/publications-projects
- "Offensive and Defensive Approach to Ethical Hacking". (2018) https://www.washingtoncybercenter.com/publications-projects
- "Imminent -Threats of Cloud Computing Technology in Healthcare Operation". (2019). https//www.thejert.com/issues
- "A CALL FOR CONCERN: The Unbalanced Representation of Minorities and Women in Cybersecurity Profession". (2019). https://www.washingtoncybercenter.com/publications-projects
- "APPEAL FOR EQUILIBRIUM: Unbalanced Culture of Women and Minorities in Cybersecurity Domain". (2020, 35-45).

  www.tesu.edu/ast/women-and-minorities-in-technology/journal
- "Amalgamation of Cryptography and Stenography on Global Society Systems". (2020) 8/8. https//www.thejert.com/issues
- "TIME AHEAD OF 2020 COVID-19 Pandemic: Outgrowth of Cloud Encryption Algorithm on Biometric Authentication analysis". (2020). https://www.washingtoncybercenter.com/publications-projects, Blog-June 2020
- "Protagonist of Digital Biometric Authentication and Forensic Analysis" https://www.washingtoncybercenter.com/publications-projects
- "Impulsive Time Ahead of Healthcare Operation in Event of the Next Global COVID-19 Pandemic." https://www.washingtoncybercenter.com/publications-projects
- "Unbalanced Tradition Ahead of Higher Education System in Event of the Next Global COVID-19 Pandemic" https//www.thejert.com/issues

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He is guided by the philosophy that
To achieve what is possible, you must attempt the impossible.

Professor Joseph O. Esin,
JERT-Chief Publishing Editor

Professor Emmanuel N. Ngwang, is the **Highly-Dynamic Chief Editor** of ***The Journal of Educational Research and Technology (JERT),*** is a 1986 graduate of Oklahoma State University with a Ph.D. in American Literature (English) and recently (July 2013) he obtained a Master's of Science degree in Criminal Justice specializing in Homeland Security and Emergency Management from today's Purdue University Global. Presently, Dr. Ngwang is the Director of Institutional Research at Wiley College. Before joining the faculty of Wiley College, Professor Ngwang was a faculty member at Texas College, Tyler, Texas where he doubled as Director of Quality Enhancement Plan (2015-2018) and full Professor of English. He has taught at several national and international universities: a Graduate Associate at Oklahoma State University (1982-1987); University of Yaoundé, Cameroon (1987-1997); Kentucky State University (1997-2003); Mississippi Valley State University (2003-2010); Claflin University (2010-2012); Jarvis Christian College (2012-2015; and Texas College, Tyler, Texas (2015- 2019). He also held an adjunct position with the University of Texas at Tyler (UTT) teaching American Immigrant Literature.

Although Dr. Ngwang's areas of expertise were in literature and education (Ph. D in English and a Master of Art equivalence in English Education-DES-), he has bridged academic disciplines through his interdisciplinary interests and versatility. He edited two full-length texts on criminal justice by Peter Nwankwo: *Criminological and Criminal Justice Systems of the World: A Comparative Perspective* (2011) and *Criminal Justice in the Pre-Colonial, Colonial, and Post-Colonial Eras: Am Application of the Colonial Model to changes in the severity of punishment in the Nigerian Law* (2010). In July 2013, he crowned his interest in criminal justice by obtaining an M.SC. in Criminal Justice, specializing in Homeland Security and Emergency Management, an area in which he has also started publishing. His area of research is not only limited to literature, education and criminal justice, but he is particularly interested in the interface between literature and criminal justice – a criminological approach to literature, an exciting and nouvelle way of looking at crime in literature. In addition, Dr. Ngwang served on over 20 master's thesis and doctoral dissertation at the University of Yaoundé, Cameroon (from 1987- 1997) and later on director of Senior Projects (memoirs) at Mississippi Valley State University (from 2003-2010). However, he continuous to work independently as a consultant and mentor of master's theses and doctoral dissertations in education and the humanities.

In addition, Professor Ngwang has published and presented research papers on Homeland Security and Management, Feminism, modern dramatic literatures and Postcolonial literature. He

has the following selected publications to his credit and in contribution to the wealth of knowledge in literature and Homeland Security and Emergency Management:

- *Art and Political Thought in Bole Butake* (in collaboration with Kenneth Usongo). New York: Lexington Publishers, 2016.
- Individual Freedom, Cyber Security and Nuclear Proliferation in a Borderless Land: Innovations and the Trade-offs in Scientific Progress. *The Journal of Educational Research and Technology (JERT).* Vol. 5. No. 5, Fall 2016. Chapter 1: pp.33-72.
- Alice Walker's Search for New World Order in *The Color Purple. The Atlantic Literary Review Quarterly*. Vol 14. No. 4. October – December 2014. Ed. Sunita Sinha. New Delhi: Atlantic Publishers, 2014: 1-18.
- The lost Generation and/or Perils of Belonging: A Study of Africans in Exile. *The Journal of Educational Research and Technology (JERT).* Vol. 4. No. 4, Spring 2015. Dallas, TX: JERT, Inc., 2015: 33-72.
- Reconsiderations and Challenges of African Immigration in the USA. *The Journal of Research and Technology (JERT)*. Vol. 1, No. 1, Spring 2013. Dallas, TX: JERT, Inc., 2013.
- Education as Female (Dis)Empowerment in Anne Tanyi-Tang's *Arrah. The Atlantic Review of Feminist Studies Quarterly*. Vol. 1, No., April –June 2012. Ed. Sunita Sinha. New Delhi: Atlantic Publishers, Ltd, 2012
- African Immigration to the United States: Trends, Ramifications, and Challenges (R*e)Tracing Africa: A Multidisciplinary Study of African History, Societies, and Cultures*. Chapter 15. Ed. Salome C. Nnoromele and Ogechi E. Anyanwu. Dubuque, IA: Kendall Hunt Publishing Company, 2012.
- Arrah's Existential Dilemma: A Study of Anne Tanyi-Tang's *Arrah*. *Cameroon Literature in English: Critical Essays on Fiction and Drama. African Languages – African Literatures*. Vol.3. Ed. Edward O. Ako. Berlin: Lit Verlag Dr. W. Hopf, 2010.
- Spaces, Gender, and Healing in Alice Walker's *The Color Purple* (1982) and Mariama Bâ's *So Long a Letter* (1981). *New Urges in Postcolonial Literature: Widening Horizons*. Ed. Sumita Sinha. New Delhi, India: Atlantic Publishers & Distributors (P) Ltd., 2009: 20 - 38. (Book Chapter)
- Re-Configuration of Colonialism or the Negation of the Self in Postcolonial Cameroon

in Bole Butake's Plays." *Reconceiving Postcolonialism: Visions and Revisions*. Ed. Sunita Sinha. New Delhi: Atlantic Publishers & Distributors (P) Ltd., 2009: 203 – 216.

- Buchi Emecheta's *Destination Biafra*: Feminist (Re-) Writing of the Nigerian Civil War. *The Journal of African Literature*. Vol. 5: War and Conflict. Ed. Charles Smith. Morrisville, NC: Lulu, Inc., 2008: 277- 304. (Section/Chapter).
- In Search of Cultural Identity or a Futile Search for Anchor: Africa in Selected African American Literary Works. *Identities and Voices: Alizés No. 28: Revue Angliciste de La Réeunion*. Ed. Sophie Gaberel Payen. Faculté des Lettres et des Sciences Humaines. Université de La Reunion. April 2007: 10 - 20.
- Female Empowerment and Political Change: A Study of Bole Butake's *Lake God, The Survivors,* and *And Palm Wine Will Flow.... ALIZES (TRADE WINDS): A Journal of English Studies*. No.23. Ed Sophie Menoux. Faculty of Letters and Social Sciences. Université de la Reunion, Cedex 9, France, September 2004:197 – 221.
- Literature as Politics: Revisiting Bole Butake's *Lake God and Other Plays*. *The Literary Griot: International Journal of African-World Expressive Culture Studies*. Vol.14, Nos. 1 & 2. Spring/Fall 2002. Politics of Black Literary Representation. Ed. O.B. Traore. Wayne: New Jersey: 265 -288.
- The Jew as Taboo: Arthur Miller's *Focus* (1945) and *Incident at Vichy* (1964). *Alizes (Trade Winds): Revue Angliciste de La Reunion*. No. 12: Taboos. Ed. Alain Geoffroy. Cedex 9, France: Faculte des Lettrès et Sciences Humaines, Université de la Reunion, October 1996: 37 – 53.
- The Relevance of the 'Don Juan in Hell' Scene to George Bernard Shaw's *Man and Superman*. *Annals of the Faculty of Letters and Social Sciences*. Vol. IV, No. 2, July 1978. The University of Yaoundé, Cameroon, 1978.
- Musical Renaissance and 'Advanced Democracy' in Cameroon: A Marriage of Music and Politics. *Proceedings of the Southern Interdisciplinary Roundtable on African Studies (SIRAS)*. Ed. Egbunam E. Amadife. Frankfort, Kentucky: Kentucky State University, 2006: 45-54.
- Racism in Literature: An Afro-centric Analysis of Eugene O'Neill's *The Emperor Jones*. Proceedings of Southern Interdisciplinary Roundtable on African Studies (SIRAS). Ed. by Funwi Ayuninjam. Frankfort, Kentucky: Kentucky State University,

2005: 82-87.

- Communication through Traditional Non-Verbal Symbols in Cameroon: Man and Nature at One. (co-authored with Dr. Stephen Y. Jikong, Cameroon). *Proceedings of The Southern Interdisciplinary Roundtable on African Studies (SIRAS)*. Frankfort, Kentucky: Kentucky State University, 2005: 123– 130.
- The INTERNET and the Southern Cameroons National Council's Cause: The Strengths and Weaknesses of the Newfound Freedom. *Proceedings of the Southern Interdisciplinary Roundtable on African Studies (SIRAS).* Ed. By Funwi Ayuninjam. Frankfort, Kentucky: Kentucky State University, March 2003.
- Colonial Legacy and the Culture of Corruption in Bole Butake's *Lake God* and *The Rape of Michelle*. *Proceedings of the Southern Interdisciplinary Roundtable on African Studies (SIRAS)*. Ed. by Funwi Ayuninjam. Kentucky State University, Frankfort, Kentucky, April, 2001: 79- 86.

In recognition of his academic publications, research and teaching contributions to academia, Dr. Ngwang was honored with the following awards by his colleagues, peers, students and administrators at various stages of his professional life:

- **2013-2014 Faculty Scholar Award in Recognition of Outstanding Research and Publication Work**. The Faculty Governance Senate, Jarvis Christian College, Hawkins, **TX**
- **2004 Humanities Teacher Award for Excellence in Teaching & Research**, Mississippi Humanities Council, Jackson, Mississippi
- **2002-2003 Excellence in Scholarship & Creative Activities Award**, College of Arts & Sciences, Kentucky State University, Frankfort, Kentucky.
- ***2002: Who's Who Among America's Teachers***, Educational Communications, Inc., Lake Forest, Illinois. **April 2002**
- ***2000: Who's Who Among America's Teachers***, Educational Communications, Inc., Lake Forest, Illinois. October.

We are remembered by what we leave behind, especially in writing,
For what we leave behind tells the true story of who we were,
And how and for what we lived.

Professor Emmanuel N. Ngwang

INTRODUCTION

COVID-19 and the Changing Paradigm in Higher Education: The New Normal!

The confusion created by the Coronavirus pandemic has surpassed most of the health, political, and physical challenges presented by recent single events like Ebola, 9-11 and SARS. While most of these events were localized, they had rippling effects that spread throughout the entire USA. However, the COVID-19 is a global pandemic that is affecting nearly every country in the world. Indeed, every state of the United States of America has been affected and the fallout from this insidious disease has not only cost the loss of lives but has affected businesses and education very profoundly. World Street has experienced some of the greatest drops in value since its inception, while schools at all levels have been closed or shutdown to mitigate the effect of this pandemic on the health of the students, faculty and staff. Some of these proactive measures were undertaken to preempt the spread of this pandemic to students in classes, cafeterias, and dormitories. This early closure of centers of education especially affected institutions in the areas of staff and faculty employment, scholarships, financial aids, and budgets. Colleges and schools had to attempt to reverse and revise their academic yearly budgets and calendars in order to reimburse students for the time they will be out, although most of the monies were or had already been spent and disbursed to various services for the rest of the year and semester.

However, the greatest challenges for all schools and institutions was how to continue their assigned responsibilities of teaching and developing the young minds of the students and children that were entrusted to them. It was not the students' fault that the calamity came; neither was it the institutions. However, The crucial challenge was and still reminds how to provide or to continue providing the academic services that these institutions had pledged to do

at the beginning of the school year, since the students were allowed to return home to protect themselves from the contamination of the pandemic. Indeed, most schools are not medically equipped to handle dozens of students who suddenly fall sick. So, the best way was to allow these students go back home to their parents/guardians.

While the health issue was fundamental to the well-being of the students as well as the institutions, the underlying role of educational institutions still reared its head in the back, beckoning for attention. As a result, the institutions, especially colleges and universities have resorted to the internet and instructional technology to complete the teaching and advising job they had been doing prior to this calamity. However, this complete swing from the face-to-face teaching/learning to online has presented huge challenges both to some instructors who have always taken online teaching for granted and students whose challenges range from not having laptops or computers at home to not having internet subscription where they live. Some of them live far from any public libraries which could provide laptop and internet services for them either for free or at a very minimal charge.

Furthermore, some of these institutions were generous enough to provide their students with individual laptops for classwork until they returned to school. The underlying principle here was that these students would be honest enough to return those laptops when this virus has been harnessed and life comes back to normal for them to return to school. However, the real cost of the laptops, the opportunity cost, was the re-direction of funds meant for some other institutional budgets and items to the purchase of these laptops. Out of a sudden, presidents of colleges and universities had to consult with their financial divisions to look for money to purchase these laptops, while still contemplating how to reimburse the students who were already complaining about unused facilities like dormitories, meals, and other labs for which

they had already paid. This dichotomy or challenge of continuing teaching online posed a major concern for institutions many of which decided to furlough their administrative workforce indefinitely in order to resolve some of these financial challenges and still satisfy the students' needs. The savings from the furlough was possibly re-directed to other unforeseen areas like the immediate purchase of laptops and hotspots connecting devices to assist the students and faculty engage in online teaching and learning.

Another area of urgency was the catering for faculty, especially the older faculty who are having difficulties with modern learning technology. To resolve the issue of instructional literacy, some institutions took a couple of weeks to give their instructional faculty basic training on how to use the Internet either through Canvas or Blackboard to navigate their teaching assignments. Others were given the options to use their Internet e-mail services for assignments, just as if they were using the internet for personal communication. This Internet option cutoff the interactive aspects of online teaching which encompasses virtual classroom, discussion board, chat rooms, and the continuous and seamless flow of learning from one module or unit to the next. That notwithstanding, it filled up a vacuum or gap created by the sudden switch from face-to-face teaching to online.

It is understandable that institutions had to complete the terms of their engagements or contracts with each student who had enrolled and paid tuition and fees for the entire semester. There was and is still the broader implications of retaining those same students or attracting them to come back after the pandemic. These twin issues have raised concerns within the circle of higher education scholars who have been worried about maintaining academic rigor and standards. The concern about expunging teaching to online has often circled around how instructors can be assured that the intended students are actually doing the work at the other end

of the computer terminals. How can we guarantee that the student himself or herself is doing the work? The argument has settled down to trust and confidence. If we accept online graduate degrees and certificates, many of which seems to be the norm today, we should also be challenged to accept the undergraduate online or degree obtained through correspondence or online. The difference here emanates from the level of maturity and sincerity where the self-discipline exercised by the doctoral student to obtain an advanced degree and to be an expert in that area may sometimes be lacking in the undergraduates many who consider the first or bachelor's degree as a mere passport to other opportunities. Research has clearly revealed that many educators, administrators, and students do not see a direct correlation between their first degree and the skills the use or need for their work.

According to the *2013 Gallup Pool Inside Education*, a survey of chief university and academic offices, reported that 4% of college trustees and officers agree that universities and colleges have a good understanding of what employers are looking for in a job candidate while 11 % of business leaders agreed that college graduates have the skills and competences their businesses need. However, 13% of all Americans surveyed strongly agreed that college and university graduates are well-prepared for success in the workplace. A further survey by *Strada-Gallup* (2018) revealed that only 28% of American workers agree strongly that their past college coursework is directly relevant to the work they do. However, these employment statistics increased when students added work experience or combined the paper degree with practical work experience using the Credegree model, a type of Career Pathways Initiative program designed to enhance the job readiness and marketability of college graduates by combining 4-year classroom experience with practical industry experience that added value to the paper certificate. But such initiatives are becoming impracticable because of the social

distancing and outsourcing of teaching to home, where such supervision is either challenging or to say the least impossible. This becomes a major setback in these new models that were becoming extremely attractive to employers who needed students who had added skills to their paper certificates and came to work ready to engage in effective working instead of training-to-work.

The more complex question, especially in response to the Coronavirus Pandemic is how to evaluate the quality of the work done by students, many of whom were not prepared for this new method of teaching. Some schools have flirted with the idea of assigning only the Pass/Fail grading model to the students' work and this occasioned the write up in *Inside Higher Education* in which Lilah Burke analyzed the impact of this new grading method, code named the "forgiving grade structure." According to Burke (2020), several institutions of higher learning adopted the "Pass/Fail" and "Satisfactory /Unsatisfactory" grading scheme "to lesson students' anxiety … to shield those who have been enormously burdened from the fatal hit to their grade point average" and, on the other hand, encourage those who have had the unfortunate trauma of "moving home, taking online classes, losing jobs or dealing with family health care." These measures are indeed emotional considerations for evaluations which are not objective, scientific, and quantifiably measurable. However, it is a stopgap attempt to heal the hemorrhaging health of a system of education that faces many more challenges.

Indeed, Burkes goes on to discuss the draw backs of these binary grading schemes in the face of continuing education and graduate school where grade point averages play preponderant roles in the admission of students and the determination or prediction of a student's success in academics. However, Harvard and Georgetown Colleges of Medicine agreed to introduce another criterion for admission by accepting those spring 2020 pass grades merely as

"prerequisites" while still encouraging the traditional ABC letter grades. Johns Hopkins medical school and a few other professional and graduate schools are still debating whether to accept those online grades or not, especially the binary pass/fail or satisfactory/unsatisfactory grading paradigm.

However, there are still some other colleges who have retained their letter grading systems despite the transfer of teaching to online. For most of these colleges and institutions, the coronavirus pandemic hit when the spring semester had run half of its course and the students had just returned from the spring break or were on spring break. Many of these students had established a preliminary standing in terms of their performance in class and the midterm grade reflected the academic potential and strength where the students had halfway in the course work. From most past experiences, most of the "serious" academic work takes place within the first half of the semester when the students and faculty are "fresh," not burnt out and eager to learn or teach, respectively. For some colleges, the second half of the spring semester is pregnant with extra-curricular but relevant and necessary activities and events such as Founders' Week, Homecoming Week, Spiritual Emphasis Week and activities, which all syphon the students time and energy leaving them very little time to add to the academic material and knowledge they had garnered within the first half of the semester.

By midterm, most of the faculty and even students themselves know their strength and weaknesses and the highest possible grade they can aspire to. Although the transfer of the teaching from face-to-face to online brings equal challenges to all the students, their respective performances are likely to be a continuum of the first half performance. However, there may be cases of borderline students who need to push further to cross the line from one grade level to another, but those are very few. Therefore, those institutions who retain the letter grading

scheme are in line with their traditional method of grading. In fact, online courses give the faculty many more writing assignments (quizzes, tests, and exams) than face-to-face when students answer some of these questions orally for the faculty to ensure that the students have understood the lesson or concept(s).

Some professors have often reserved the research paper for the latter part of the semester, when the students are given the chance to visit the libraries and collect materials and write. In this case, the transfer of teaching to online will obviously not disrupt these students' research, especially since computers are becoming the greatest venue for research. They are equipped with home computers and laptops to carry out quality research and academic writing just as if they were on college campuses.

However, the American Association of Collegiate Registrars and Admissions Offices responded to this debate by differentiating the two types of online classes—those classes that were moved to online to complete the face-to-face classes (like what we had in the spring of 2020 as immediate response to the COVID-19 pandemic) and those classes which were traditionally taken online. The AACRAO recommended that binary grades should be indicated on the transcripts as such only for classes where "instruction was terminated before learning goals [were] met. If instruction just moved online, … no transcript notations or changes in grading" should be notated on the transcripts.

In response, Suzanne Ortega, president of the Council of Graduate Schools opined that "the vast majority of universities are moving in the direction of "holistic admissions consideration," undergirded by the view that admission should not be determined by a single piece of evidence but the totality of the student's academic records. The Council of Graduate Schools had already sent this concept/suggestion to all graduate schools prior to the advent of

COVID-19 to use for admission, but many of these schools were reluctant to implement. But the urgency and cataclysm of the pandemic has resuscitated this idea with great urgency.

However, the Graduate Council's attempt to find an acceptable solution to this online situation, particularly for the students, is encountering other simmering problems. On April 13, 2020, Greta Anderson came up with a write up in *Inside Higher Education* entitled "Students Say Online Classes aren't What they Paid For." Per Anderson's article, some first-generation students are disgruntled that the complete package they signed for in education – the experience of in-class and collegiate intermingling – is no longer there when everything else is out-sourced to online. The students complain that they "are being shortchanged by online classes." They maintain that online classes are "a throwaway—a shortened quarter" and they do not feel like "[they are] getting the same education that [they] would have otherwise. The sort of enrichment and learning that [they]would have in the classroom isn't there." This problem has been so critical that some students filed a class action lawsuit for tuition refunds. While part of the fees has been refunded, the universities have responded by asserting that the online courses are still being covered by faculty still employed to use the same materials and grading standards to assess student's academic assignments. The University of Chicago was foremost in standing its grounds on the concept of retaining the fees. They even went a bit further to remind the students that they could take "a voluntary leave of absence for the quarter and receive a full tuition refund if the leave was arranged by the first Friday of the quarter, which was April 10, 2020." The administrators further assured the students that the "UChicago instructors are adapting courses to a remote learning environment to ensure that students continue to receive a rigorous, transformative education."

The institutions have equally justified retaining some of the students' fees by saying that as "the University continues to function even as many staff and faculty are working and teaching remotely… many of the costs associated with campus-based fees continue, and new costs have been incurred during this time. The debts owed for student buildings and facilities and our need to maintain campus infrastructure continue despite the current crisis." This is a Catch-22 as we have both sides arguing their positions. These students argue for the "learning experiences" that they had hoped for and they also express the difficulty of navigating their education as first-generation students. They also express that they do not feel supported by the institution, especially as many of them have to struggle to sponsor themselves even after losing their part-time jobs to the pandemic. They also argue that "if [they] wanted to go to an online school, [they]could go to an online school. [They] paid to go to class and sit in a lecture" (p.5). On the other hand, the institutions have argued for a change caused by the pandemic which required "adjustment to social distancing and classes delivered remotely for their safety." The administrators also alluded to the problems and challenges incurred in unplanned for expenditures like video software licensing, technology security and laptops for remote workers and some students. Either way, the new systems, born of the challenges of the Coronavirus Pandemic, have forced students and administrators to look at education from several new perspectives and to take novel actions.

To resolve the issue of instructional literacy, some institutions took a couple of weeks to give their instructional faculty basic training on how to use the Internet and Instructional technology to navigate their teaching assignments. Others were given the options to use their internet e-mail services for assignments, just as if they were using the internet for personal communication. This Internet option cuts off the interactive aspects of online teaching which

encompasses virtual classroom discussion board, chat rooms, and the continuous and seamless flow of learning from one module or unit to the next. Moreover, some of the students submit their essay assignments on Internet, a devise that truncates the formatting value of most assignments. At the other end, the professor receives an essay without form or format and has to decipher and imagine how the student had intended to write the essay and where the various paragraphs fall. That notwithstanding, it filled up a vacuum or gap created by the sudden switch from face-to-face teaching to online.

Furthermore, there are growing concerns within the circle of community colleges whose students intend to transfer to four-year colleges to complete their degree requirements, where some of those community college students are forced “to retake those courses” if they want to be admitted into four-year colleges. Indeed, only a few graduate schools in the nation put out requirements or made any statements about admission changes for the spring semester. Much of this debate and conclusions were left in the air as colleges were still grappling with how to quantify the binary grading system that has been adopted by most of the colleges affected by the Coronavirus Pandemic. After all, the colleges and universities had a greater challenge, which is how to accommodate their own internal challenges of adjusting to the teaching changes and admission created by the pandemic without losing the students and programs they already had.

LESSONS LEARNED

The first fact is that the coronavirus epidemic has forced colleges and universities to adopt a new system of teaching and student evaluation, which are both online. As such students have been forced to adapt to that system, but the grading system has raised an issue of acceptability and accuracy in evaluation. The Pass/Fail or Satisfactory/Unsatisfactory

paradigms do not give an accurate assessment of each students' academic strength but lumps students into two simple groups. This grading paradigm acts like a road check or roadblock on a voyage that distinguishes the speeds of runners. Such a check can dissuade the fast runners, who suddenly see themselves on equal speed level with the slower runners, from maintaining their momentum.

Secondly, it does not incentivize the smarter students who want to maintain their momentum towards retaining the GPA for graduate and professional admission and job competitions.

Thirdly, the online paradigm has the challenge of justifying who is actually doing the course work- the students or some other person doing for the students. Furthermore, there is the further challenge which emanates from faculty members who have not had adequate professional training in handling online teaching. This challenge can be overcome in due time, but at this initial stage, it is a major challenge. Out of frustration, some scholars may either drop these courses or faculty may give rewarding marks just to let things go or to placate students.

Fourthly, there is the challenge of the rigor which the University of Chicago talked about. We cannot begin to talk about rigor when there is the initial challenge to the use of instructional technology, which limits access to the variety of projects and activities a faculty member can do online in order to broaden his or her methodologies to reach all types of learners. Some of faculty members were not equally trained to use extra links to the library and other teaching and learning resources that usually enrich the teaching of such classes. Both faculty, staff and some students are all learners and newcomers to this new world of learning, and sometimes it is equally difficult to identify who is learning from whom. There is so much to learn within such a short time that the faculty spend more time learning how to manipulate

the teaching gadgets than doing research on best practices to be used in teaching. It is going to take a while for both parties to become comfortable with this new paradigm.

Moreover, this change in paradigm has created unforeseen hardships on some staff who have been furloughed indefinitely, many of whom may not return to work. They were not prepared for sudden and early retirement, and many of them are forced to accept lower paying jobs or loss their houses for failure to pay mortgages.

While the Pass/Fail or Satisfactory/Unsatisfactory paradigms laid emphasis on the evaluation and the contents of education and an attempt to accommodate the challenges introduced by the Coronavirus epidemic, the online teaching paradigm has re-awakened in us the traditional and almost-forgotten approach to education— the whole education, the experience of education. To restore this notion, this traditional yet solid concept that undergirded old-time education, academic competence, academic freedom that enhanced the pride of "being educated"- holistic education- is a challenge that lies ahead of us in academia. It is indeed questionable whether education in the USA institutions will ever return to the "Old Norman." So much money has been investing in changing the face of education that colleges and all other institutions of learning that there seems to be a tendency to improve and strengthen this "New Normal" so that those approved values and standards usually attributed to college and learning environments will be adopted and adapted to the new virtual learning atmosphere and environment. In high schools, there is a nudging sense of coming back to school to meet and socialize with friends, prepare for and participate in graduations, receiving free lunches and sports, which cannot be replaced with homeschooling. But how ready are we for this unprecipitated onslaught of changes?

The answer may lie in the fault of lack of mitigative preparation. We do not seem to learn from our mistakes of the past or to be proactive in asking provocative questions that will enable us to prepare adequately for the future. Professor Joseph Esin's article points towards that concept, that we have often ignored the importance of preventive education that would provide us with the know-how of readiness and prevention. He advocates the creation of a "National Pandemic Education" unit with a clearly defined and heavily stuffed budget—the "The National Pandemic Education Budget (NPEB)." Professor Esin's argument borrows much from and is a trajectory of the creation of the 9-11 Commission initiated by President George Bush to study the areas of national security vulnerability and how terrorists succeeded in attacking the United States, The commission was further empowered and advise the House of Congress on measures to be taken to forestall further attacks. The Commission, among other findings and suggestions, suggested the amalgamation of security units into one of the largest and most expensive government departments in the US, the Department of Homeland Security. Indeed, since the creation of the Department of Homeland Security as the watch dog of American security and territorial integrity and the promulgation of the USA PATRIOT ACT of 2001, the USA has not suffered any major devastating attack from its enemies. If the creation of a Department Homeland Security acted very much as a panacea to foreign attacks, why could such a health unit, in line with Homeland Security not be created and fully equipped to specifically handle pandemics, Professor Esin quibbles.

However, Professor Ngwang seems to suggest that even with the creation of a department to oversee any crisis, the success of such a department lies in leadership. From our handling of the COVID-19 and other natural disasters like Hurricane Katrina and COVID-19 today, the problem of failure lies in leadership. Presently, our current president downplayed and continues

to minimize the severity of the COVID-19 Pandemic thereby betraying the leadership trust invested in him. I his interview with Bob Woodward, a renown American investigative journalist on CNN, one of the country's leader news media, the President confessed that the Chinese government had informed or rather warned him of the severity of the pandemic and the ease with which it could be spread, but he withheld such knowledge from the citizenship because he did not want to cause panic. Yet, he did nothing in his power to assuage the situation by aggressively attacking the inevitable spread of this pandemic. Instead, he fought, challenged, contradicted, and negated his own scientists over scientifically sound facts. As a result, almost 200,000 USA citizens have lost their lives. Professor Ngwang's paper lies in the direction of leadership for crisis, which could have mitigated the severe crisis of the COVID-19 pandemic. Every disaster calls for good leadership, and great leaders are born out of challenges and pandemics.

Finally, Dr. Festus Elleh addresses the whole gamut of research writing by providing a comparative value of the different approaches to software project research. While his paper does not address any specific problem or concern, it however discusses the merits of research. After setting a compare and contrast approach to research methods, he uses sampling, validity, reliability, and bias as variables to justify his biases for a particular inclination in methodology. The study found that researchers more frequently use the descriptive and quasi-experimental types of quantitative research in software project research to collect information about a phenomenon in a discipline. The quantitative approaches tend to be objective, deductive, and generalizable while the quasi-experimental research identifies problems with current practice, justifies or condemns "current practice, make judgments by making comparison between the current and the experimental variables." He further suggests that although, it may cost more

money, time, and effort, the study recommends that it is very important to choose a sample size that will be able to accomplish reliability and generalizability. The paper concludes that the quality of a research does not only depend on the adequacy of its planning, but also on the productivity of the measurement processes that are used.

We hope you will enjoy this edition of the *Journal of Education Research and Technology (JERT),* and these articles and events in the world will incite your curiosity to join us with articles for more publications. We are also online at https://www.thejert.org.

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Field | How to Improve
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Corona Virus

Spyware
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Unbalanced Tradition Ahead of Higher Education System in Event of the Next Global COVID-19 Pandemic.

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1. Prelude

Time and again, aggressive, and venomous viruses such as 2020 COVID-19 pandemic suddenly emerge killing millions and pushing the world back several years. Yet, the world community is always caught unprepared as if the previous pandemic or a one similar to the previous was never to re-occur. As the saying goes, knowledge is power, and we learn from the past in order not to repeat and make the mistakes that landed us in the difficulties of today. Such lessons are clearly embedded in academic and health disciplines, study, research to find preventive and mitigative solutions to these challenges. Unfortunately, societies and communities never enroll and even come close to graduating students from any institution in preparation to battle the past, present, and future looming threats of pandemic attacks. The 2020 COVID-19 pandemic is not a legend or myth; it is a deadly pandemic and a ruinous virus with the ability of changing lethargic components, mutating and facilitating the transfer of deadly venom to all people from the youngest to the elderly citizens with precipitous speed. In our generation, the riposte of September 11, 2001, twenty-seven (27) days after terrorists crashed airliners into the Twin Towers, the Pentagon and a field in Pennsylvania, President George W. Bush signed an executive order on October 8, 2001 to establish the Department of Homeland Security, paving the way for the biggest reorganization of the federal government since the years immediately after World War II in 1944, when Congress established the Defense Department, the Central Intelligence Agency (CIA) and the National Security Council (Bradbury-Jones & Isham, 2020). A year later, the Department of Homeland Security was created, absorbing twenty-two (22) agencies and organizations, and becoming the

third-largest federal bureaucracy in the United Sates (Andreas, Kuckertz, Anja, Carlos, Reyes, Alicia, Elisabeth & Berger, 2020). Across the government, national budgets were increased for counterterrorism operations. Congress enacted laws granting powerful investigative authorities to law enforcement units.

Unfortunately, the intelligent and security departments and units that were created did not foresee the advent of the Coronavirus Pandemic (COVID-19) which has unleashed the most devasting attacks on humanity more than any other tragedies the world has experienced. The stealthy advent of the 2020 COVID·19 pandemic presents a rinsing aura of virulent diseases that is presently ripping the global community and spearheading the expansion of healthcare professionals' hours of operations. However, these healthcare and medical professionals are constantly put at risk of attending to patients infected with the deadly virus. This irritated newly arrived pandemic is engrained with unintended, negative consequences, mental anguish, physical and psychological health risks, isolation, and loneliness and closures of the educational systems.

Amid the COVID-19 pandemic, the unchallenged and all-inclusive concern is the permanent closures of all levels of schools from grade schools to high schools, colleges, universities, and comprehensive learning centers where educational endeavors are obstructed totally halted across the globe. The education systems from kindergarten, grade schools, middle schools, high schools, colleges, and universities are the enduring and unmatched conduit to acquire personal and professional skills, knowledge, backgrounds and expertise to defend and protect the current, future and unborn generations in the next event of an abrupt emergence of COVID-19 pandemic-like invasion. President John F. Kennedy once asserted that "think of what you can do for your country not what your country can do for you," making it incumbent and morally obligatory for humanity to be proactive in serving each other and always thinking about what to do to make the

world a better place to live and work. Today, as the 2020 COVID-19 pandemic is drumming each nation's doorbell, world leaders are charged with aphoristic questions of *what can you do for your country?*

i. Countries are functional components of the global community, and amid the sudden outbreak of 2020 COVID-19 pandemic, states and national borders are closed, local and international flights indecisively halted, entire educational systems shutdown, and the global economy put on the brink of extinction.

ii. In nine cases out of ten, most students enrolled in institutions of learning depend on the institutions' computer resource centers for the completion of individual and group assignments, research projects, and studies. But most of these institutions of higher education and public libraries are permanently shut down with students quarantined at home, forcing most schools, colleges, and universities to resort to online cybernetic operations. Only one or two students out of approximately thirty-five (35) enrolled learners do not have computers at home and are unable to complete class assignments on a scheduled date and timeline.

iii. The rebuilding of educational systems in the event of the next COVID-19 must involve federal and state government, private, and public education administrators' fundamental approach to increase the annual education budgets, tuition upsurge, and mandatory procurement of laptop and desktop computers for all students from grade schools through post-graduate studies to support the advancement of student learning endeavors.

iv. In the process, professors, educators and higher education administrators must be transparent with educational stakeholders like parents, relatives, caretakers, and

guardians by acknowledging that the abrupt outbreak of COVID-19 pandemic has influenced the scope of face-to-face instructional and learning undertakings; hence, mandatory purchase and distribution of important learning tools such as laptops and desktop computers will ease the burden of continuous learning and education that has been interrupted by the sudden advent of this pandemic. Unfortunately, this change in educational paradigm shift will inevitably lead to substantial increase in education tuition in the event of the next COVID-19-pademic.

The current global outbreak of the 2020 COVID-19 pandemic is exerting an unbiased control and pressures on the growth and advancement in instructional and learning endeavors on entire global education settings. The pandemic outbreak has introduced *social-distances* and encouraged the outsourcing of instruction and learning process from physical classroom contact hours to the virtual online environment. It is worth nothing that the world-class and capital-intensive colleges and universities never entertained a likelihood and readiness for a corrosive and sweeping epidemic like the current 2020 pandemic that is ripping and tearing the global community into unprecedented shreds and pieces.

The current sudden pandemic is similar to the 9-11 terrorist attacks which led to the urgent creation of the Department of Homeland Security, which absorbed twenty-two (22) agencies, and an immediate increase in national budgets for counterterrorism operations. But unlike the 9-11 fallout, today, there is no evidence of a borderline comprehensive plan to mitigate the risk of the global lockout of the educational ecosystem in the event of the next COVID-19. The World Health Organization (WHO) and the United States National Center for Disease Control (CDC) are exploring avenues for the prolongation of lives. Unfortunately, the USA leadership has already initiated a move to take the USA from collaboration with the World

Health Organization under the pretest that the WHO failed in its approach to the COVID-19 Pandemic which has presently taken over 574,000 lives world wide and 135,000 lives in the USA and going.

Today, zero global and national organizations are reviewing a single demographic factor to implement a fundamental increase in the state and national budget to empower academic professors, instructors, educators, and higher education administrators' ability to function effectively in the event of the next COVID-19 pandemic. Social-distancing and self-quarantine have turned out to be a norm and reality in higher education system and will continue for years, affecting the impulsive shift in global educational system, and making instruction and the learning process an overwhelming, challenging, and disheartening undertaking both for professors, educators and students alike.

Education as Ultimate Authority in the event of the Next COVID-19 Pandemic

According to Esin (2013), "Education is a civilization of hope, the origin of a balanced vision, unmatched promise, confidence in natural reliquary that is free for global citizens." What the federal, states and the global communities need is the same aggressive and uncompromising approach which led to the creation of the Department of Homeland Security as the third-largest federal bureaucracy in the United Sates government, alongside with fundamental increase in national budgets for counterterrorism operations. Future global leaders of the free world will be deprived of the civilization of hope and balanced vision by permanent closures of grade schools, high schools, colleges, universities, comprehensive schools and stymied across the globe. Education is the unmatched promised land for peaceable, diplomatic, and amiable living conducive to producing physicians, allied healthcare professionals, professors, instructors, educators, and career professionals in all dimensions of the global work force. Offensive,

defensive, and much aggressive measures which led to the creation of the Department of Homeland Security with the third-largest federal budget in the history of the United States should be adopted and implemented in the combat against this COVID-19 Pandemic through education. An aggressive upsurge in the federal, states, and local education budgets is imperative in the event of the next COVID-19 pandemic because of the centrality of education in this battle.

1. Education is a natural and endless nucleus of human existence; without education, human professions, occupations, skills and intellectual growth and advancement, modern innovative technologies, and the developing and industrialized world economy will surely expire. Insensitively, federal and state governments across the globe have for decades and persistently downplayed the importance of the education system by spending less money on education process. Professors, educators, instructors and most educational professionals and public servants are among the least paid in the world. States, national and legislative members of the government are obstinately unconvinced to increase annual education budgets and salary upsurge for professors, instructors, and educators who remain among the least paid globally.
2. Education is an unbroken tradition and a sitting life-wire in all continents, landforms, islands, and landmasses of the world. Education is the genesis of human animation; it never expires, and never runs out of business. It provides essential steps toward career, ethics and moral development, and self-disciplinary principles that are much needed to battle current and future outbreaks of global epidemics and man-made disasters in all dimensions.
3. Education is an open-ended, enduring, flexible operation absorbing professors, instructors, educators, and students across the globe, who constitute a remarkable and the

largest world population that is in despairing need of local, states, and national budget increases to restore and upgrade the global education systems.

4. Education is the ultimate authority needed to battle thoughtless enemies such as epidemics that are mixed with unintended, negative consequences, analogous stresses, mental anguish, physical and psychological health risks, isolation, loneliness which aim to shutdown schools, colleges, universities, businesses, creating economic vulnerability and job losses.

Amid the COVID-19 pandemic, one of the most unchallenged and protuberant threats were healthcare operatives, instructional and learning processes that were paralyzed by the world pandemic shattering episode. The abrupt and unprecipitated emergence of the pandemic has placed academic faculties, instructors and educators in a predicament and swift exposure to digitally online settings with limited measuring tools and ability to measure student academic performance, course, and student learning outcomes, and sustainable meaningful instructional and learning ecosystem. Per Trehearn (2018), Esin (2020), and Gibson (2020), the unexpected instructional and learning endeavors are engrained with lopsided one-directional activities, and students with limited or no background in online education are often behind in measurable information such as digital architecture outcome-based content, pedagogical preparedness, integration using hybrid model for online instruction. Monitoring digital performance and student learning assessments will continue to lag behind in the event of the next pandemic. Our private and public transmission and communication systems are unrestricted and with no boundaries; the integration of mobile technology and electronic communication has increased, but the higher education budgets have not. Amid 2020 COVID-19 pandemic, the options or possibility of students at all levels of education going back to campus is uncertain and open to

intensive negotiation and planning. Across the globe, higher education budgets are forever neglected and swept under the carpet. Equity in cybersecurity education must be organized to provide step-by-step approach, to empower professors, instructors, and learners on the swiftly growing threat on innocent citizens (Esin, 2018).

Conclusion: Homecoming in the event of the next COVID-19 Pandemic

All countries on earth are functional components of the global community. Amid the sudden outbreak of the 2020 COVID-19 pandemic, states and national borders are closed, local and international flights are unconditionally halted, entire educational systems shutdown and the global economy is on the brink of extinction due to lack of understanding of the importance of homecoming; where most leaders, legislators, and affluence citizens carefully refuse to acknowledge the aphorism that home is forever a balanced, sturdy, and permanent household. Today, a better horizon for all citizens emanate from coming home, especially when we engage in a mounting support through peaceful home-based town hall sessions, collaborative alliances with state and federal legislators to step forward in the creation of the National Pandemic Education Budget (NPEB) in the national headquarters with branches in state capitals. Unquestionably, the creation and establishment of NPEB will produce eternal, considerable, positive, and rewarding affirmation to conquer and subdue the next COVID-19 pandemics. Any investments outside of the home-country, states, and the individual will repeatedly remain the worst and life-time liability.

African leaders, legislators, and citizens with affluence and financially stable opportunities, who are confronted with indefinite lockdowns, must avoid the worst life-time liability by supporting global, national, and state NPEB. The culture of NPEB will be a well-structured algorithm to restore hope, confidence and measures allowing professors, instructors,

educators, and enrolled learners the opportunity to be equipped with instructional and learning armory to undertake instruction and learning endeavors as an enduring opportunity. In so doing, they will position themselves as saviors of the world, humanitarians who, at the same time, lead in the increase of academic and scientific knowledge as they equally prepare for the advent of new pandemics. They may not have the cures and the prevention to the next pandemic, but they will at least have the know-how and expertise to tackle, and possible contain it before it spreads all over the world like the 2020 COVID-19 has done.

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Leadership
Training

Leadership Crisis in Emergency Management: A Case for Investment in Leadership Training

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Abstract:

Although we cannot prevent most disasters, especially natural disasters, we can at least train and prepare people who will lead us effectively in the event of any disasters. This is a full-time job which requires more than the usual training. The nature and variety of these disasters call for full time leaders who have dedicated themselves to the concept of leadership under crises. Emergencies call for more than normal leaders, but the types of seasoned leaders who can work well under pressure and act like a center of attraction for people to look up to for enlightenment and direction. Appointments to such positions should be void of political considerations or leanings, but on expertise, know-how and those qualities acquired through learning, experience and daily relationships built on trust and confidence. This was the case at the Pentagon on 9-11, which did much to reduce the magnitude of loss, confusion, and conflict. Senator Joe Liebermann pointed out very clearly the need for greater and more effective leadership in times of crisis when he said "One thing that I have found is a strong correlation between effective leadership and effective response. Unfortunately, I have also found the reverse to be true" (Senate Hearing., p. 3).

The increase and prevalence of natural disasters, especially beginning with the Katrina and Rita Hurricanes in the Gulf Coast and the destructive results of the tsunamis, continue to baffle us when we think of the losses suffered. According to Nwanna (2004), De Villeirs (2008), Ripley (2008) and Haddow, Bullock, & Coppola (2011), everyday some new disaster comes up and as the seasons change and global warming continues, so do these natural disasters increase. Coupled with these natural disasters is the continuous threats and fears of man-made disasters in the form of chemical accidents, the collapse of mines, automobile and airplane accidents (9/11

experience) and the looming threat and fear of the terrorists using weapons of mass destruction. Each of these disasters is bound to come with devastating loss of lives and property, some of which are preventable and some of which are not. A few years ago, in particular, the number of destructive tornadoes increased with over 36 deaths already caused. Kentucky, Indiana, Alabama, Missouri, Texas, and some other Midwestern states were particularly hit. Over fifty children and people were killed in Moore in Oklahoma when a tornado hid the city destroying the entire city and the primary school. These events, especially the local responses to them, showed how ill-prepared we are for natural disasters, because of poor and sometimes lack of leadership in handling these situations. There is therefore a great need for strong and decisive leaders who are knowledgeable and aware of details, who are open to other opinions and collaborative efforts of local emergency staff, and more importantly, and who have gained power not through bullying but because they are calm and credible.

To effectively talk about these leadership skills, we have to look back at how America responded to some of the worst emergencies that took place not too long ago and how these events revealed the lack of the caliber of leadership needed. In February 2012 and also last year, we witnessed some of the worst emergencies in our history, with the exceptions of 9-11 and the Oklahoma City bombing. In these situations, and as television channels depicted, we saw isolated cases of individual heroism, survival, and individual resilience. In Liberty, Western Kentucky, the Mayor who doubled also as the Court Judge was seen moving around and inspecting the devastation caused by the tornado. He braved the bad weather to encourage his local people to wake up to the reality of the situation and help rebuild the city. In 2011, First Baptist Church of Orangeburg, South Carolina, where I worshipped, raised money and collected clothes, canned and non-perishable foods and water for the disaster victims in Tuscaloosa, Alabama. These were

activities initiated and carried out by charitable and non-profit organizations. Unfortunately, some of these supplies collected were not properly handled or equitably distributed because the distribution activities were not clearly mapped out by strong leadership on the ground.

In fact, I was attracted to this Homeland Security Management because I saw the need for a broader and more comprehensive approach to these disasters, especially after watching the 9/11 events live and seeing the confusion into which the cities (New York and Washington, D.C.) and the entire US were thrown. According to Haddow, Bullock & Coppola (2011), these attacks constituted "the first national disaster event to have occurred in the United States outside of wartime…. leaving all communities with a lingering sense of vulnerability" (302). Furthermore, the failure of the Michael Brown administration to successfully manage the Katrina disaster in New Orleans, Louisiana in 2005 again re-emphasized the need for a greater and urgent re-thinking of leadership in disaster management. The February 10, 2006 Congressional Hearing entitled "Hurricane Katrina: The roles of US Department of Homeland Security and Federal Emergency Management Agency leadership" (S. Hrg 109-829) was specifically dedicated to the scrutiny of the failure of leadership in the pre- and post-Katrina hurricane disaster management. It also called for the need for regionalization of disaster control and management based on the knowledge of local geopolitics and local logistics. As we watch CNN and other local and national television and radio stations, we find a consistent lack of sustained and organized body of policies and leadership put in place to handle all these emergencies. The various states have come up with individual blueprints and agendas for emergency management in response to the absence of any comprehensive plan that is federal since by its very nature disasters are localized and vary in terms of their nature: earthquakes, tornadoes, tsunamis, WMD, terrorism, wild fires, avalanches, just to name a few (Steven & Gunaratna 2004, Nwana 2004). But there is one

constance in all these situations- the need for strong and effective leadership to take care of mitigation and preparation for management of disaster event and recovery efforts.

Since these disasters and emergencies seem to be increasing exponentially, there is an urgent need to accelerate the training and deployment of great leaders of disaster respond teams throughout each state in preparation of responses to natural disasters. In fact, the State of South Carolina has budgeted a reasonable sum of money in this venture, after identifying that training and strong leadership are key components to any successful operations during emergencies (Healy 1012). There is also a greater need to prepare and train leaders to coordinate activities during emergencies and natural disasters, leaders who do not bully their way into power, but get the power and respect because they are calm and credible, they are knowledgeable, aware of details, and decisive, and finally leaders who are open to other opinions and can rely on subordinates in times of emergencies to do their job.

As we look back at the response to Katrina and Rita, it is obvious that Michael Brown, the then director of the Federal Emergency Management Agency (FEMA) was almost an absent manager who flew to the scene of emergency rather late and unprepared. He definitely lacked the knowledge and awareness of the details of the enormity of the disaster, and that is why he assured the world that the situation was under control. Yet, people were drowning and dying without help. He could not function well without the assistance of the local leaders who were themselves overwhelmed by the disaster. During the Congressional hearing of Friday, February 10, 2006, Michael Brown admitted to this leadership failure, but maintained that FEMA's mission had been marginalized. Its response capability had been diminished. "There is a whole clash of cultures between DHS's mission to prevent terrorism and FEMA's mission to respond to and to prepare for responding to disasters of whatever nature" (US Senate Hearing,

p.2). Probably, one of the reasons for the confusion that ensured from the 9/11 Ground-Zero disaster was the lack of coordination and leadership. The Post-9/11 First Responder Evaluation report clearly indicates that, in spite of Mayor Rudy Giuliani's brave leadership role, there were major issues of organizational leadership, clarity in the chain of command, lack of more efficient and comprehensive disaster evacuation response plans and leadership. Case after case reveals that determined and knowledgeable leadership is key in every emergency management situation.

During the World Trade Center attack in New York, fire fighters and law officers instinctively dove into the burning buildings to help save lives without any leader handling and directing the operations based on any standard formula for such activities. This experience has given rise to the grave concern for trained leaders in the area of emergency management and natural disasters. A few universities (Kaplan University being one) responded to this discrepancy by designing and offering courses in emergency and disaster management as a practical response to the failures that emanated from the previous natural disasters and how we managed these emergencies. These are positive steps in the right direction, but they are not enough compared to the rate and intensity of the occurrences of disasters that call for immediate action. Such trained leaders should be able to go out into the cities and other areas and train and drill the local folk on how to respond to emergencies and disasters. The wild fires of California continue to destroy human lives, houses and property as well as vegetation yearly And with al Qaeda threatening to use weapons of mass destruction on us every day, it will be of utmost importance for the society to train on self-survival and how to contend these threats. And this awakening can only be done through strong and visionary leaders and leadership, who are dedicated to their jobs.

Furthermore, every disaster breed groups and groups need leaders (Ripley 2008), who are fully in charge of all operations and who are equipped to direct all operations through a thoroughly calculated plan put in place by experts. Such leaders must be men and women of the people; that is, persons trusted by the people to lead them from danger to safety. Talking about group thinking in times of disaster, Ripley (2008) discussed situations like the burning of the Air France plane on August 2, 2005 (p.132) and the incident of the burning of Beverly Hills (pp.130-133) where strong, decisive and calculated leadership helped save thousands of lives from perdition. Such leaders should be courageous enough to put themselves in danger for the sake of saving their people. Some of these leadership qualities include bravery, moral rectitude, people's skills and the ability to communicate effectively and clearly to a people in the language, style and tone that the people under pressure will understand and follow.

There is the constant bickering over leadership values. Yes, some leaders are made, and others make themselves. Irrespective of how this is done, each leader must stay on top of the new developments in his or her areas. Each natural disaster calls for a particular approach and method and the use of specific equipment and great collaboration with disaster predictors and stakeholders. The leader must constantly acquaint himself or herself with the new equipment and communication gadgets and be alert to how each of them works. There is no point in having the equipment piled up only to discover that none of them works, or that they are all broken down or that the leader does not know how to use them. It was shamefully realized that some of the communication devises failed to work during the 9/11 crisis in New York. The leaders have to go beyond the call of duty and the normal training to stay on top of cutting-edge technology that will be needed in his or her area in times of crisis. President Bill Clinton used to emphasize that to prepare for peace you must be prepared for war. So, the true leader is one

who is always prepared for the surprises that come with these disasters, for many of these emergencies occur without warning. COVID-19, like SARS came unannounced but both of them caught us unprepared. To prepare for these types, the leaders need to work in collaboration with all stakeholders- businesses, social services, medical departments, law enforcement, Salvation Army, local leaders, and schools and organizations that house a significant number of people at a given time. This is when a leader now becomes a facilitator and a coordinator of events.

Good decisive leadership is needed to handle any emergency. Another important lesson learned from Katrina disaster was the fact that the leaders had fore-knowledge of the structural weaknesses of the levees and not enough was done to handle the situation to reduce, if not prevent the devastating results of the hurricane (Haddow, Bullock & Coppola 2011). A strong and decisive leader would have petitioned the local and the federal governments and authorities on the urgent need to invest in re-building or reinforcing the levee walls to assuage the damage that came. This is part of mitigation, which is a strong component of restricting structural and human damage caused by disasters. This was clearly a case of the failure of the Emergency Support Systems (ESF) with adequate knowledge of the needs of the people. Michael Brown and other members of the Congressional Hearing Committee admitted that FEMA was relatively new and was compromised by its affiliation and subservience to the Department of Homeland Security, and the director could not act independently and swiftly in response to these emergencies. Consequently, Mr. Brown and other members of Congress suggested and were leaning towards a better empowerment of leadership through independence. Indeed, Haddow, Bullock and Coppola (2011) have suggested that considering the urgency and prevalence of emergencies and disasters today, the Federal Emergency Management Agency

should be upgraded to a full department of government with its own secretary and budget so as to be able to operate independently of the newly created Department of Homeland Security, which in effect is equally struggling with the department of National Security over autonomy and terrorism. This national leadership will inevitably permeate to the regions, states, counties, and subdivisions, where cells of groups will be created and trained for emergency preparedness and leadership roles. Indeed, the devastating impacts of September 11, 2001 resulted in increased cooperation and collaboration between private business and emergency managers at the local levels (Haddow, Bullock, & Coppola 2011, p. 123), but these collaborations should lead to enhanced preparedness for emergencies. Unfortunately, we are only always awakened to this reality when the disaster has come and gone like in the cases of the wildfires in California, Oregon, and Washington States this year.

The U.S. is rich in the spirit of giving, but some of the gifts hardly reached the targeted destination. A good emergency management leader will set up posts where these supplies will be dropped and effectively distributed. In the instance of a disaster, nearly everybody is confused and panicky, but the true leader will be the one with a level head to calm down all those who are panicking and give the people a sense assurance and of direction on where to get the necessary supplies and which route of survival and evacuation to take. Somebody must be in charge, otherwise everybody will get lost in confusion. This is where the leader has to come up with a road map, evacuation plan, and his or her team ready to go to work immediately. And since disasters are localized, there is a need for the leaders to organize and train local leaders who can and should head each disaster activity as First Responders before the federal agents arrive. This will be tantamount to delegation of powers where the local operators feel and strongly believe that they are part of the national team. It takes a lot of money to do this, but

again this lack of leadership was one of the reasons the 9/11 Commission identified as responsible for the higher number of deaths at Ground Zero in New York City where communication failed and emergency leadership was almost absent. The leader should be empowered to identify and utilize local skills through rigorous training in preparation for natural disasters and emergencies. Emergencies, by their very nature, do not announce their arrival, and that is the more reason such leaders should constantly be on the alert for any eventuality.

Indeed, Senator Lieberman maintained during the Congressional Hearings on the role of US Department of Homeland Security and Federal Emergency Management Agency leadership that "one thing that I have found is a strong correlation between effective leadership and effective response. Unfortunately, I have also found the reverse to be true" (S.H, p.3). This conclusion drawn by Senator Joe Lieberman during the Congressional Hearings laid a high premium on leadership, especially as this statement was made in response to "all the missed opportunities to respond to the levee breaks; and inadequate ability to control inventory and track assets" (pp. 2-3). As we look forward to an increasing number of natural and man-made disasters and emergencies, we need to focus our attention on leadership training. We need to train the sort of leaders who will work in collaboration with weather forecasters, medical authorities and facilities, utility organs and all stakeholders to train the citizens to prepare for disasters, how to comport themselves during disasters and how to pick up pieces of life and continue life after the recovery phase.

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COMPARE

CONTRAST

QUALITY RESEARCH

PLANNING

PRODUCTIVITY

MEASUREMENT

PROCESSES

Quantitative Research Process
PROBLEM & PURPOSE
HYPOTHESES OR QUESTIONS
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Quantitative Approaches for Software Project Research: Issues of Sampling, Validity, Reliability, and Bias

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Abstract

There are many quantitative research approaches used to conduct studies on software project management. This paper sets out to compare and contrast the approaches with a critical examination of the issues of sampling, validity, reliability, and bias. The study found that researchers more frequently use the descriptive and quasi-experimental types of quantitative research in software project research. The study also found that researchers use descriptive approaches to collect information about a phenomenon in a discipline. The reason is that quantitative approaches tend to be objective, deductive, and generalizable. Similarly, the study found that researchers use the quasi-experimental research to identify problems with current practice, justify or condemn current practice, make judgments by making comparison between the current and the experimental variables. Although, it may cost more money, time, and effort, the study recommends that it is very important to choose a sample size that will be able to accomplish reliability and generalizability. This study believes that there is the tendency for researcher's bias in most research. The paper concluded that the quality of a research does not only depend on the adequacy of its planning, but also on the productivity of the measurement processes that are used.

Keywords: quantitative methods, descriptive approaches, quasi-experimental research, software project, sampling, validity, reliability, and bias.

Background

Quantitative research approaches in research are so attractive in software project management research because they offer various comparative angles from which a topic can be approached, especially as quantitative research is a methodical and organized process of using

numerical data to obtain information about the world (Burns & Grove, 1993; Cormack, 1991; Corner, 1991). The three major types of quantitative research are descriptive, quasi-experimental, and experimental. Researchers more frequently use the descriptive and quasi-experimental types of quantitative research in software project research (Burns & Grove, 1993). However, each methodology has its advantages and drawbacks that yield similar results if the sapling is effectively done.

According to Project Management Institute [PMI] (2017), software project management involves the application of knowledge, tools, and techniques to manage the development, adaptation, or upgrade of software projects subject to users' requirement. In the 21st century, interest in IT and software project management has grown dramatically (Debbie, Timothy, & Mark, 2007; Maizlish & Handler, 2007). IT companies across the globe hare under the pressure to increase their software project success to win new contracts and improve profitability. Unfortunately, large numbers of software projects fail despite the improvement in project management processes (Maizlish & Handler, 2007; Standish Group, 2004). Researchers have thus begun to study causes of failure of software projects, and many of them tend to use most frequently the quantitative approach in software project research (Gokaydin, 2007; Norri & Walker, 2004).

Purpose of the study

This study is a comparative analysis of the quantitative research approaches used to conduct studies on software project management. It examines the impact of sampling, validity, reliability, and bias on these methods of research.

Research Question

The research questions presented are based on the problems identified in this study. Answers to the research questions could produce practical recommendations on the preferred quantitative research methods to conduct software project management research.

RQ1. What quantitative research methods do researchers use to conduct research in software project management? The independent variable (IV) is quantitative research methods. The dependent variable is software project management.

Research Hypotheses

The following research hypotheses will guide this study:

$H_0$1: There will be no relationship between quantitative research methods and software project management.

H_A1: There will be a relationship between quantitative research methods and software project management.

$H_0$2: There will be no relationship between descriptive, quasi-experimental, and experimental methods and software project management.

H_A1: There will be a relationship between descriptive, quasi-experimental, and experimental methods and software project management project management.

Conceptual Model

Figure 1: Conceptual Model

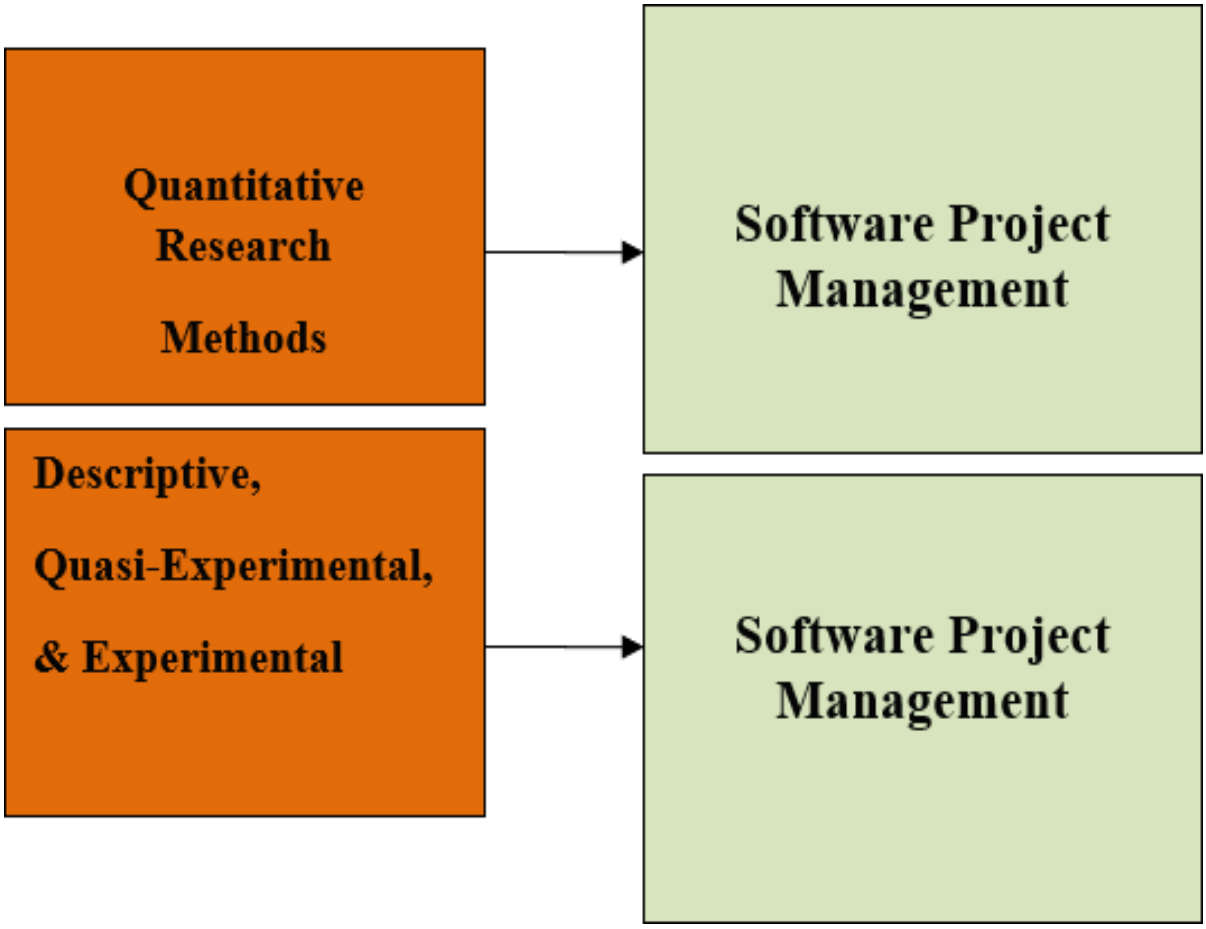

Figure 1 graphically illustrate the conceptual model for this study

Literature Review

The increase of interest in software application has ignited a concomitant spike in research in the various departments of components of area (Anantatmula & Thomas, 2010; Bandura, 1997; Benetti et al., 2009). Project Management Institute [PMI] (2017) defines a project as a temporary work embarked upon to deliver a special product, service, or outcome. There are different types of projects some of which include construction, manufacturing, product, capital, development, and software projects. However, software project management

involves the application of knowledge, tools, and techniques to manage the development, adaptation, or upgrade of software projects to meet users' requirement (PMI, 2017).

Some of the methodologies include Agile, RUP, Scrum, XP, SSADM, PRINCE2, XP, and Crystal. According to Sinha (2010), *Agile* is an adaptive approach, which relies on the philosophy that change is inevitable. It advocates a short delivery cycle, just-in-time analysis, close collaboration, and high visibility. Agile methods divide projects into minor boxes known as iterations, which further divide into scrums and sprints. A single iteration generally spans for two to four weeks to complete a deliverable set. Generally, the first iteration involves preliminary scoping, planning, and initial designing (Sinha, 2010). Subsequent iterations produce hands-on development.

After completion of one development iteration, the project manager will show demos and collect feedback (Sinha, 2010). The project team will then implement any changes needed in the working software in subsequent iterations (Sinha, 2010). Agile methods include agile modeling, agile unified process, dynamic systems development method, extreme programming, feature driver development, open unified process, and velocity tracking.

One of the benefits of this model is that it incorporates needed modifications in the software to avoid last-minute surprises. The future of software projects seems to lie in the use of highly agile and interactive development methods such as extreme programming, even though highly structured management methodologies such as RUP, a software design methodology created by the Rational Software Company, can still be valuable for large, static software projects (Sinha, 2010). RUP uses an iterative approach because it is a software product designed and built in a succession of incremental iterations. Each of the iterations includes some of the development disciplines - requirements, analysis, design, implementation,

and testing (Sinha, 2010). RUP has four project life cycle phases namely inception, elaboration, construction, and transition (Sinha, 2010).

The inception phase is where you build the business case, pass the life cycle objective, or cancel/redesign the project. In the elaboration stage, the PM sets up the basic architecture, mitigate risk; and pass the life cycle architecture milestone. At the construction phase, the PM builds the software system and codes the software. Finally, at the transition phase, the PM moves the software system from development to production, tests the software, and trains users.

The iterative approach leads to higher efficiency (Beck, 1999). Testing takes place in each iteration, not just at the end of the project life cycle, making it easier to detect problems earlier and easier and cheaper to resolve them. According to Beck (1999), RUP does not use a waterfall approach for software development and is particularly applicable on larger software projects. The phases of requirements, analysis, design, implementation, integration, and testing are not done in strict sequence (Beck, 1999).

Scrum is a software development process containing practices and predefined roles that enable the creation of self-organizing teams (Sinha, 2010). Scrum recognizes changes and focuses on dealing with emerging requirements. The main roles in scrum teams are scrum master, scrum team, and product owner. Scrum master is the role held by a project manager who coordinates and maintains the processes. He or she is the one who facilitates scrum processes and coordinates with the product owner and the development team (Sinha, 2010). However, the product owner is a key stakeholder representing the end user; he/she also serves as a proxy customer to the team. He or she is the one who prioritizes the requirements. The product owner answers team questions and provides directions to the team. The product owner

needs to have good communication skills, willingness to go deeper into understanding the product and its market value, good user interface skills, and some technical background (Sinha, 2010).

Team might be a cross-functional group of five to nine members doing analysis, design, implementation, and testing (Sinha, 2010). Software project management like any other project goes through the application and integration of the project management processes of initiating, planning, executing, monitoring and controlling, and closing (PMI, 2017). The goal is to have a successful project delivery that, according to Kerzner (2003), has achieved the desired objectives.

The dramatic growth and increase in IT and software project management across the globe in the last 15 years continues to put pressure on these companies to increase their software projects and techniques efficiency in order to win new contracts and improve profitability (Anandamela & Thomas, 2010; Gokaydin, 2007). Despite the improvement in project management processes and project manager certifications, there are still large numbers of IT/software projects that are not successful (Debbie, Timothy, & Mark, 2007; Maizlish & Handler, 2007; Standish Group, 2004). According to Standish Group (2004), only 29% of IT/software projects succeeded, meaning that 71% of those projects failed. Hartman and Ashrafi (2002) did a study on project management in the information systems and information technologies and found that many IT and software projects failed. Organizations that value software project management then started wondering how much investment and resources they should allocate to project management (Gokaydin, 2007).

The failure rate of IT and software projects creates an alarming situation leading to further research in software and IT project management. Studies indicate that researchers tend

to use the quantitative approach most frequently in software project research (Gokaydin, 2007; Lindbergh, 2009; Norri & Walker, 2004).

Quantitative Research Methodology

Quantitative research is a methodical and organized process of using numerical data to obtain information about the world for research purposes (Burns & Grove, 1993; Cormack, 1991; Corner, 1991). It is objective, deductive, generalizable, and numerical (Cormack, 1991). Benetti, Reginato, and Martins (2009) define quantitative research method as involving the collection and analysis of numerical data and the application of statistical test.

Comparatively speaking, whereas quantitative research tends to have objective analysis, qualitative research appeals more to subjective components (Benetti, et al., 2009). Quantitative research is also generalizable and that is especially important in research. Maxwell (1992) defines generalizability as the extent to which one can extend the account of a particular situation or population to other persons, times, or settings than those directly studied.

Quantitative research is one of the major methods and designs for the collection, measurement, and analysis of data. The majority of software project research is quantitative (Gokaydin, 2007, Cooper &Schindler, 2011). Part of it is that quantitative studies tend to be objective, deductive, and generalizable (Vogt, 2007). In quantitative study, the category of data determines the statistical procedures a researcher can use to analyze the data (Lindbergh, 2009; Zumbo & Zimmerman, 1993). For most quantitative studies, three categories of data are usually collected: nominal, interval, and ratio commonly referred to as levels of measurement (Zumbo & Zimmerman, 1993).

Quantitative Research Approaches

As mentioned above, there are three most popular approaches in quantitative research namely descriptive, experimental, and quasi-experimental. Although two of those three - descriptive and quasi-experimental are more associated with software project management, the paper will explain all the three approaches to create a general understanding of the approaches. Lindbergha (2009) uses the quantitative, non-experimental, correlational design to study the relationship between project manager capability, organizational culture, and project outcomes. He bases most of his literature on IT/software projects. MacCallum, Zhang, Preacher, and Rucker (2002) advocated the use of quantitative design in social science research in his study on the practice of dichotomization of quantitative variables.

Descriptive Approach

Researchers use descriptive approaches to collect information about a particular phenomenon in a discipline (Leedy & Ormrod, 2001; MacCallum et al., 2002). Descriptive designs do not involve the manipulation of variables or the determination of causality. A descriptive survey applies generally in scenarios of studying a current day condition or phenomenon and historical analysis used for understanding past events or conditions (Leedy & Ormrod, 2001).

There are three types of descriptive research design namely simple, comparative, and correlational. A simple descriptive research design applies when collecting data to describe persons, organizations, settings, or phenomena (Leedy & Ormrod, 2001). A comparative descriptive design applies when the researcher describes two or more groups of participants. A correlational research design applies when describing the statistical association between two or more variables (Leedy & Ormrod, 2001).

Experimental Approach

Experimental research is one in which the researcher attempts to maintain control over all factors that may affect the result of an experiment (Gall, Borg, & Gall, 2003). In doing this, the researcher attempts to determine or predict what may occur. According to Gall, Borg, and Gall (2003), in an experimental design, the researcher tries to manipulate the participants, in order to change the behavior of the participants. Part of the procedures is to assign participants to different conditions, and to measure variables of interest. All other variables in the controlled experiments remain fixed before the data collection begins. The researcher uses methods of physical, selective, and statistical control for the experiment (Gall, Borg, & Gall, 2003).

According to Gall, Borg, and Gall (2003), experimental studies involve manipulation, control, and randomization. Manipulation involves a situation where the researcher causes a change of behavior of the research participants. Controlling occurs when the researcher manages or puts conditions on the situation. Randomization is a situation whereby the researcher assigns participants to any group by chance (Gall, Borg, & Gall, 2003).

Generally, there are steps involved in conducting an experimental study. They include identifying and defining the problem; formulating hypotheses and deducing their consequences; constructing an experimental design that represents all the elements, conditions, and relationships of the consequences (Gall, Borg, & Gall, 2003). Others include conducting the experiment; compiling raw data and reducing it to usable form; and applying an appropriate test of significance (Gall, Borg, & Gall, 2003).

According to Gall, Borg, and Gall (2003), there are two types of validity in experimental research - internal and external. Internal validity seeks to know if the experimental treatment makes the difference in this specific instance rather than other extraneous variables. External

validity on the other hand seeks to know what populations, settings, treatment variables, and measurement variables can this observed effect be generalized (Gall, Borg, & Gall, 2003).

Quasi-experimental Approach

Quasi-experimental designs are usually constructions that already exist in the real world (Creswell, 2009; Burns & Grove, 1993). A quasi-experimental design will have some sort of control and experimental group, but these groups probably were not randomly selected (Creswell, 2009). Random selection is usually where true-experimental and quasi-experimental designs differ. Researchers use quasi-experimental design to examine causality where it is not feasible to use the experimental method (Creswell, 2009).

It is a design in which the researcher manipulates an independent variable to measure its effects on a dependent variable, and the researcher does not randomly assign participants to comparison groups (Creswell, 2009). In order to improve a quasi-experimental design, the researcher needs to match the comparison groups on characteristics that relate to the dependent variable (Burns & Grove, 1993; Creswell, 2009). The following paragraphs compare and contrast the descriptive and quasi-experimental designs more critically.

Compare Quasi-experimental and Descriptive Approaches

Quasi-experimental research uses non-equivalent control groups (Burns & Grove, 1993). Similarly, descriptive research also does not use control groups. Researchers use descriptive approaches to collect information about a particular phenomenon in a discipline (Leedy & Ormrod, 2001; MacCallum, Zhang, Preacher, & Rucker, 2002). Descriptive designs do not involve the manipulation of variables or the determination of causality (Leedy & Ormrod, 2001; MacCallum, Zhang, Preacher, and Rucker, 2002). Similarly, researchers use the quasi-experimental research to identify problems with current practice, justify or condemn current

practice, make judgments by making comparison between the current and the experimental variables.

A descriptive survey applies generally, in scenarios of studying a current day condition or phenomenon and historical analysis used for understanding past events or conditions (Leedy & Ormrod, 2001). Similarly, quasi-experimental research studies current day and real world conditions. Descriptive study has external validity and quasi-experimental research has external validity more as if real world conditions (Burns & Grove, 1993; Leedy & Ormrod, 2001). The both designs are feasible given time and logistical constraints.

Contrast Quasi-Experimental and Descriptive Approaches

The quasi-experimental design studies causality in experiments. While the descriptive approach studies variables as they are without trying to find out what causes something to happen (Burns & Grove, 1993; Leedy & Ormrod, 2001). Quasi-experimental design tends to change the behavior of test participants while descriptive design does not worry about changing behavior of test participants (Burns & Grove, 1993).

Descriptive research answers the questions: what, how, and why something is happening. Whereas, quasi-experimental design answers the question, does something cause an effect? (Burns & Grove, 1993; Leedy & Ormrod, 2001). Quasi-experimental research is deductive because researchers design all experiments to test hypotheses whereas qualitative research deals with the heuristic hypothesis-generating (Burns & Grove, 1993; Leedy & Ormrod, 2001; MacCallum, Zhang, Preacher, & Rucker, 2002).

Methodology

The purpose of this study was to compare quantitative researcher methodologies used in software project management research. The goal was to find out which quantitative research

methodologies are do researchers use. The study created a relationship between scores associated with the independent variable (IV) namely quantitative research methods and the dependent variable (DV) namely software project management. This chapter discussed the research questions and hypothesis.

RQ1. What quantitative research methods do researchers use to conduct research in software project management? The independent variable (IV) is quantitative research methods. The dependent variable is software project management.

Research Hypothesis

$H_0$1: There will be no relationship between quantitative research methods and software project management.

H_A1: There will be a relationship between quantitative research methods and software project management.

$H_0$2: There will be no relationship between descriptive, quasi-experimental, and experimental methods and software project management.

H_A1: There will be a relationship between descriptive, quasi-experimental, and experimental methods and software project management

Table 1. *Summary of Null Hypotheses, Independent, and Dependent Variables*

Hypothesis Number	Independent Variables	Dependent Variables
$H_0$1	Quantitative Research Methods	Software Project Management

$H_0$2	Descriptive, Quasi-Experimental, & Experimental Methods	Software Project Management

Research Design

This study adopts the survey design. Surveys are useful ways not only to determine the attitudes of people on particular questions but also to look for patterns of cause and effect among many variables (Cooper & Schindler, 2008). The selection of this research design is in line with the post-positivist philosophical assumptions (Creswell, 2009). Post-positivist research principles emphasized meaning and the creation of new knowledge, that can support committed social movements, that is, movements that aspire to change the world and contribute towards social justice. The characteristic of post-positivist research include: research is broad rather than specialized; theory and practice cannot be kept separate; the researcher's motivations for and commitment to research are central and crucial to the enterprise; the idea that research is concerned only with correct techniques for collecting and categorizing information is now inadequate (Creswell, 2009).

Methodological Model

The research instrument employed a five-point semantic differential Likert scale with values ranging from 1 *Strongly Disagree* to 5 for *Strongly Agree* (Carifio & Perla, 2008). Surveys use Likert scales for measuring attitudes, opinions and disposition by asking a user to make value judgments, which is relevant for this study (Carifio & Perla, 2008).

Likert type data involve an ordinal level of measure. Given ordinal level of measurement, Spearman's rho, a nonparametric statistical procedure became the statistical tool

to test the research questions and hypotheses. Furthermore, the data were screened for normality with skewness and kurtosis statistics.

Five out of seven distributions had significant negative skews, and six out of seven distributions were outside the range of normality for kurtosis. Since most of the distributions had significant negative skews and were outside the range of normality, the use of Spearman's rho, a non-parametric statistical test, was warranted to investigate the research questions and hypotheses (Field, 2009).

Population, Sample Size, Sample Frame, and Sampling Method Population

The population for this research was IT doctoral researchers in the United States. About 10 million professionals fit the target population (Bureau of Labor & Statistics (2012).

Sample Size

The target sample size, n, is expected to be at least 101 based on a sample power calculation with G*Power version 3.1.6. In calculating the sample size, a priori power analysis was performed to compute a sample size based on a given alpha, a given power, and given effect size values (Faul et al., 2012b). See Table 2 for the output of power calculation.

Table 2. *Output of Power Calculation*

Power Calculation

F tests – Linear multiple regression

Analysis: A priori: Compute required sample size

Input: Effect size f^2 =.15

α err prob = .05

Power (1-β err prob) = .95

Number of predictors = 4

Output: Total sample size = 101

Actual power = .0.9507039

Sample Frame

Doctoral researchers in IT with software project management experience from University of the Cumberlands formed the sample frame for this study. One hundred and twenty doctoral researchers participated in the survey. The demographics of the 120 doctoral students included software developers who work in small, medium, and large companies.

Sampling Method

The random selection of participants provided equal chances to all doctoral researchers in that database (Vogt, 2007). The strength of this sampling method was that it approximately represented the whole population thereby limiting the threat to validity or generalizability (Vogt, 2007).

A random sampling method was utilized in this study, with a 95% confidence level and a confidence interval of +/- 5%, which meets standard levels (Polit & Beck, 2004). A suitable sample size is one that has enough participants to be representative of a population, and has statistical power (Lowry, 2011). To determine the sample size that is representative of the population, one must know the population size, confidence interval and confidence level usually 95% (Vogt, 2007).

Recruiting participants involved sending out recruitment emails to doctoral researchers in IT with software project management experience who met the inclusion and exclusion criteria.

The recruitment message instructed potential participants to indicate their preference of participating in the study.

Instruments/Measures

This study used an original instrument design to investigate quantitative research approaches used in conducting research in software project management.

The final instrument was then constructed using a 5-point Likert scale with values ranging from 1 strongly disagree to 5 for strongly agree to collect the data. A total of 21 questions including biographical information constituted the measurement items on the instrument. The questionnaire items measured: liking quantitative research methods in software project management, and liking qualitative, quasi-experimental, and experimental quantitative methods.

Factor analysis that was performed showed most loadings occurring well above .50, which is considered a very acceptable factor loading. Generally, factor loadings ranged from 0.411 to 0.906.

Pilot Test

A pilot test was conducted to test the reliability and internal consistency of the instrument (Hertzog, 2008). Cronbach's alpha, a measure of instrument reliability (Cronbach, 1971), was computed to assess the scale reliability. All the Cronbach's alpha coefficients were greater than 0.70, indicating an adequate level of internal consistency. In other words, answers to a survey will be different due to differences in opinion not because the respondents have different interpretations of the survey or the survey is confusing (Cronbach, 1971; Hertzog, 2008). The results of ANOVA tests including the values of F-tests, levels of significance, and

values of the coefficient of determination indicated that the research model was robust and well-founded (Ali et al., 2008).

Data Collection

A survey was used to collect data for this study. According to Cooper and Schindler (2008), surveys are useful ways not only to determine the attitudes of people on questions but also to look for patterns of cause and effect among many variables. The survey, designed in the form of structured questionnaires was administered to 120 doctoral students at the University of Cumberlands, out of which 101 were completed and valid responses were received. The study used a random sampling method to select the 120 participants from the School. The random sampling method gives everyone an equal chance of being selected. The strength of this sampling method is that it approximately represents the whole population thereby limiting the threat to validity or generalizability.

The study participants were required to sign an informed consent form before they start. The participants were also required to complete the survey questionnaire, which was in hard copy distributed in class. The survey responses were inputted into a computer system and exported to IBM SPSS Statistics 20 software for statistical analysis. The data were copied and stored on a portable hard drive and encrypted with 256-bit Advanced Encryption Standard (AES) symmetric-key algorithm to ensure maximum protection and confidentiality.

Analysis and Interpretation

The data were filtered and exported to IBM' "Statistical Package for the Social Sciences" (SPSS) Grad Student version 20. Results that have partial, incomplete, or inconsistent data were rejected as items for analysis, while items that are valid and complete

were analyzed. The research instrument employed a five-point semantic differential Likert scale with values ranging from 1 Strongly Disagree to 5 for Strongly Agree.

Likert scales were used to measure the independent and dependent variables (Carifio & Perla, 2008; Norman, 2010). Likert type data is understood to involve an ordinal level of measure. Given ordinal level of measurement, a nonparametric statistical procedure - Spearman's rho was used for hypotheses testing (Carifio & Perla, 2008; Creswell, 2008; Field, 2009; Norman, 2010).

Furthermore, the data were prepared, screened for normality with skewness and kurtosis statistics. Five out of seven distributions had significant negative skews, and six out of seven distributions were outside the range of normality for kurtosis. Since most of the distributions had significant negative skews and were outside the range of normality, the use of Spearman's rho, a nonparametric statistical test, was warranted to investigate the research questions and hypotheses (Field, 2009).

This study is a comparative analysis of the quantitative research approaches used to conduct studies on software project management. The purpose is to find out the quantitative research approaches preferably used to conduct studies on software project management. It is also within the goal of this study to find out the impact of sampling, validity, reliability, and bias on these methods of research. Specifically, the study correlated scores associated with the independent variables namely quantitative research methods and the dependent variables of software project management.

Research Question Testing

The research question and hypothesis tested showed that many IT and software project management studies were done with quantitative methodology (Gokaydin, 2007). Korrapati

and Eedara (2010). The type of quantitative approaches used include qualitative and quasi-experimental. Although not a testable hypothesis, the study found from literature review that software project research areas include finding out the relationship between software project success and Information Technology (IT) employee job satisfaction in IT companies. Gokaydin (2007) used the quantitative approach to study the outcome of projects managed by certified Project Management Professionals (PMP) and compares the project outcomes to noncertified project managers. Norri and Walker (2004) use mixed method comparison survey, which includes a quantitative analysis utilizing ANOVA that demonstrated the statistical significance to study project management leadership.

Bias

Bias in research refers to a misrepresentation or alteration of the findings directly or indirectly by the researcher (Cooper & Schindler, 2008). There are two possible sources of bias: the effects of the researcher on the case, and the effects of the case on the researcher (Cooper & Schindler, 2008). Researcher effects, the first form of bias are when the researcher disrupts or threatens social and or institutional relationships (Cooper & Schindler, 2008). This has become one of the most challenging research biases to avoid in many quantitative studies when relying upon interviews.

The second form of bias is when participants tell the researcher what the researcher wants to hear or what is politically correct. The way to address this is to spell out the intentions of the research to the participants. This includes advising the participants about the purpose of the research, why the interviews are taking place, and how they would collect and use the information. Executives will be able to choose the location of the interview to remove the

threat quotient and perception of exoticism (Cooper & Schindler, 2008). This study did not involve any interview and was free of any bias.

Conclusion

Despite the improvement in project management processes and project manager certifications, there are still many software projects that are not successful (Debbie, Timothy, & Mark, 2007; Maizlish & Handler, 2007; Standish Group, 2004). According to the Standish Group (2004), 71% of software projects failed. Researchers thus, began to study causes of failure of software projects, and ways to increase the success rate of software projects (Maizlish & Handler, 2007).

As a result, researchers tend to use the quantitative approach most frequently in software project research (Gokaydin, 2007; Korrapati & Eedara, 2010; Lindbergh, 2009; Norri & Walker, 2004). Descriptive and quasi-experimental researches are the quantitative approaches that researchers use mostly in software project research (Gokaydin, 2007; Lindbergh, 2009). Part of it is that these quantitative approaches tend to be objective, deductive, and generalizable (Benetti, et al., 2009). The experimental approach, which is the other major quantitative research approach, requires the use of controlled groups, which is more appropriate to studies in medicine and nursing (Howe, 1998; Morse, 1991). The issues of sampling, validity, reliability, and bias are crucial in any empirical study.

Quantitative designs tend to meet the test of validity, reliability, and bias better than any other research designs (Benetti, et al., 2009). The analysis in this response shows that reliability is equally as important as validity. A study technically is of no use if it does not lead to generalization (Benetti, et al., 2009).

Recommendation and Implication for Further Research

Although, it may cost more money, time, and effort, it is simply important to choose a sample size that will be able to accomplish reliability and generalizability. This is akin to the popular adage that anything worth doing is worth doing well. There is the tendency for researcher's bias to influence the output of research studies (Miles & Huberman, 1994). Gladly, it is possible to clarify researcher's bias through Moustakas' (1994) epoch process. All being said and done, it is important to remember that, the quality of a research does not only depend on the adequacy of its planning, but also on the productivity of the measurement processes that are used (Benetti, et al., 2009).

This study did not look at all the methods of software development. Therefore, we could not generalize the finding of this study to all types of software project management. This could be areas for further research. This study focused on quantitative approaches that are associated with software management projects precluding all other types of research methodologies.

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EFFECT OF SPENT ENGINE OIL ON THE GERMINATION AND DEVELOPMENT OF GINGER (*Zingiber Officinale* ROSCOE)

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Prelude

The present study was carried out to evaluate the effect of spent engine oil on germination and growth attributes of ginger (Zingiber Officinale Roscoe) rhizome with a view to investigate the level of the pollutant that the tested plant can tolerate. The soil samples used in this study were collected from three experimental farms and mixed up to get a composite soil, spent engine oil was obtained from different mechanic workshops within Calabar while the Rhizomes were sourced from Watt market in Calabar. Soil samples (4kg per bag) were mixed homogenously with 25, 50, 75 and 100ppm of spent engine oil, with Oppm as the positive control. Rhizomes were then sown into planting bags. Soil analysis and Heavy metal analyses were carried out before and after contamination. Data were collected four times at interval of 21 days, for growth parameter which include numbers of days to cotyledon emergence, percentage germination, number of leaves, plant height, leaf width and leaf length. The chlorophyll content of the tested plant was also determined. Data collected were subjected to one-way Analysis of variance (ANOVA) and means were separated using LSD at 5% probability. Results obtained showed that spent engine oil contain

higher concentrations of heavy metals above the regulatory limits. There were significant differences ($p<0.05$) in soil nutro-physical properties of soil challenged with different concentration of spent oil. After 9 weeks of planting, all plant parameters evaluated were significantly ($p<0.05$) reduced as the concentration of spent oil increases. The chlorophyll content of plants on treatments also varied. The results suggest that spent engine oil as low as 25ppm could be considered inhibitory to the growth and yield of ginger. Hence, the present study showed that spent engine oil adversely affects the germination and growth of ginger.

INTRODUCTION

Ginger (Zingiber officinale) belongs to the family of Zingiberaceae . It is a slender perennial plant with thick and branched underground stem (rhizome), it is a spice grown across many parts of the world. Ginger is likely cultivated originated from India, where it is being cultivated in commercial level (Hass, 1998). Ginger was introduced in Africa and the Caribbean by the colonial masters and it is now cultivated throughout the humid tropics. It got to Nigeria in 1927 and its cultivation started around Kwoi , Kubacha , Kafanchan and Kagarlco areas of Southern Kaduna state and around the neighboring part of plateau state (KADP , 2000) .

Zingiber officinale is usually consumed in most Nigerians homes as a spice which can be used to spice up many dishes such as stew, pepper - soup and even different kinds of soups and a range of other value added products including flavouring in candies and beverages. Medically, studies indicate that ginger is effective in reducing inflammation in arthritic conditions (Srivastava et al. , 1992) . Another case study presented ginger as a preventive agent for migraine headache without any side effect (Muhammed et al. , 2007) . In view of the fact that ginger root has been used in several parts of the world in the management of motion sickness , researchers attempted to clucidate the mechanism of action . In one of the studies , it was proposed that ginger constituent

may increase gastric motility and prevent the accumulation of toxic substances , thereby blocking the gastrointestinal reactions which trigger the nausea

Environmental pollution due to spent - engine oil is a common hazard in developing countries were environmental laws are in effective or at best rudimentary . The basic challenges faced by mankind is how to produce enough food crops with increased yield to meet the ever increasing demand due to rapid increase in population .. Research has shown that millions of people in developing countries lack enough food to meet their daily demand . This food shortage is partly attributed to soil pollution due to spent - engine oil which is caused by man's residence and his activities on earth. This is because of the manifold surge in the number of automobiles coupled . Most of the automobile companies and workshops dispose their petroleum derived waste either into open soil or into water bodies and irrigation canals which ultimately reach to agricultural plants (Iwuoha et al . , 2015) .

The physical and chemical properties of soil polluted with petroleum hydrocarbons, undergo marked changes, the changes in soil due to contamination with petroleum derived substances can lead to water and oxygen deficit as well as shortage of available forms of nitrogen and phosphorus which are essential element that affect the growth and yield of plants . Contamination of soil with spent - engine oil leads to significant reduction of soil moisture content which subsequently induces the retardation in plant growth (Iwuoha et al., 2015).

Plants are known to respond differently to their environment right from germination and at their different stages of growth. Hence there is need to evaluate the effect of polluted soil on the growth performance of ginger.

Indiscriminate disposal of spent engine oil by mechanics is of great threat to the environment as it

contributes immensely to the degradation of the environment due to the excess hydrocarbon , which may adversely affect the germination , growth and yield of various plants . Since much work has not been done and published and this plant is of great importance to the society ; hence this study is necessary to determine the performance of the test plant (Ginger) grown on soil polluted by spent engine oil .

MATERIALS AND METHODS

Experimcntal site

This research work was carried out in the Department of Genetics and Biotechnology, University of Calabar, Calabar, while the field work was carried out at the experimental farm of the Faculty of Biological Sciences, University of Calabar.

Laboratory Analysis

Heavy metal contents of the spent engine oil analysis were carried out in the Department of Chemistry, University of Calabar, Calabar.

Sample collection

Rhizome of Ginger was obtained from Watt Market Calabar, Cross River State. Spent engine oil was obtained from diferent mechanic workshops located at Calabar Municipality, Cross River State. Top soil (0-25cm) was collected from different points in the experimental farm and mixed together to get a composite soil. Black polythene bags Were obtained from Ministry of Agriculture, Calabar, Cross River State.

Four kilograms (4kg) of dry soil each was weighed into 25 bags perforated at the base and side to ensure proper drainage and aeration.

Soil preparation/ treatment

Twenty-five (25) bags each containing loamy soil were contaminated using Oml, 25ml, S0ml 75ml

and 100ml of spent engine oil. Each treatment was replicated five (5) times

Planting of Rhizomes

Five rhizome of Ginger were sown in each polythene bag (a total of 25 bags) at a depth of 3cm.

Evaluation of Growth Parameters

The plants were monitored for a period of 9 weeks to ensure good conditions of sown rhizomes

Data Collection

Data were collected based on the following parameters; number of days to sprouting, plant height, number of leaves, leave width and leave length.

Experimental Design

This experiment was arranged using a randomized complete design (RCD) with (5) five replicates.

Analysis of Spent Engine Oil and Soil Used

Determination of moisture content in soil

Weigh the aluminum dish to be used. Aliquot approximately 50g of moist soil into aluminum dish and reweigh, hence, the moist weight of the soil sample is now known .

Dry the soil overweight at 105°C in the oven then remove the dish from the oven and allow them to cool. Reweigh the dish plus the even dry soil. Now, the weight of the dry soil is known, Calculate the soil moisture content each sample using the following equation:

Percentage moisture content (ML) = [wet weight-dry weight].

3.8.2 Digestion process for heavy metals analysis in soil samples

Homogenized the samples, the 0.5g of the sample into digestion bottle and add 100ml of distilled water to dissolve the sample. 0.5ml of conc. HNO; of conc. HCL to break the bond and release the metals, Heat in oven at temperature of 105°C for 2 hours and filter the sample using Whattman’s

filter paper into 120 ml beaker then add distilled water to make up the volume. Finally proceed for AAS analysis.

RESULTS

Table 1 reveals results of heavy metal analysis of soil after treatment which shows significant differences ($P<0.05$) in mean concentration of the treatment groups compared to the control. There was a gradual increase in the concentration of the metals as the concentration of the spent oil in the soil increased. The mean concentration of Cr was 0.00mg/kg for the control sample and 0.02, 0.04 and 0.06mg/kg for 25ppm. SOppm, 75m and 100ppm of spent oil in soil. Mean concentrations of Pb were 3.4, 9.5, L1.1, 11.8 and 12.4mg/kg for control, 25, 50, 75 and 100ppm of spent oil respectively. Average concentrations of Fe in soil samples were 17.9, 33.2, 40.1, 45.0 and 48.3 for control, 25, 50, 75 and 100ppm while those of As were 0.01 at all treatment levels.

Nutrient analysis of soil polluted with spent engine oil (revealed in table 2) showed that the concentration of Nitrate and phosphate of the control samples were significantly higher ($P<0.05$) compared to the treatment groups. The mean concentration of Nitrate reduced as the Concentrate of the spent oil increased; hence the mean values were 24.0, 15.1, 14.5, 15.3 and 10.0mg/kg for control, 25, 50, 75 and 100ppm of spent oil in the soil. Similar the phosphate concentration increased with increased level of spent oil with precisely mean values of 21.6, 17.30, 15.90, 15.40 and |1.3mg/kg for 0, 25, 50, 75 and 100ppm of spent oil respectively. For potassium, the mean concentration increased as the concentration of the spent oil increased. Mean concentration of P was 20.0mg/kg for the control sample and 23.0, 31.0, 30.0 and 29.0mg/kg for treatment with spent engine oil at 25, 50, 75 and 100ppm respectively. Total organic carbon content of soil of the treatment groups were significantly higher with mean values of 21.40, 29.10, 30.20, 31.20 and

34.70 mg/kg for control sample, 0, 25, 50, 75 and !00ppm of spent engine oil respectively. The moisture content of soil treated with !00ppm of spent engine oil was higher (4.44%) compared to the Control group (2.29%) and soil samples treated with 25, 50, and 7Sppm of spent engine oil with MC of 2.16, 2.34 and 2.13% respectively. The temperature of soil samples treated with spent engine oil was statistically Similar ($P>0.05$). The specific mean values of the soil samples were 27.50, 27.40, 27.47, 27.63 and 27.40°C for 0, 25, 50, 75 and 100ppm level of the spent oil. In terms of pH of the soil, the treatment groups were statistically similar ($P>0.05$) compared to the control. All soil samples were acidic regardless of the concentration of the spent oil, the specific pH values of the soil samples were 6.82, 6.84, 6.46, 6.26 and 6.49 for 0, 25, 50, 75 and 100pm treatment levels.

Table 3 shows result of chlorophyll content of Ginger grown on soil polluted with spent engine oil. Spectrophotometry analysis of Ginger grown on polluted soil indicated that chlorophyll contents were higher in the control groups compared to the treatments. The control had a relatively chlorophyll a and b content of 13.01 and 3.96mglg while those of the treatment groups were 11.75 and 3.81, 12.13 and 3.43, 12.81 and 2.97 and 13.04 and 3.72mg/g for 0, 25, 50, 75 and 100ppm treatment levels respectively.

Growth attributes of ginger grown on spent engine oil polluted soil is shown in figure 1. The result shows that, germination rate was significantly affected ($p<0.05$) by the presence of spent oil in the soil. Significant decrease was noted in percentage germination of seeds sown on contaminated soil compared to the control. 5.92%, 75%, 57%, 42% and 18% germination were recorded in soil polluted with 0, 25, 50, 70 and 100ppm of spent engine oil respectively. Average number of days to cotyledon emergence was delayed as it took the control group 7 days to germinate while those of 25, 50, 75 and 100ppm treatments took average 11, 16, 25 and 31 days respectively to sprout as

presented in figure 2.

Results of the growth attributes of ginger on spent engine oil polluted soil are presented in Table 4. Result obtained from the plant height showed that spent oil significantly affect ($p<0.05$) plant height at 3, 6 and 9 week after planting. Higher mean plant height of 25.80, 32.60 and 37.60cm was observed in plants on the control group at 3, 6 and 9 weeks after planting while the means plant height of 5.02, 9.38 and 21.00cm were recorded on soil polluted with 100ppm of spent oil at 3, 6 and 9 week alter planting as indicated in table 4. There was significant difference ($p<0.05$) in average number of leaves across the treatment groups When compared to the control at weeks 3 and 9 after planting, however, no significant difference ($p>0.05$) was observed between the control and treatment groups at weeks three after planting. Significantly higher mean number of leaves (10.40. 9.80 and 15.20cm) were observed on plants grown on the control while those of plants on 100ppm of spent engine oil were 2.00. 6.00. and 7.40 at 3. 6 and 9 weeks after planting as presented in table 4. In terms of leaf length, spent oil significantly ($p<0.05$) influenced lengths of leaves as plants on the control had mean leaf length of 15.02, 17.86 and 21.28em at 3, 6 and 9 weeks after planting. These values were significantly higher compared to those recorded on plants grown on spent oil polluted with 100ppm at weeks 3, 6 and 9 after planting (4.96, 8.16 and 9.34cm). Similarly, there was significant reduction in leaf width of plant sown on spent oi Polluted soil, Mean leaf width of 2.26, 4.42 and 1.96em were recorded on the control at 3.6 and 9 weeks after planting. Lower mean leaf width of 0.92, 0.98 and 1.72cm were however noted for plants on 100ppm spent engine oil at the same weeks after planting.

Table 1: Heavy Metals Result Soil Challenged by Various Levels of Treatments

Parameters	Control	25ppm	50ppm	75ppm	100ppm
Pb(mg/kg)	3.4±0.1	9.5±2.1	11.1±1.9	11.8±2.4	12.4±2.2

Cr(mg/kg)	ND	0.02±0.00	0.04±0.01	0.04±5.2	0.06±0.01
Fe(mg/kg)	17.9±2.1	33.2±3.6	40.1±4.8	45.0±5.2	48.3±4.9
As(mg/kg)	0.01±0.00	0.01±0.00	0.01±0.00	0.01±0.00	0.01±0.00

Pb=Lead; Cr=; Fe= Iron; As= Arsenic

Table 2: Nutro-physical Parameters of Soil Treated with Spent Engine Oil

Parameters	**Control**	**25ppm**	**50ppm**	**75ppm**	**100ppm**
Nitrate (mg/kg)	24.0±0.9	15.1±1.5	14.5±2.1	15.3±1.2	10.0±0.4
Phosphorus (mg/kg)	21.6±0.4	17.3±0.8	15.9±1.1	15.4±0.5	11.3±0.7
Potassium (mg/kg)	20.0±0.1	23.0±0.0	31.0±0.0	30.0±0.0	29.0±0.0
TOC (mg/kg)	21.4±0.02	34.7±1.2	31.2±1.6	29.1±1.8	30.2±2.3
MC%	2.29±0.0	2.16±0.0	2.34±0.0	2.13±0.0	4.44±0.0
Temperature ^{0}C	27.5±0.0	27.4±0.0	27.5±0.0	27.6±0.0	27.4±0.0
pH	62.82±0.0	6.84±0.0	6.46±0.0	6.26±0.0	6.49±0.0

TOC=Total organic carbon; MC=Moisture content

Table 3: Chlorophyll Content of Ginger Grown on Soil Polluted with Spent Engine Oil

Chlorophyll type	**Control**	**25ppm**	**50ppm**	**75ppm**	**100ppm**
Chlorophyll a (mg/g) at 645nm	13.01±0.0	11.75±0.0	12.13±0.0	12.81±0.0	13.04±0.0
Chlorophyll b (mg/g) at 633nm	3.96±0.0	3.81±0.0	3.43±0.0	2.97±0.0	3.72±0.0

Table 4: Mean ± S.E of Growth Attributes of Ginger on Spent Engine Oil Polluted Soil

	3 Weeks after planting					6 weeks after planting					9 weeks after planting				
Parameters	0ppm	25ppm	50ppm	75ppm	100ppm	0ppm	25ppm	50ppm	75ppm	100ppm	0ppm	25ppm	50ppm	75ppm	100ppm
Plant height (cm)	25.80± 2.60[a]	21.56±1. 73[a]	19.62±1.68[a]	12.48±0. 78[b]	5.02±1.67[c]	32.60±2. 95[a]	23.60±1.46[a]	24.10±0. 39[a]	15.46±1.2 7[b]	9.38±0.59[d]	37.60±2. 92[a]	29.58±1.70 [b]	28.58±0.54[b]	21.78±0.59[c]	21.00±0.89[a]
Number of leaves	10.40± 1.7[a]	7.00±0.8 4[b]	4.00±0.32[c]	2.80±0.8 4[c]	2.00±0.95[c]	12.80±1. 36[a]	9.40±0.40[a]	9.00±0.6 3[a]	7.60±1.14 [a]	6.00±0.90[a]	15.20±0. 73[a]	12.00±0.71 [b]	10.00±0.71[b]	10.20±0.49[b]	7.40±0.75[c]
Leaf length (cm)	15.02± 0.79[a]	11.20±0. 70[b]	10.44±1.05 [b]	0.86±0.6 5[b]	4.96±2.07[b]	17.86±1. 10[a]	13.00±0.76 [b]	12.96±1. 18[b]	9.72±0.75 [c]	8.16±0.94[c]	21.28±0. 37[a]	16.12±0.25 [b]	14.56±0.96[b]	12.48±0.69[c]	9.36±0.79[d]
Leaf width (cm)	2.26±0. 10[a]	2.22±0.2 0[a]	1.98±0.49[a]	1.60±0.9 0[a]	0.92±0.39[b]	4.44±0.2 4[a]	3.24±0.33[b]	3.32±0.2 3[b]	1.94±0.10 [c]	0.98±0.67[d]	4.96v0.7 5[a]	3.82±0.18[b]	3.60±0.20[b]	2.18±0.73[c]	1.72±0.18[d]

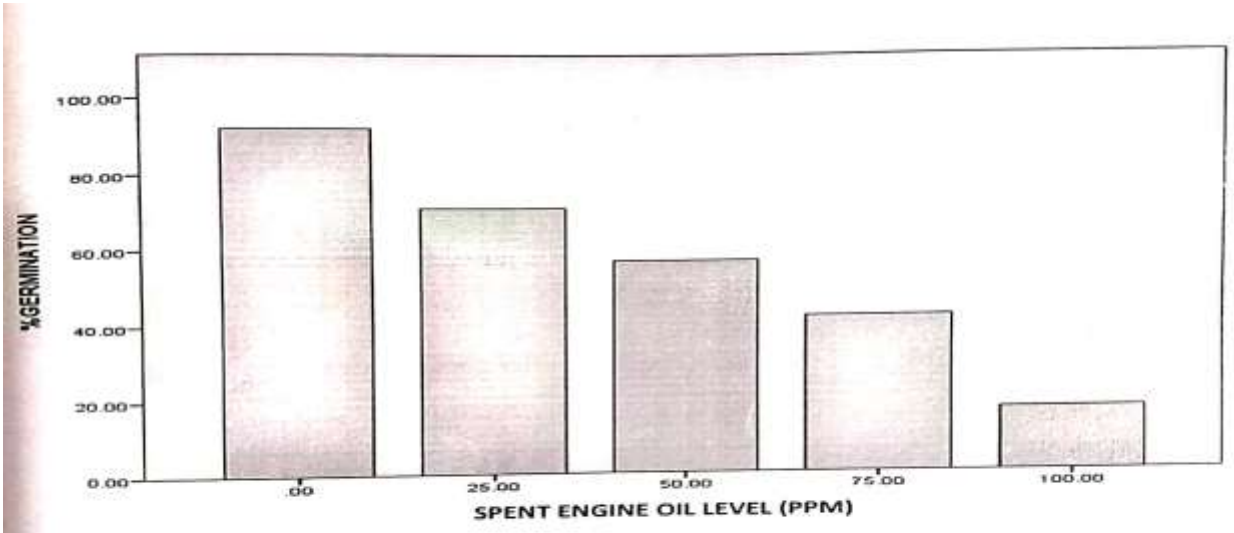

Fig 1: Percentage germination of ginger grown on spent engine oil polluted soil.

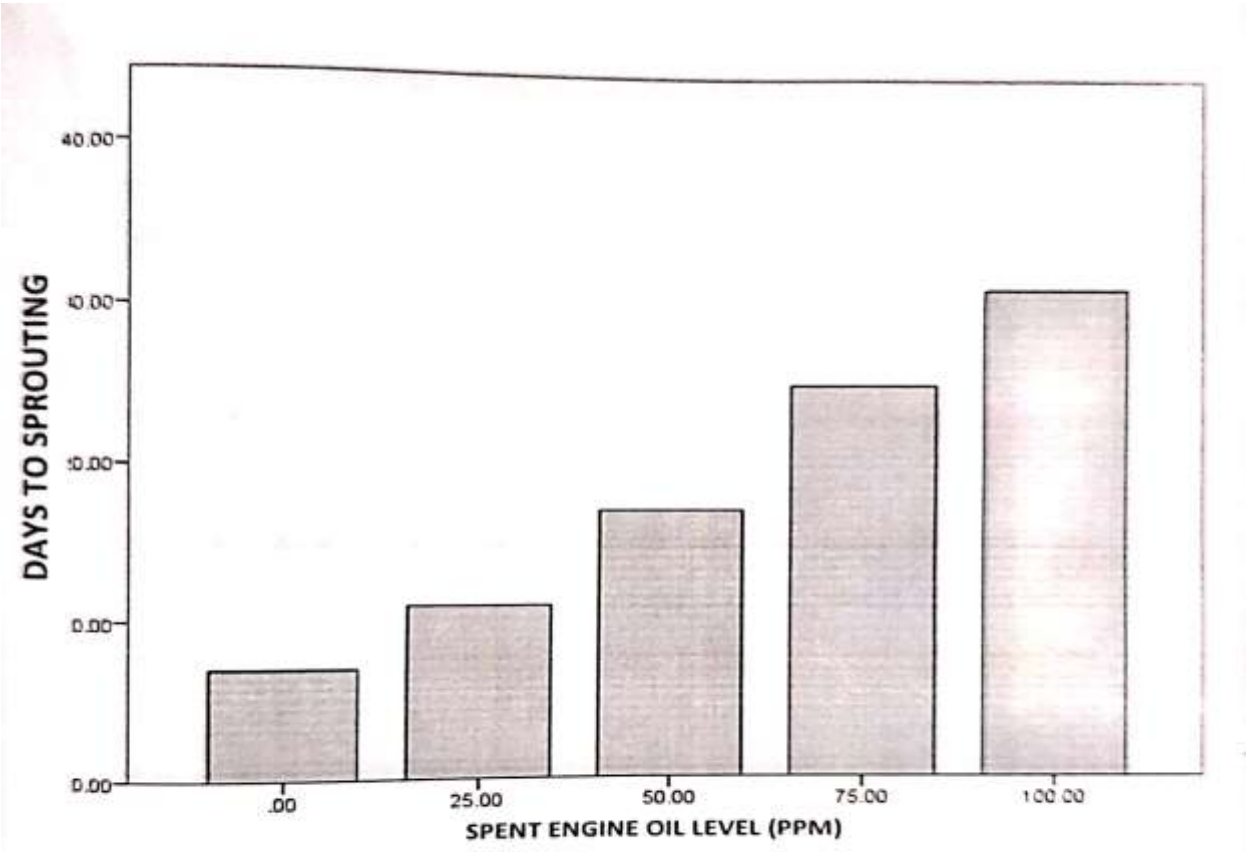

Fig 2: Days to sprouting of ginger grown on spent engine oil polluted soil

DISCUSSION

Some heavy metals such as Pb, Cr, Fe and As are usually associated with al] petroleum products that affect plant growth. The result of the analysis of spent engine oil content revealed that the concentration of Pb was significantly higher above the regulating limit of 0.05me/I permitted in any unused crude oil products. This is an indication of severer contamination of the spent oil by Pb producing activitics. On the other hand, the mean concentrations of Cr and Fe were within the regulatory and acceptable limits for lubricants. This implied the absence or near absence of Cr and Fe activities in the spent oil. However, the concentration of Arsenic in the spent oil was significantly low beyond the detection limit (0.00Ikg/l) of the equipment used. These result tallics with the report of so many researchers who reported that spent engines oil contained heavy metals in a significantly higher concentration that is detrimental to both plant and animals (Okonokhua eg al., 2007; Uchendu, ef al., 2014; Nwite ef al., 2015; Onwusin ef a/., 2017).

SPD content of the soil used in this study was analyzed before spent engine oil was introduced. Results showed that the sandy nature of the soil was relatively higher (46%) compared to clay and silt which constitute 30 and 24% of the soil. Similar results was obtained by Nwite et al,(2015) who observed 690, 200 and 110gkg" for sand, clay and silt respectively of soil sample obtained.

Heavy metal analyses of soil afier treatment were carried out. The same heavy metal species analyzed for spent oil was conducted for various soil samples afier been Challenged by various concentrations of spent engine oil. Result showed elevated Concentrations of Pb on the control sample, indicating prior pollution of the soil by the spent oil. The presence of Fe'* concentration, though within regulating limit in the control sample could be attributed to natural processes. The trace concentration of arsenic is Within the 30mg/I spent engine oil as permissible and regulatory limits.

However, the effects of the spent engine oil on the soil severely revealed a linear selationship between treatment concentration and the four heavy metal concentrations ic ys level of treatment increases from 25-100ppm so also docs the heavy metals concentration increased in the soil. The results obtained in the present study is slightly different from that of Uchendu ef al, (2014) who noted that the concentration of heavy metals

in polluted soil were irregular but however agree with the report of Okonokhua ef al., (2007) who concluded that heavy metals (Fe, Cu, Zn and Pb) concentrations of soil increased with increasing concentration of spent engine oil. The order of magnitude of feavy metal concentration observed in the spent engine oil analyses was similar to that observed in soil samples after the introduction of spent engine oil with the swapping of fe and Cr. A possible explanation of this could be that, the test plant take up more Cr than Fe.

The concentration of Nitrate, phosphate and potassium ions was determined as nutrient component of the soil after contamination. Results indicated that there was ‘ significant reduction N and P concentration with increasing concentration of the spent oil except among the 75ppm treatment level. The concentration of nitrate was highest in the control group, followed by phosphate before potassium. Surprisingly, the concentration of K severely increased with increasing concentration of the spent engine oi! with the exclusion of the 75 ppm treatment level suggesting that the soil at this level could be Slightly different from others or the spent engine oil exhibits a mechanism that is entirely different from other. This result agrees with the findings of Nwite et al., (2015) who Stated that available P. exchangeable K, Mg, Na and Ca were 143, 123, 34 and 48% significantly ($P<0.05$) lower at 1.01/poly bag of spent engine oil treatment compared with the control. They pointed out that spent engine oil at 1.0k severely affected physiochemical properties of soil more than any other levels except with regards to O, C and N concentrations.

The SPD result revealed a higher proportion sandy and silly proportion to clay in the control samples. However, the sandy proportion becomes reduced as treatment concentration increased. The spent engine oil seems to close the sand spaces, rendering it harder by blocking the wide ‘pore spaces. This gives rise to clay soil condition as evidenced in increasing clay concentration and soil nutrient percentage decreases. This explains wholly why the nitrogen and potassium concentration decreased as the spent engine oil treatment level increases. There were significant increase ($p<0.05$) in TOC. MC and Temperature of soil treated with 100ppm of spent oil though the pH levels of soil sample were all acidic. The pH values recorded in the present study is significantly higher compared to the pH range of 5.43-6.79 recording by Uchendu ef al., (2014) in soil polluted with different concentration of spent engine oil.

The chlorophyll content of the control samples was significantly higher than those of the experimental samples. Samples challenged by 25ppm spent oil caused a reduction in chlorophyll @ content though invariably causcd a higher chlorophyll / contents. Similar results was obtained by Clementine er al., (2008) on their study on the cflect of spent engine oil on growth and chlorophyll content of Corchorus olitorius, they noted higher chlorophyll content of 11.5mg/c on plant grown on the control samples compared to those planted on polluted soil.

The results from the present study indicate that spent engine oil contaminated soil Severcly affected the germination and growth of the ginger plant. According to the result Presented, there was a significant reduction in growth performance of plants grown on soil samples polluted with 50-100ppm of spent engine oil. The number of days to sprouting and growth rate was delayed and poor respectively, in contaminated soil compared to the control. This is in agreement with the findings of Clementina et al, (2008) and Uchendu et al., (2014). Okonokhua, (2007) who reported that the number of gays to emergence of seeds and growth performances after germination were adversely affected with increasing concentration of spent engine oil.

The mean leaf length and width of ginger were greatly affected by the spent engine oil. The significant reduction in leaf length and width in this report could be due to reduction in nutrient content of the soil challenged by different concentration of spent engine oil. It could also, due in part to the increasing concentration of the heavy metal content of the polluted soil samples as revealed by Agbogidi et al., (2013). Similarly, Onwusiri et al., (2017) also observed a gradual reduction in leaf length and width of fluted pumpkin grown on soil contaminated with 20, to 60, 80 and 100ml of spent engine oil.

Plant height was generally poor on contaminated soil. This is an indication that spent oil inhibited the growth performance of ginger. This could be as a result of imbalance in plants growth hormones triggered by the change in chemical composition of soil challenged with spent engine oil. Mean number of leaves per plant were significantly different on soil challenge with spent engine oil at various weeks after planting. The significant reduction in number of leaves per plants may be due to lower chlorophyll content noted in plants

challenged with spent engine oil. Apart from reduction in number of leaves, the colour of the leaves was yellowish which is a symptom of nutrient deficiency in plants. This is in agreement with the report of Clementina er al., (2008) and Uchendu et al, (2014),

CONCLUSION

The present study was carried out to check the effect of spent engine oil on the germination and development of ginger. The experiment was arranged in a 4x5 factional experiment using completely randomized design (CRD) with five replicates. Soil samples (4kg/bag) were treated with 25, 50, 75 and 100ppm level of spent engine oil. One group with Oppm of spent oil served as the control. Soil analysis and heavy metal analyses were carried out before and after contamination. Data were collected four times at interval of 21 days, for growth parameter which include numbers of days to sprouting, percentage germination, number of leaves, plant height, leaf width and leaf length. The chlorophyll content of the ginger plants was also determined. At 9 weeks after planting, plants showed significant reduction in growth performance and chlorophyll content with increasing concentration of spent engine oil

Results obtained from the present study revealed that contamination of soil with spent engine oil causes increased in heavy metals content of soil, reduction in nutrients and chlorophyll content of both soil and plants. A linear relationship was observed between the treatment concentrations and the heavy metal contents of the soil. Consequently, the pollutant adversely affects the germination, growth performance and yield potential of the tested plant (ginger).

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DESIGN AND IMPLEMENTATION OF SMART HOME AUTOMATION SYSTEM IN NIGERIA

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DESIGN AND IMPLEMENTATION OF SMART HOME AUTOMATION SYSTEM IN NIGERIA

ABSTRACT

Over the years, they have been lots of researched carried out to improve home automation in other countries of the World. However, little or no research at all has been done to improve the home automation system in Nigeria. The smart home automation system using Arduino and an Android device is primarily aimed at creating a convenient platform where users can control devices in their homes with ease.

The project will be created using an Arduino board containing a micro controller that will be programmed with C++ programming language. An android application will also be created to control the hardware. Hardware and software will be connected together using the

Bluetooth technology.

The platform will be developed using a methodology called prototyping method where the design team focus is to produce an early model of the new system, software or application. This prototype will not have full functionality or be thoroughly tested but it will give external customers a sense of what is to come.

Currently, well developed countries already use smart home control system widely but the reverse happens to be the case in Nigeria. It is therefore recommended that student and researchers in this part of the world should carry out more research on fields such as; Internet of Things (IoT), Robotics, Artificial Intelligence etc.

INTRODUCTION

The era of having only smart devices are over. We are gradually moving to smart buildings (any structure that uses automated processes to automatically control the building's operations) like companies, school and even our homes. According to (Rouse, 2017). Smart home technology, also often referred to as home automation or domotics (from the Latin word "domus" meaning home), provides home owners security, comfort, convenience and energy efficiency by allowing them to control smart devices often by a smart home application on their smart phone or other networked device (Tracy, 2016).

This system specifically answers the problem of security, inconveniences, connectivity and Home energy vampires.

The aim of this project is to design and construct a home automation system that will remotely switch on or off any household appliance connected to it, using a microcontroller and smart phone. This will be achieved through the following activities; Develop Bluetooth appliance, develop an application for a mobile device, Integrate the device to the controller and Test the setup and Analyze the data.

KEYWORDS: Arduino, Arduino Uno, Domotics, Android, Android Application, Internet of Things (IOT), Relays.

2.1 Arduino

Arduino is a single-board microcontroller meant to make the application more accessible which are interactive objects and its surroundings. The hardware features with an open-source hardware board designed around an 8-bit Atmel AVR microcontroller or a 32-bit Atmel ARM. Current models consists a USB interface, 6 analog input pins and 14 digital I/O pins that allows the user to attach various extension boards.

In a nutshell, an Arduino is an open hardware development board that can be used by tinkerers, hobbyists, and makers to design and build devices that interact with the real world. While Arduino refers to a specific type of board design, it can also be used to refer to a company which manufactures a specific implementation of these boards, and is typically also used to describe the community around compatible boards made by other people or companies which function in a similar way.

The Arduino Uno board is a microcontroller based on the ATmega328. It has 14 digital input/output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power jack and a reset button. This contains all the required support needed for microcontroller. In order to get started, they are simply connected to a computer with a USB cable or with an AC-to-DC adapter or battery. Arduino Uno Board varies from all other boards and they will not use the FTDI USB-to-serial driver chip in them. It is featured by the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

Figure 2.1: An Arduino Board

2.2 Features of the Arduino Uno Board

1. It is an easy USB interface. This allows interface with USB as this is like a serial device.
2. The chip on the board plugs straight into your USB port and supports on your computer as a virtual serial port. The benefit of this setup is that serial communication is an extremely easy protocol which is time-tested and USB makes connection with modern computers and makes it comfortable.
3. It is easy-to-find the microcontroller brain which is the ATmega328 chip. It has more number of hardware features like timers, external and internal interrupts, PWM pins and multiple sleep modes.
4. It is an open source design and there is an advantage of being open source is that it has a large community of people using and troubleshooting it. This makes it easy to help in debugging projects.
5. It is a 16 MHz clock which is fast enough for most applications and does not speeds up the microcontroller.
6. It is very convenient to manage power inside it and it had a feature of built-in voltage regulation. This can also be powered directly off a USB port without any external power. You can connect an external power source of upto 12v and this regulates it to both 5v and 3.3v.

7. 13 digital pins and 6 analog pins. This sort of pins allows you to connect hardware to your Arduino Uno board externally. These pins are used as a key for extending the computing capability of the Arduino Uno into the real world. Simply plug your electronic devices and sensors into the sockets that correspond to each of these pins and you are good to go.
8. This has an ICSP connector for bypassing the USB port and interfacing the Arduino directly as a serial device. This port is necessary to re-boot load your chip if it corrupts and can no longer used to your computer.
9. It has a 32 KB of flash memory for storing your code.
10. An on-board LED is attached to digital pin 13 to make fast the debugging of code and to make the debug process easy.
11. Finally, it has a button to reset the program on the chip.

2.3 Android Operating System

Android, a mobile operating system whose original creator was Andy Rubin and not Google has been with us in one form or another for over six years. Within this time, there has been an absolute breathtaking operating system development cycle that has never existed. Although lately, Android has been running on a one year unheard development cycle which is slower than it used to be as compared to Windows and Apple operating system (Amadeo, 2014).

According to (Hildenbrand, 2016), Android user interface is mainly based on direct manipulation using touch gestures that loosely correspond to real-world actions such as swiping, tapping and pinching, to manipulate on-screen objects, along with a virtual keyboard for text input. In addition to touchscreen devices, Google has further developed Android TV for televisions, Android auto for cars, and Android wears for wrist watches, each with a specialized user interface. Variants of Android are also used on notebooks, game consoles, digital camera and other electronics. Android's source code was released by Google under open source licenses which makes it popular with technological companies that require a ready-made, low cost

and customizable operating system for high-tech devices.

2.4 Android Applications

Android applications add more functionalities to Android devices. Some commonly known Android applications includes; social media platforms such as Facebook, 2go, WhatsApp and other common applications such as Calendar, contacts etc. These Applications also run on other Operating systems such as Apple IOS if the application was also written to run on those operating systems (Scott, 2016).

Android Applications are also written using the Android Software Development Kit (SDK) and the Java programming language. They include a comprehensive set of development tools including a debugger, software libraries, a handset emulator based on QEMU (Quick Emulator) documentation, sample codes and tutorials (Kadariya, 2013). According to (Staff, 2015) Google initially supported Eclipse as its Integrated Development Environment (IDE) using the Android Development Tools (ADT) plugin until in December 2014 when Google releases Android studio based on IntelliJ IDEA as its primary IDE for Android Application Development.

2.5 Major Home Automation Systems Using Cell Phone

1. **Bluetooth based home automation system using cell phones:** In Bluetooth based home automation system the home appliances are connected to the Arduino BT board at input output ports using relay. The program of Arduino BT board is based on high level interactive C language of microcontrollers; the connection is made via Bluetooth. The password protection is provided so only authorized user is allowed to access the appliances. The Bluetooth connection is established between Arduino BT board and phone for wireless communication.
2. **Wi-Fi based home automation system using cell phones:** Wi-Fi based home automation system mainly consist three modules, the server, the hardware interface module, and the software package. Wi-Fi technology is used by server, and hardware Interface module to communicate with each other. The same technology is used to login to the server web based application. The server is connected to the

internet, so remote users can access server web based application through the internet using compatible web browser. Software of the latest home automation system is split to server application software, and Microcontroller (Arduino) firmware. The Arduino software, built using C language, using IDE comes with the microcontroller itself. Arduino software is culpable for gathering events from connected sensors, then applies action to actuators and preprogramed in the server.

3. **Cloud Based home automation system:** Home Automation using cloud-based system focuses on design and implementation of home gateway to collect data about data from home appliances and then send to the cloud-based data server to get store on Hadoop Distributed File System.
4. **Raspberry pie home automation with wireless sensors using smart phone:** Home Automation System has been developed with Raspberry Pi by reading the algorithm and subject of Email. Raspberry Pi guarantees to be an efficient platform for implementation powerful, and economic smart home automation. Home automation using Raspberry pi is better than any other home automation methods in several ways.

3.1 Analysis of the Present System (Using Nigeria as a Case Study)

There has been an evolution across various spheres of life with every new stage made better than it previous. We have moved from the time where electricity did not exist, to the time when electrical appliances were first seen, to the era of smart product like smart phones etc. A typical Nigerian home has not reached the Apex of a smart home. Many homes still run on a manual system where everything in the home is controlled manually, one after the other. Some homes have tried approaching the smart home system by installing solar home system that automatically switches to the solar energy when power is out. This however does not satisfy the characteristics of a smart home.

The current manual system present in homes has the following characteristics;

1. Individual control of the system: The entire system is controlled one after the other. The bulb has to be switched off before moving over to turn off the cooker or heater etc. There is no central source use in controlling the system making it even stressful for larger houses.
2. There is no use of smart devices: The current manual home does not rely on the use of anything smart for its existence. A smart phone, smart watch or connectivity systems like Bluetooth and WIFI is not needed here.
3. Devices are controlled based on user actions: In a manual home system, everything is controlled because someone put in an effort to do so physically. This is not so in a smart home where there are some preset settings and automatics put in place example; turn off the security light when its morning.
4. The system does not require constant power: The effectiveness of the manual home system is not dependent on constant supply of power.
5. It can be easily altered: Anyone can use any household appliances by controlling it to its taste without the knowledge of the next person in the home. Smart home however has the ability to Log activities.

3.6 Problems of the Existing System

The manual home control system is not a perfect system because it has some problems. This is the more reason why the smart home control system must be put in place. These problems includes;

1. The inconveniences surrounded by the manual home control system
2. The security challenges faced with the system
3. The inability to control the appliances centrally
4. The high cost of energy loss.
5. Inability to prevent an outbreak that occurs when no one is home. Example; fire outbreak.
6. Burglars can have easy access to such homes
7. Home appliances can only be controlled when you are physically present unlike a smart home where you can switch on appliances using the internet from any location of your choice.

8.

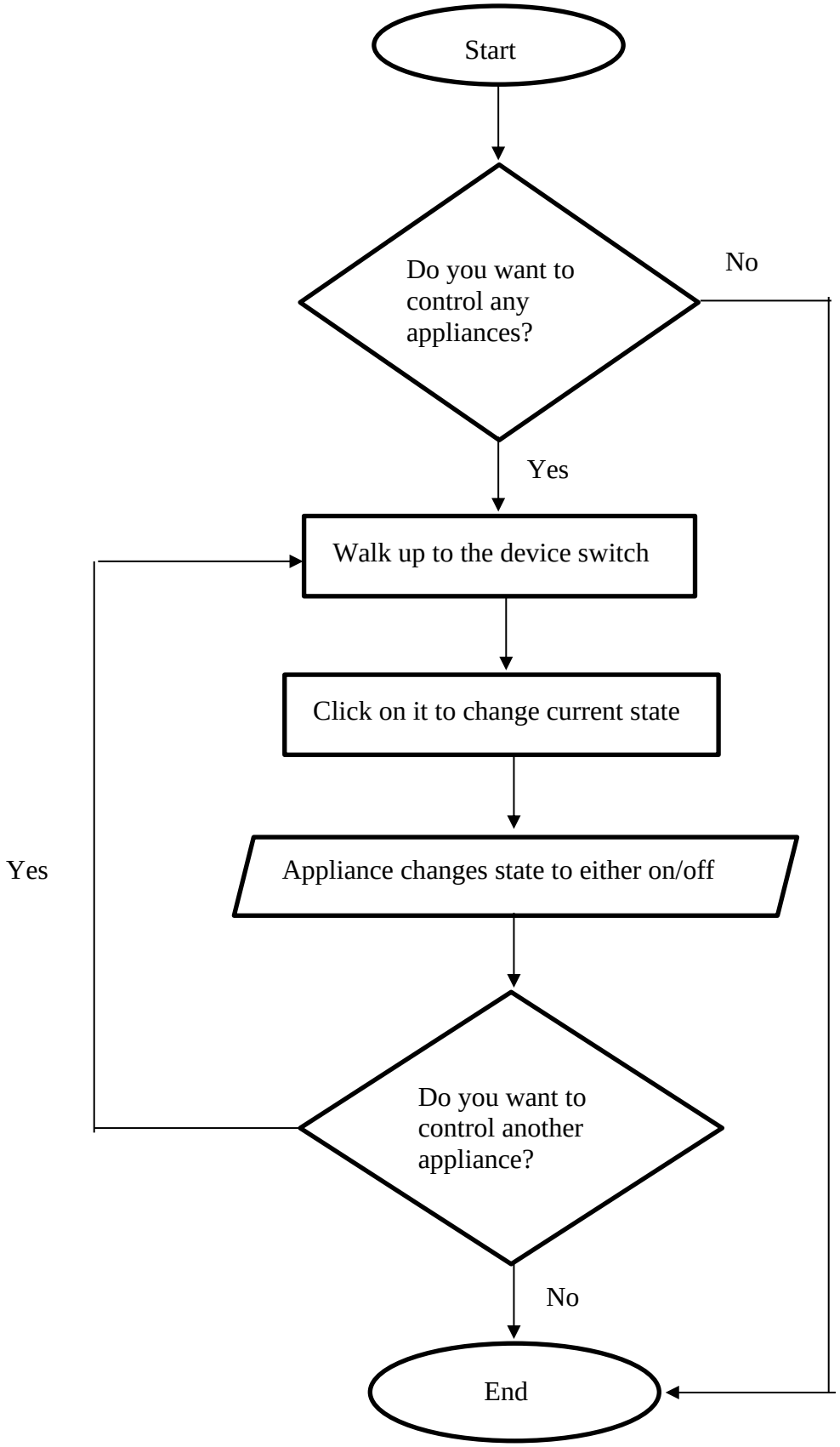
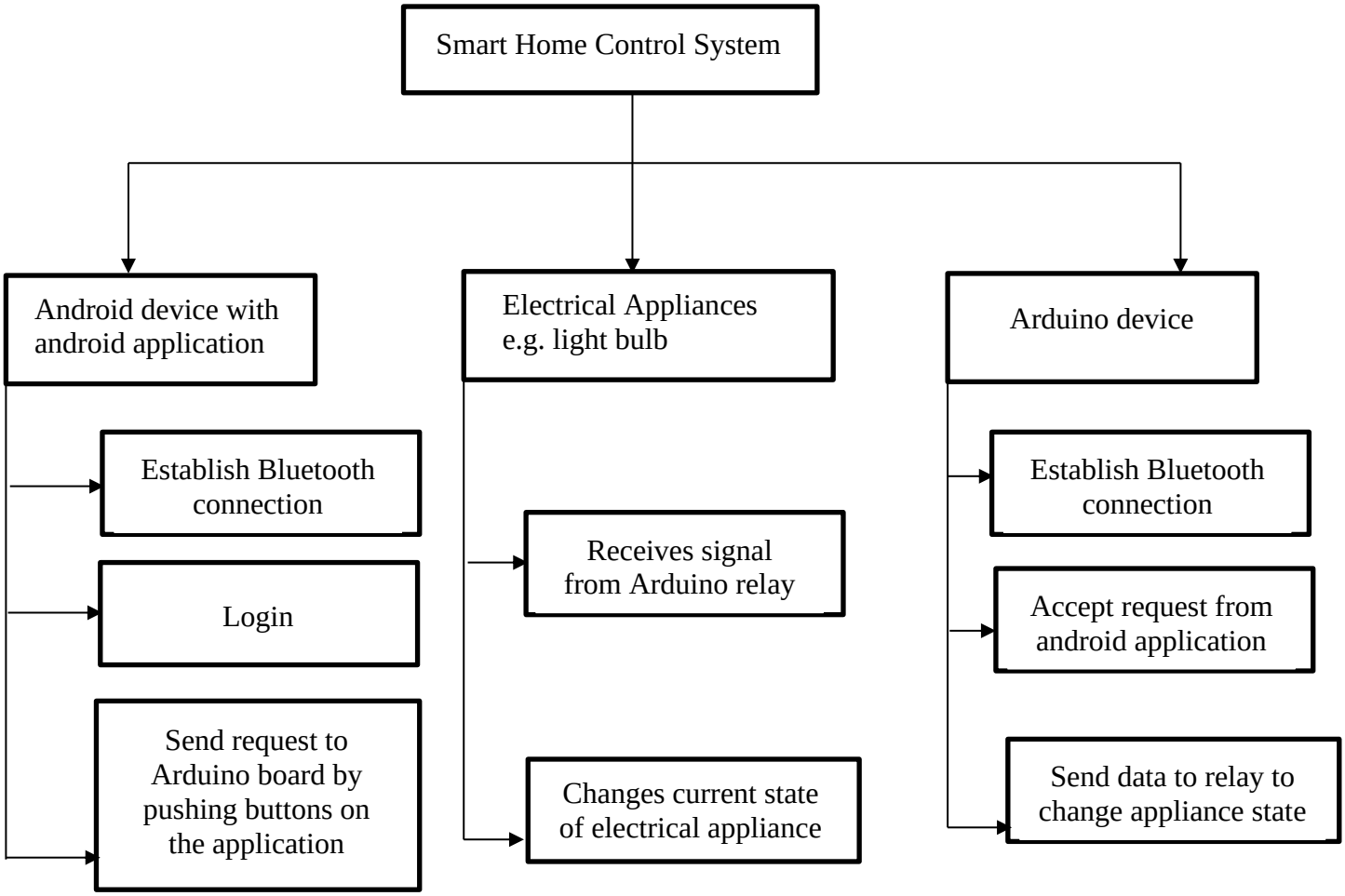


Figure 3.1: The organization of the present system using a flow chart

3.7 High Level Model of Proposed System

This section identifies all the modules in the new system design. Each module performs operations that are distinct from the operations of other modules. These modules work together as a system in order to achieve the objectives of the overall home automation process.



4.0: SYSTEM DESIGN

User Interface (UI) design is the process of making interfaces in software or computerized devices with a focus on looks or style (Calvin, 2019). The main aim here is to create designs users will find easy to use and pleasurable.

This project is an android application with various interfaces made up of interactive colours to make the application user friendly. The android application will contain different pages as shown below;

i. The Landing page: This is the first page that welcomes the user after installing and launching the application. It will have an experience that happens when the user first opens the application. It will also contain some information about the downloaded application.

ii. The Registration page: This page will allow the user enter his/her personal details that will be stored in the database.

iii. The Login page: The user after a successful registration will be directed to this page for proper signing in.

iv. Menu Page: This is the main menu with all the major activities in the application. From here, the sub menus of the application can be reached to control the smart home system.

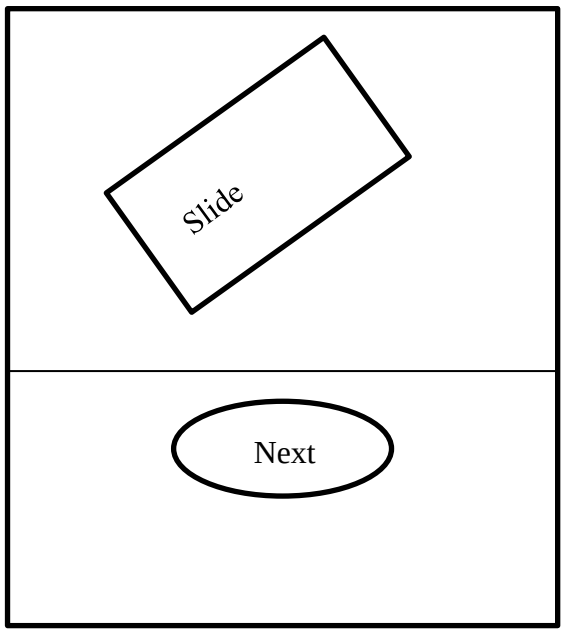


Figure 4.1: Landing Page

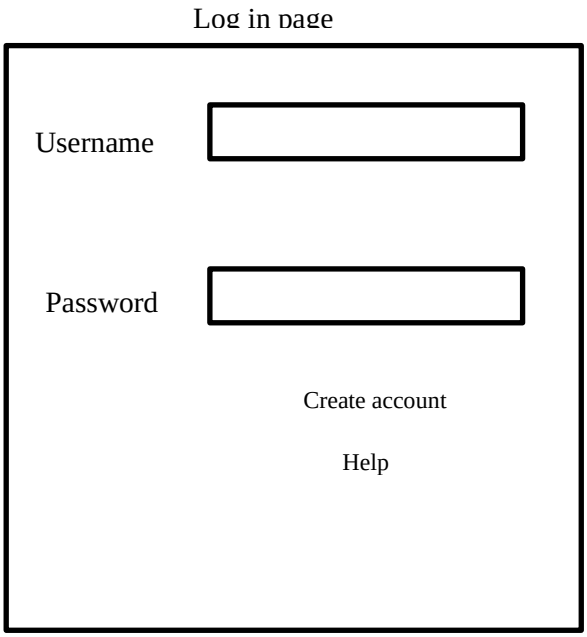


Figure 4.2: Login page

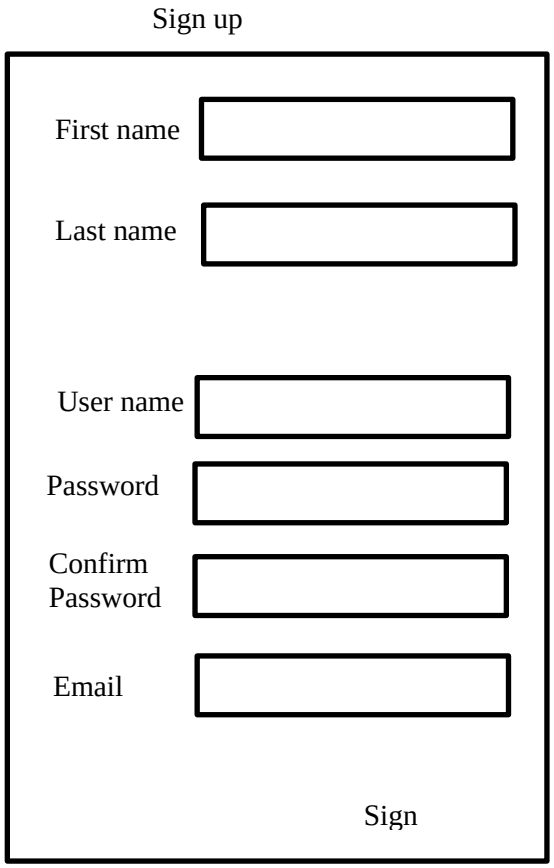


Figure 4.3: Register Page

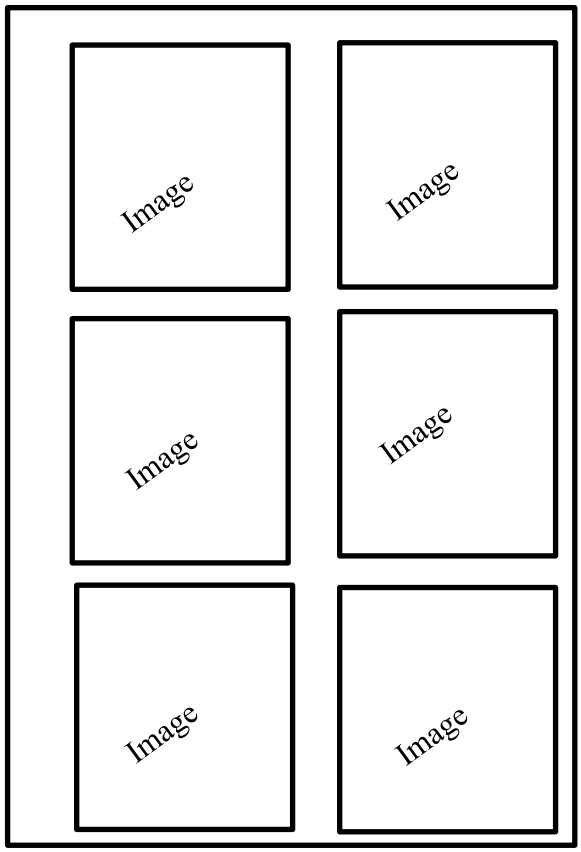


Figure 4.4: Main menu page

4.1 Database Design

The android application, Smart CSC will have a database majorly for storing information gotten from the user. The database has only one table and is called a flat file database (Techopedia, 2017).The database will be designed using the various design specifications below;

Entity Relationship Diagram:

An Entity Relationship Diagram shows the graphical representation of a database. It shows the tables and relationships between the tables in the database (SmartDraw, 2019).

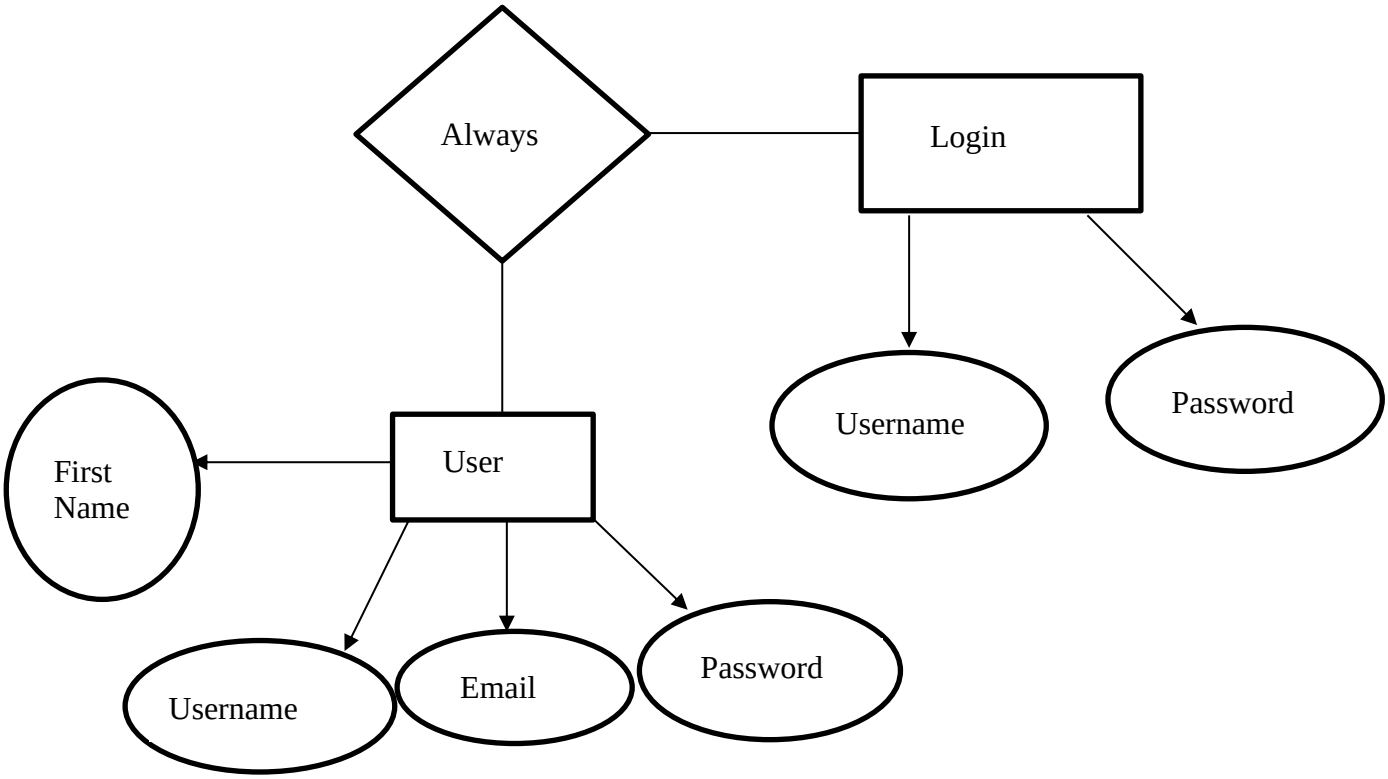


Figure 4.5: Entity Relationship Diagram

Table 4.1: Test Plan for Smart CSC Database Design

Test for adding a record		
Users table		
1.	When a text is entered in the First name field	It saves the record on the database
2.	When the first name field is left empty	It gives an error message
3.	When a number is entered in the first name field	It gives an error message
4.	When a text is entered in the Last name field	It saves the record on the database
5.	When the last name field is left empty	It gives an error message
6.	When a number is entered in the last name field	It gives an error message
7.	When a variable character (text/number) is entered in the username field	It saves the record on the database
8.	When the password entered matches with the confirm password	It saves the record on the database

Table 4.2: Data Dictionary

Table name\Entity	Field name\Attributes	Data type	Length	Default field value	Description
User	User ID	Number	10		Primary key on the user table
User	First name	Text	30		User's first name
User	Last name	Text	30		User's last name
User	User name	Var char	30		User's username
User	Password	Var char	30		User's password
User	Email	Var char	30	lluste@gmail.com	User's Email address

4.2 Program Specification

The requirement gathering stage includes the overall planning for the project and identifying all the project requirements such as hardware and software requirements. These processes are done by collecting data from many sources. At this stage plans were done about the project's resources and requirements, literature studies and schedule to get more information about the project. Materials were gotten basically using the internets on websites and YouTube, as well as books and research papers.

Within the data collection period, research shows that Android Operating System is the most common mobile operating system used in this part of the world and the creation of an Android application rather than iphone Operating System (IOS) or Windows is more preferable.

The following are the system requirements needed for the propose project;

i. An operating system like Windows.

ii. Database

iii. A laptop or desktop computer

iv. A virtual environment to test the application

v. An android device to test the application

vi. Massachusetts Institute of Technology (MIT) Application Inventor

The project required the specific hardware and software below;

i. A laptop or desktop with at least 4 gigabyte RAM

ii. A laptop or desktop running with a processor speed of at least 2.0 Giga hertz.

Software requirement for the project

i. Massachusetts Institute of Technology (MIT) App Inventor

ii. Fire base

Client-side System requirements:

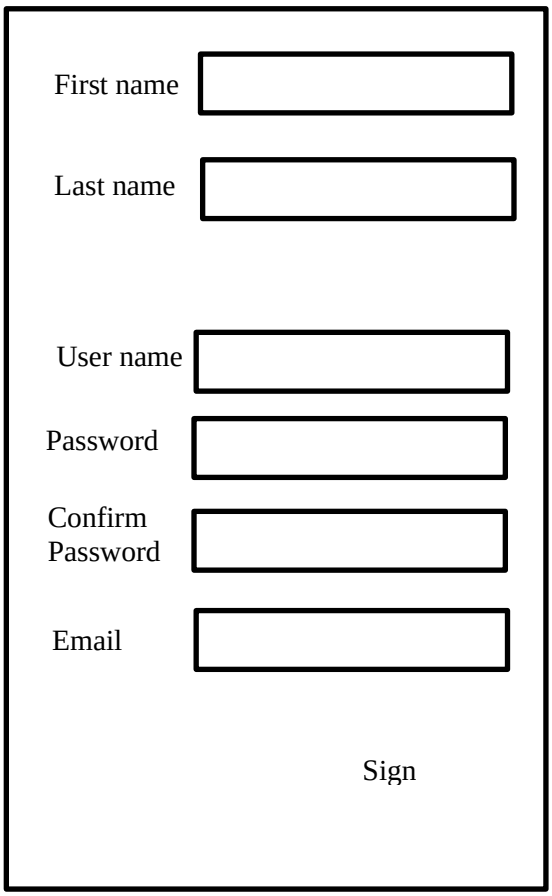
iii. Operating System: Android Operating System (from version 4.0 above)

iv. Device: Android devices

v. Internet access.

Input / Output Specification

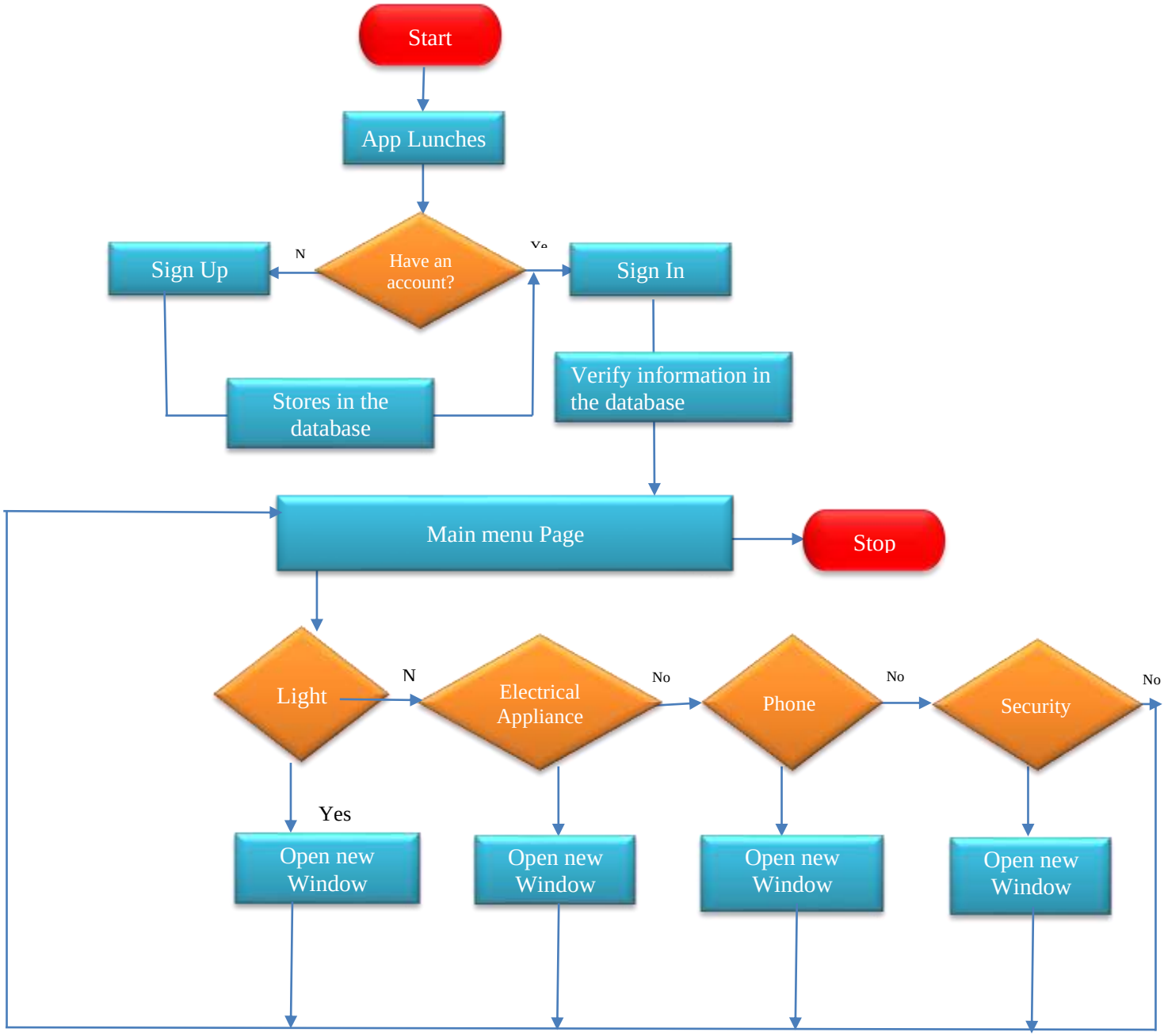
The Program will have an input structure from the registration page where user's inputs will be gotten. The input and ification are as shown below;



First	Username	Email	Password
Stella	StellyA	St@gmail.com	******

Figure 4.7: Output Screen

4.6 Overall System Flowchart and Block Diagram



4.7 Choice of programming Language

Programming language is a formal language which comprises of a set of instructions that produces various kinds of output. They are used in computer programming to implement algorithms. In developing the smart CSC system the C++ and MIT Block based programming language was used in the project implementation. C++ is a powerful programming language that is quite stable and fast. In Arduino programming, the programmer does not program the Arduino board itself but the microcontroller inside the board. C++ programming language because of its stated features is of no doubt one of the best in programming micro controllers. MIT block based programming was used in creating because of the simplicity and benefit of fewer lines of codes it offers (Wikepedia, App Inventor for Android, 2016).

Conclusion

Smart home control technological system falls into the brand of new inventions and its importance cannot be over emphasized. No wonder it is widely used in more advanced countries.

It is high time we take the step ahead in ICT in this part of the world, looking away from some barriers that can hinder us.

5.3 Recommendation

Africa as a continent should not be left out in the flow of ICT. Many homes in other parts of the world already have these systems incorporated but the reverse is the case in Africa.

Nigeria as a hold needs to work on their electrical system (PHCN). This is because Smart CSC functions effectively when a house has electrical supply.

Students in computer science department should be encouraged to carry out more research in fields such as

Internet of Things (IoT), robotics, artificial intelligence etc.

Finally, Citizens of Nigeria should do well to incorporate project such as Smart CSC in their homes without any fears to the best of their capacity.

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