UNIVERSITY OF LAGOS, NIGERIA

Inaugural Lecture Series 2018

TOPIC:

THE BEAUTY AND POWER OF NUMBERS: BUILDING BLOCKS FOR MATHEMATICS AND SCIENTIFIC DEVELOPMENT

By

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An Inaugural Lecture Delivered at the University of Lagos
J. F. Ade. Ajayi Auditorium on Wednesday
19th September 2018

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ISSN: 1119-4456

Published by

University of Lagos Press and Bookshop Ltd.
Works and Physical Planning Complex
P.O. Box 132
University of Lagos
Akoka, Lagos
Lagos, Nigeria.

Email: press@unilag.edu.ng

Dedication

To Almighty God Who makes all things beautiful in His own time. To my dear husband of blessed memory who held the academic ladder firmly for me to climb to the top and lastly to my wonderful children and their spouses.

Protocols
Vice-Chancellor,
Deputy Vice-Chancellor (Academics & Research),
Deputy Vice-Chancellor (Management Services),
Deputy Vice-Chancellor (Development Services),
The Registrar,
The Bursar,
The University Librarian,
The Provost College of Medicine,
The Dean, Faculty of Education,
Members of Senate,
Heads of Departments,
Other Principal Officers of the University,
Directors,
Distinguished Academic and Professional Colleagues,
Distinguished Non-academic Colleagues (Administrative and Technical),
Your Excellencies,
Your Royal Majesty and Highnesses,
Your Lordships (Spiritual and Temporal),
Dear Students,
Members of the Press (Print and Electronic Media),
Distinguished Guests, Ladies and Gentlemen.

PREAMBLE

It is with deep sense of humility and gratitude to God that I present myself this day 19th September, 2018 to deliver this inaugural lecture, in the 2017/ 18 academic session in this great University. This inaugural is the first in Mathematics Education in the Department of Science and Technology Education and also the first in the Faculty of Education since the establishment of the Faculty and by extension the first in the history of our great University. I am the third Professor of Mathematics in the Faculty, this is quite significant as it underscores the wide apathy towards Mathematics, the wheel for scientific and technological development. The alphabet of Mathematics, NUMBERS will be used in this lecture to tackle the apathy against Mathematics.

Mr. Vice-Chancellor sir, my love for numbers started from primary school in the mental arithmetic classes. I was always among the first pupils who got the answers to the mental arithmetic problems. This continued all through my secondary school. In one of our classes in my form three, our teacher then was one of those undergraduates who came to teach in secondary schools during their long vacation. The teacher and the class were battling with one problem in arithmetic when all of a sudden I had an insight into the problem. I solved it on my paper and raised my hand to solve the problem on the board. The teacher was initially reluctant but eventually agreed. After solving the problem, my classmates started calling me 'Mrs Durrel'. Durrel was the author of the mathematics textbook in use then at the secondary school level. The teacher called me 'Mrs. Chike Obi': that was the first time I heard that name. I never knew that was the man God will eventually use to bring me into academics.

In form four, the principal of my school, Miss Mary Maduekwe of blessed memory, took over our mathematics classes. She noticed this potential for numbers in me and selected just six of us in the first term of form five to register for Additional Mathematics (now Further Mathematics). All of us who registered had credit and above in Additional Mathematics when the School Certificate result was released. Our Principal took great interest in me and encouraged me to proceed to the Federal Government College, Okposi in 1967 for the Higher School Certificate (HSC) programme to study Mathematics, Physics and Chemistry so as to become an Engineer.

However, it was not to be, because the Nigerian/Biafran war broke out and all schools in the Eastern part of the country were closed. In the middle of the war, I got married. My

academic career resumed again in 1973 at the Advanced Teachers College, Kano. My Mathematics lecturers noticed this same ability for Mathematics. In a chat with one of them, I told him that I wanted to be an Engineer but today I am not training as an Engineer but as a Mathematics teacher. He assured me that I would produce many Engineers. Today, the truth of the statement is established. Many students whom I taught in the primary, secondary and the tertiary levels are now Engineers and I am more fulfilled as a Teacher of Mathematics than I would have been as an Engineer.

INTRODUCTION

The study of Mathematics as a core subject cuts across all boards and has always left us with one question, "Why should Mathematics continue to be a compulsory subject in primary, secondary and to some extent in tertiary levels of education?" Those that questioned why Mathematics should be retained as a core course at the secondary school level or beyond, only vex themselves with using mathematical skills to solve life related problems. This is why I define Mathematics as the father of all forms of logical and rational reasoning, also indispensable in solving life challenges and problems. It is the first of the basic 3Rs of education, which are aRithmetic, Reading and wRiting. What is Mathematics like? It is like air that comes in different forms of levels, e.g. breeze, wind, storm, tornado, hurricane, whirlwind, tempest, cyclone or blizzard. The simple part of mathematics is enjoyable just like a breeze but at the advanced stage of it can be like a hurricane to those who have no use for it. Mathematics is like two young lovers in a relationship that ended up getting married. It is all about love, affection, romance, etc. But as they move on, it becomes more of responsibilities and hard work to keep it working.

Who needs mathematics? Everyone does. Is there anyone who can avoid learning mathematics at any level education? Not at all! At least, you must learn the si arithmetic like addition, subtraction, division, multiplication, and measurement for everyday application. According to Halmos quoted by Albert (1980), "Mathematics is security, certainty, truth, beauty, insight, structure and architecture". It is a means of understanding nature, patterns and the universe. It is the loom upon which God weaves the fabric of the universe. It is science of patterns, a conducting thread, connecting scientific ideas with the understanding of our environment and a formal system of thought for recognising, classifying and exploiting patterns developed by human mind and culture" {Adepoju, 2004).

2.1 Brief History of Numbers

"Number" is an idea that cannot be sensed with our five physical senses. Numbers are indispensable in today's society and appear practically everywhere from football scores to phone numbers, to the time of the day. The reason number appears everywhere is because number is actually an idea and not something physical. Many people think they can physically see the number three when written on the board but this is not so. The number three cannot be seen because it is an idea. Mathematical ideas like numbers can only be seen with the "mind's eye" because that is how one sees an idea.

The relationship between numbers and civilisation is symbiotic. The history of numbers and civilisation is such that without numbers, civilisation could not have advanced nor could numbers without civilization. The first use of the number 1 as a counting number was 20,000 years ago. Humans are the only species who have the ability to count, form numbers and perform calculations on them. Many different number systems have been developed and used by different cultures and civilisation through the ages. Nikolai Weiball (2011) identified three ways in which human's reason about numbers irrespective of culture and civilization. These three ways are: one, talking about number and the need to represent numbers in speech; two,

write about numbers hence, a representation in form of notation or symbol is required; and three, humans need to reason about numbers. This need gave rise to a number basis, radix or fundamental number from which all other numbers radiate. Each fundamental number forms a set and each set becomes a number system. These systems have been affected by civilization overtime.

2.2. Primitive and Prehistory Number System

The primitive and prehistory number system was born out of necessity to express magnitude. Examples of such number systems are the "body count", the bundle stick, tally sticks, 2-count and neo-2 count. The body count describes magnitude with different part of the body. Each part of the body was associated with a given quantity and by touching them, the given quantity is inferred. The mode of counting was mainly through the fingers and toes.

2.3 Tally Sticks and Bundle

Tally sticks are simply pieces of wood in which notches have been made to represent some quantities. Tally sticks were used for accounting purposes in the 18th century, a bundle is made like ~~IIII~~ representing 5. It is with us even till date, as students use tallies in elementary Statistics.

2.2 Count

2-2 count could be called a counting system with only two numbers 1 and 2 and sometimes an additional expression for 'many' or uncountable magnitude. This 'Bushman 2-count' shows the number words used among the Bushman in South Africa.

Figure I: 2.2 Count

Number	Word or Combination
1	xa
2	t'oa
3	xa- t'ao
4	t'oa- t'oa
5	t'oa- t'oa-xa
6	t'oa- t'oa-t-oa

This counting and numbering systems has limited application because for large numbers, the repetitions would become too large to manage. The count was improved and expanded by the Neo-2-count. In the Neo-2-count, there are words for 3 and 4. This made it possible to express large numbers as products of 2 with 3 and 4. For example in this system, 5 is 2 + 3 and 7 is 1+2×3 and 10 is 2+2×4. This system of numbers has the same limitation as 2-count.

Figure II: Neo- 2-Count

Number	Word or Combination
1	nathedac
2	cacayni or nivoca
3	cacaynilia
4	nalotapegat
5= 2 + 3	nivoca cacaynilia
6= 2×3	cacayni cacaynilia
7= 1+2×3	nathedac cacayni cacaynilia
8= 2×4	nivoca nalotapegat
9=2×4+ 1	nivoca nalotapegat nathedac
10= 2+2×4	cacayni nivoca nalotapegat

2.4 The Egyptians Number and Number System

The Egyptians use more of picture for their numbers, hence their hieroglyphic number system dates back to 3000BC. It uses 10 as the radix, therefore, it is a decimal system. The Egyptians invented different symbols for different numbers.

They have symbol for 1, which is just a line, while that of 10 is a rope, up to a million. The symbol for a million is a prisoner begging for forgiveness that is, a person on his knees with hands raised. The different numbers and notations are given in *figure III*.

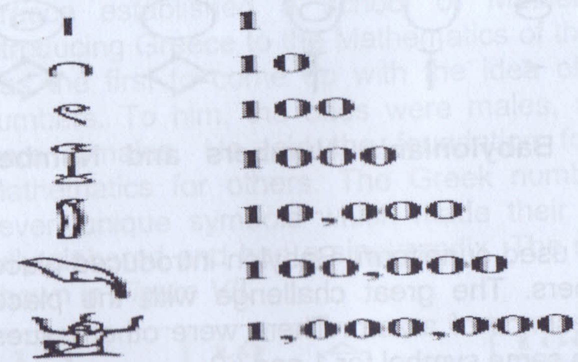

Figure III: Egyptian Numbers

The Egyptians have hieroglyphic numerals for almost all numbers. The basic arithmetic operations were quite difficult with the hieroglyphic Egyptians numbers.

2.5 The Sumerians and Babylonian Numbers and Number System

The Sumerians used 60 as their base. It is from this number base that modern usage of 60 seconds in a minute, 60 minutes in an hour and 360(60x6) degrees in a circle took their roots. The 'Sumerian Numerals' are shown in the figure below.

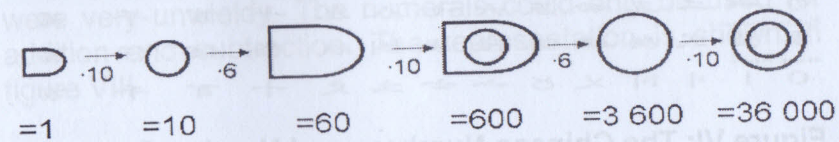

Figure IV: The Sumerian's Numbers and Number System

In figure IV, 1 and 60 share the same symbol but that of 60 is slightly bigger. The Babylonian's was very similar to that of the Sumerian's. They shared the sexagemal (base 60)

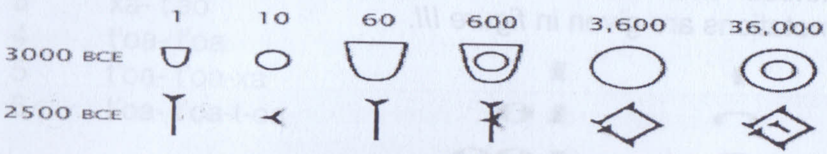

Figure V: The Babylonian's Numbers and Number System

The Babylonians used cuneiform. Babylon introduced place value into numbers. The great challenge with the place value was the absence of a zero. There were other issues like the use of the same symbol for 1 and 60.

2.6 Chinese Numbers and Number System

The Chinese Numbers and Number System dates back to 2500BC. They have not been affected much over the years. Their main difference from other number systems is the presence of zero. The Chinese have number words for 1 to 9, similar to the English system. Powers and higher numbers follow the English pattern. Numbers in Chinese are written the way they are spoken. There are also different forms of 'Chinese numerals'. The representation is shown in *Figure VI.*

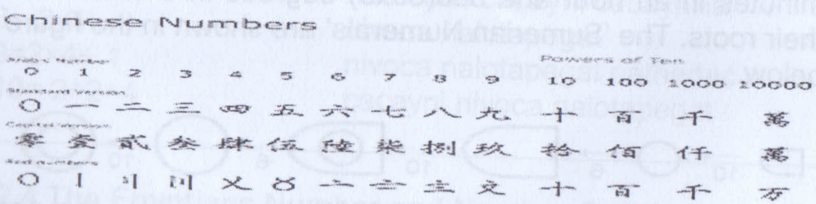

Figure VI: The Chinese Numbers and Number System

2.7 Greek Numbers and Number System

The Greek number and number system were influenced by the Egyptian number and number system. The contribution of Greece to the world of numbers was spearheaded by Pythagoras. He studied in Egypt and upon returning to Greece established a school of Mathematics, thereby introducing Greece to the Mathematics of the Egyptians. He was the first to come up with the idea of odd and even numbers. To him, the odds were males, while the evens were females. He laid the foundation for future Greek Mathematics for others. The Greek number had twenty-seven unique symbols which made their number system fully ciphered and had a single radix. The representation is shown in *Figure VII.*

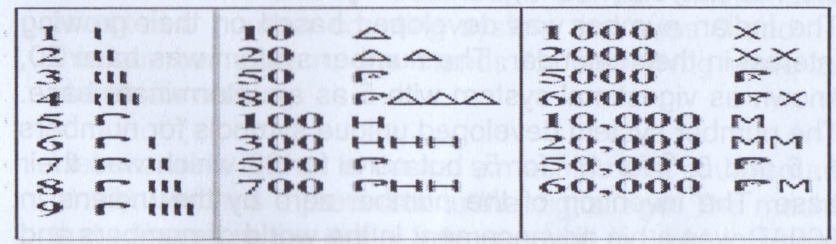

Figure VII: Greek Number System

2.8 The Roman Numbers and Number System

The Roman number and number system came into use around the beginning of the Common Era, i.e., A.D. It was also a decimal system with no zero. Their numbers were mainly capital letters, for example, 5 is V, 10 is X, 50 is L, 100 is C and D is 500. Higher number were formed by a combination of these letters. The Roman numerals/numbers were very unwieldy. The numerals could only be used for addition and subtraction. The representation is shown in figure VIII

Roman Numeral Table							
1	I	14	XIV	27	XXVII	150	CL
2	II	15	XV	28	XXVIII	200	CC
3	III	16	XVI	29	XXIX	300	CCC
4	IV	17	XVII	30	XXX	400	CD
5	V	18	XVIII	31	XXXI	500	D
6	VI	19	XIX	40	XL	600	DC
7	VII	20	XX	50	L	700	DCC
8	VIII	21	XXI	60	LX	800	DCCC
9	IX	22	XXII	70	LXX	900	CM
10	X	23	XXIII	80	LXXX	1000	M
11	XI	24	XXIV	90	XC	1600	MDC
12	XII	25	XXV	100	C	1700	MDCC
13	XIII	26	XXVI	101	CI	1900	MCM

Figure VIII: The Roman Number System

2.9 The Mayan (Indian) Number System

The Indian number was developed based on their growing interest in their calendar. The number system was base 20, known as vigestimal system with 5 as an interminate base. The number system developed unique symbols for numbers 1, 5 and 0, ° for 1, ¯ for 5, but none for 20 which was their base. The invention of the number zero by the Indians in 500AD was a big advancement in the world of numbers and Mathematics.

The Indians created a method of counting to deal with large numbers. They also created different symbols for numbers one to nine, known today as the Arabic numerals. The invention of zero by the Indians transformed numbers and mathematics; because in the history of numbers, it is the first time nothing had a number. Zero, by itself, was not special; however the power and beauty of zero is seen when paired with other numbers. Zero enabled the Indians to advance scientifically because it is very fluid. Using the Arabic numbers, the Indians were able to reason out that the Earth spins on its axis and also moves round the sun. Mr. Vice-Chancellor sir that is the power of numbers.

2.10 Hindu Numbers and Number System

The Hindu Numbers and Number System are attributed to great astronomers- Aryabhata and his pupil, Bhaskara I. They invented the fractions and turned the Arabic numbers into quadratic equations and algebra. These numeric breakthroughs enabled Science, Mathematics and Astronomy reach new levels in the Middle East. The zero was very important in the development of the Hindu number system. It allowed for the introduction of place value system, and the use of only nine symbols for all numbers. It therefore made calculation simpler than all the other number system discussed earlier. Hindu-Arabic number and number system are in use today. There are other number bases like 2, 8 and 16. Gottfried, a German mathematician invented a number counting system that uses 0 and 1. In this number system, one stands for something while zero stands for nothing.

Liebnitz went further to design a machine that could count in binary, which is a precursor to the digital age. The machine that ushered in the digital age was built in 1944 in England and was named Colossus. It was used during the World War II as a code breaking apparatus. This helped the allies to crack numerous Nazi codes thereby shorting the war by two years; thanks to the power of numbers. The binary system was adopted and used for every computer built. This breakthrough with numbers led to the internet space exploration and indeed the wheel to modern life and civilisation. This again, Mr. Vice-Chancellor is the power of numbers.

2.11 Types of Numbers

There are different types of numbers, which are:

I. Natural Numbers

The natural numbers are represented by the capital letter N. They are the counting numbers from 1, 2, 3……

II. **Whole Numbers**

The whole numbers are represented by the capital letter W. They are the natural numbers including zero, i.e.,

1, 2, 3..... Hence W= O+ N

III. **Positive Numbers**

Positive numbers are 1, 2, 3, 4 ... They are the same as natural numbers.

IV. **Negative Numbers**

They are the natural numbers with a minus signs. They are written as: ...,-4, -3, -2,-1.

V. **Integers**

The integers are represented by the capital letter Z. Integers are whole numbers together with negative numbers. Note that zero is neither positive nor negative. The set Z or integers can be defined as the set of whole numbers and their opposites. Z={-4,-3,-2,-1,0,1,2,3,4,.....}

VI. **Rational Numbers**

Represented as Q. These are all numbers in the form a/b where, b is not zero. Therefore rational numbers include fractions, powers and roots if their standard form is a/b rational number, e.g. 2/3, 5/6, 12/5 e.t.c.

VII. **Irrational Numbers**

Irrational numbers cannot be expressed as the ratio of integers. All nonterminating, non-repeating decimals are irrational numbers. Examples of irrational numbers are the square roots of any prime numbers, e.g. $\sqrt{2}$, $\sqrt{3}$, etc.

VIII. **Real Numbers**

The rational and irrational number together make up the real numbers represented by symbol R, i.e. union of rational and irrational numbers.

IX. **Complex Numbers**

The invention of complex numbers arose out of the need to solve algebraic equation of the form, $X^2 + 1 = 0$

There is no real number whose square is -1. The complex numbers are in the form a+ib where, and b are real numbers but i is imaginary. If a is zero, the complex number is purely imaginary. If b is zero, the complex number will be equal to a, and that is a real number. This shows that the complex number represented by C is a universal set for all numbers.

In summary, all numbers used in any work today must belong to one of these sets:

N – Set of positive numbers.
Z – Set of integers.
Q – Set of rational numbers.
R – Set of real numbers.
C – Set of complex numbers.

2.12 THE POWER OF THE NUMBER ZERO (0)

Zero among numbers signifies where nothing is powerful and beautiful as follows;

- When Zero is added to any number, the sum is the original number. The same is true for subtraction.
- When Zero is multiplied by any number, the product is 0.
- Any nonzero number raised to power zero, the result is 1. Hence, zero is a powerful equaliser.
- Zero divided by nonzero number, the result is 0.
- Any number divided by 0 is undefined.
- The discovery of zero revolutionised Mathematics, Science and Technology.

3.0 Why Teach Mathematics?

Despite Mathematics being interwoven with human endeavour, there is a lot of apathy in its teaching and learning in schools all over the world. This apathy has influenced the choice of the title for this inaugural lecture.

"THE BEAUTY AND POWER OF NUMBERS: BUILDING BLOCKS FOR MATHEMATICS AND SCIENTIFIC DEVELOPMENT".

Why teach mathematics? Some of the reasons include:

(i) Mathematics is beautiful and it is an amazing human accomplishment.

(ii) It prepares students for college and future career especially in Science, Technology, Engineering and Mathematics.

(iii) The world has become more quantitative and it is difficult to live a meaningful life without Mathematics literacy.

(iv) Mathematics is used for critical reasoning.

3.1 Numbers in Mathematics

Mathematics is a language, the letters of its alphabet are numbers. Moss (2001) quoted by Faulkner (2009) lists the four characteristics of number sense to include:

(i) Fluency in estimating and judging magnitude.

(ii) Ability to recognise unreasonable results.

(iii) Flexibility when mentally computing.

(iv) Ability to move among different representations and to use the most appropriate.

From the primitive society to the present Information Age, people do count and keep records. In the primitive society, they would use methods like counting with stones, notches or sticks and other local approaches. The advancement in technology and use of the four basic operations of addition, subtraction, multiplication and division are carried out using numbers as a tool. These operations are extended to money, time, length, etc.

Numbers, being the alphabets of mathematics are used to demonstrate the beauty of mathematics.

3. 2 Mathematics is Beautiful

Look at this numbers:

1*1=1
11*11=121
111*111=12321
1111*1111=1234321
11111*11111=123454321
111111*111111=12345654321
1111111*1111111=1234567654321
11111111*11111111= 123456787654321
111111111*111111111=12345678987654321
12345678987654321

Figure IX: Symmetry in Numbers

What do you see? Firstly, you will see symmetry in the product. The middle number in each product divides the product into two equal and identical numbers. Secondly, only 1 is used in the multiplication to produce other counting numbers. In addition, the numbers at the centre or line of symmetry is equal to the ones multiplied twice or squared. The second picture is just as beautiful.

1*8+1=9
12*8+2=98
123*8+3=987
1234*8+4=9876
12345*8+5=98765
123456*8+6=987654
1234567*8+7=9876543
12345678*8+8=98765432
123456789*8+9=987654321

Figure X: Beauty of Numbers I

The last number (digit) of the first number is exactly the same as the numbers added. Try adding the last digit in the number multiplied on the left-hand side with the last digit of the final answer to the right, **what do you notice?** That is take home for all. Don't forget we are in a Mathematics lecture and assignment is the spice in Mathematics.

The next set of numbers is connected by simple arithmetic operations of multiplication and addition.

1*9+2=11
12*9+3=111
123*9+4=1111
1234*9+5=11111
12345*9+6=111111
123456*9+7=1111111
1234567*9+8=11111111
12345678*9+9=111111111
123456789*9+10=1111111111

Figure XII: Beauty of Numbers II

The difference between the last digit, of the numbers multiplied and the number added is 1. The final answer of each operation is only ones and the number of ones is equal to the added digit (number).

9*9+7=88
98*9+6=888
987*9+5=8888
9876*9+4=88888
98765*9+3=888888
987654*9+2=8888888
9876543*9+1=88888888
98765432*9+0=888888888

Figure XIII: Beauty of Numbers III

Look at the numbers above and count from 9 to 2. The difference between these two numbers is 7, which is added in the first column of numbers. The subsequent additions are one less; beauty is the final answer of only eight. That is the beauty and power of numbers.

What exactly is the source of mathematical beauty? Mathematical beauty comes from identifying simplicity in complexity; pattern in chaos and structure in statis.

Look at this again:

1*8+1=9
12*8+2=98
123*8+3=987
1234*8+4=9876
12345*8+5=98765
123456*8+6=987654
1234567*8+7=9876543
12345678*8+8=98765432
123456789*8+9=987654321

Figure XIV: Beauty of Numbers IV

The first number in the right-hand side is 9 all through, while the last numbers from the bottom to the top are the counting numbers. The final result has the digit equal to the number added. Mathematics explores pattern. It is this that reveals the "Beauty of Mathematics".

There are some beautiful connections between numbers and the alphabets.

3.3 Number and the Alphabets

These are the letters of the alphabet:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

If the letters are given position as they occur, then the numbers will be;

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

Note the following:

K	N	O	W	L	E	D	G	E	
11	14	15	23	12	5	4	7	5	= 96%

AND

H	A	R	D	W	O	R	K	
8	1	18	4	23	15	18	11	= 98%

A	T	T	I	T	U	D	E	
1	20	20	9	20	21	4	5	= 100%

THEN LOOK AT THIS:

L	O	V	E	O	F	G	O	D	
12	15	22	5	15	6	7	15	4	= 101%

Mr. Vice- Chancellor sir, from the above illustration, We could see that the Love of God gave me over 100% which made it possible for me to stand before this August audience today to deliver this lecture. Therefore, one can conclude with mathematical certainty; using numbers that while knowledge and hard work get you close, attitude gets you there, but only the love of God will put you on the top.

The beauty of mathematics is not just in numbers but through its power, and the elegance of its arguments and formulae bridges are built between previously unconnected worlds.

For example, Albert Einstein's formula of E=MC built a bridge between energy and mass. Two concepts that seem worlds apart. The beauty of this equation is that energy will have mass and mass can put on energy. In this case, mathematics reflects a sense of order that is out there as part of nature.

Moreover, numbers and equations have inherent power in connecting practical events in an incomparable simplistic manner. Look at this beautiful mathematical equation.

$e^{i\pi} + 1 = 0$……………………………………………….(1)

This simple equation connects the five most important numbers in mathematics in a lucid and simple way. The five numbers are 0, 1, π, e and i. Each of these numbers have different origins and they have been connected in such a simple way. This simple equation helps us to understand how things change over time. In fact, the electricity supply industry, which utilises alternating current to provide electricity uses equation (1) every time it designs and operates a power station. This is one of the cases where beauty in numbers (mathematics) and practical power are both demonstrated.

The beauty of numbers can also be seen in this addition in an arithmetic class by a German boy, Karl Fredrick Gauss (1777 – 1885). The teacher asked the pupils to add up numbers 1 to 100 to keep them busy while he leaves for 15 minutes. Gauss put up his hand before the teacher left the classroom. Gauss had an answer which demonstrated both beauty and practical power.

Gauss observed that:

1+100=101
2+99 =101
3+98 =101
. . . = …
. . . = …
50+51 =101

Hence, the sum of numbers from 1 to 100 is 50 times101 which is equals 5,050. The solution to this problem exploited symmetry and saved one from the tedium of adding 1+2+3+4+……… to 100. This power of beauty and elegance in numbers and mathematics happens frequently.

A French mathematician, Poincare (1854 -1912), said,

'The mathematician does not do mathematics because of its usefulness, he studies it because it delights in it and he delights in it because it's beautiful.'

However, very often the search for beauty in mathematics has led to new ideas and discoveries of new theories that have fundamentally changed our understanding of the physical world and become indispensable. The practical purpose of Mathematics, using numbers and equations, is often the quest for beauty in Mathematics. Copernicus, a Polish 16th century mathematician was convinced that the universe is a systematic harmonic structure framed on the bases of mathematical principles designed by God. The pursuit of an aesthetic harmonious mathematical structure led Copernicus to his famous heliocentric theory which states that the earth and the other planets revolve round the sun as opposed to the earlier belief that the earth was the centre of the universe with the sun revolving round the earth. The motivation for this discovery was purely aesthetic, because the mathematics describing the sun centred universe was more aesthetically pleasing than the mathematics describing the earth centred universe. Copernicus' mathematical idea was later given an experimental confirmation by Galileo and Kepler, that indeed the earth revolves round the sun. This shocked the world and revolutionised science and society. That is the power and beauty of numbers and mathematics.

The beauty of numbers is vividly summarised in the creation of the world by God. God was indeed the first to use the number one to seven in creation. For every number and day, he created something unique and at the end of the entire creation, nothing was omitted. Everything flowed in a logical and sequential order. That is the power and beauty of numbers.

3.4 Beauty of Numbers in Geometry Shapes

The beauty of numbers in geometrical shapes is illustrated with simple three and four dimensional perfect polygons of equilateral triangle and square.

3.4.1 Magic Triangle

A natural/magic triangle of order 3 (n-1) distinct positive integers are placed in array, n integers on each side so that the sum of integers on each is a magic constant Mn. An example of magic triangle of order 4 with $M_{4}=20$ is shown in *figure XV*.

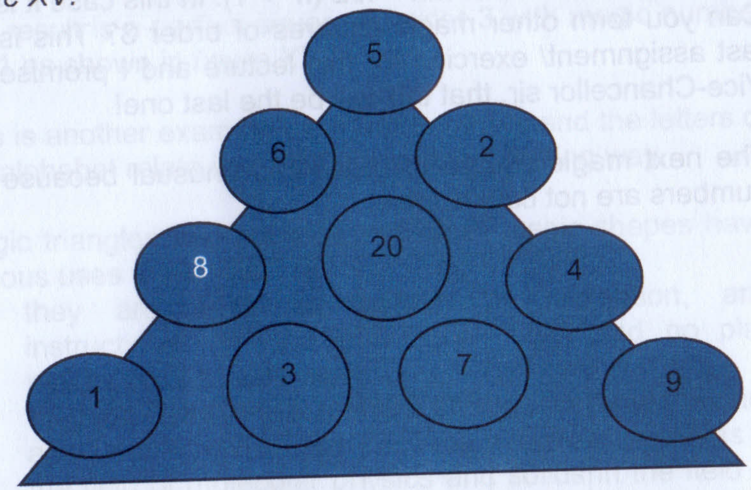

Figure XV: Magic Triangle

The numbers are consecutive. Try getting other magic triangles of the order 4 or higher orders.

3.4.2 Magic Square

A natural or normal magic square of order n is a square array of numbers consisting of distinct positive integers 1, 2, ... n^2 arranged in a way that the sum of the numbers in any horizontal, vertical or main diagonals is always the same number called the 'Magic Constant'. The figure below is a magic square of order 3.

8	1	6
3	5	7
4	9	2

Figure XVI: Magic Square

The Magic constant is Mn = n/2 (n^2 + 1). In this case it is 15. Can you form other magic squares of order 3? This is the last assignment/ exercise for this lecture and I promise Mr. Vice-Chancellor sir, that this will be the last one!

The next magic square of order 3 is unusual because the numbers are not consecutive.

5	22	18
28	15	2
12	8	25

Figure XVII: Magic Square

The magic number is 45. Try replacing all the numbers in the nine cells by the English spelling of each of the numbers. The result is a second magic square of consecutive numbers. For example, the first number is 5, written in English as five with four letters; replace it with 4, 22 is twenty-two replace it with 9. Do so for all the other numbers.

4	9	8
11	7	3
6	5	10

Figure XVIII: Magic Square

The result is a perfect square of order 3 with magic number of 21 as shown in *figure XVIII*.

This is another example of where numbers and the letters of the alphabet relate in a beautiful and interesting way.

Magic triangles and squares and other magic shapes have various uses in real life.

1. they are used as games or recreation, and instructional games because all work and no play makes Jack a dull boy;
2. they are used to test artificial intelligence, and they are also used to investigate oscillatory motions of atoms in the field of molecular physics and solids in the field of solid state.

3.5. Numbers and our Daily Activities

Aside from beauty and scientific applications, numbers play an important role in our lives. Almost all the things we do involve numbers. Whether we are conscious of it or not, our lives revolve around numbers from our date of birth. At birth, the normalcy of a baby: weight, height, pause, temperature, heartbeat etc. are all ascertained using only numbers; that is the power of numbers.

There are numerous numbers that have influenced our lives on daily basis. A few examples given below will suffice:

1. **Telephone number**: It is used in all forms of communication, personal, official, business etc., and doubles as an identification number for each person.
2. **Bank verification number: It** identifies a person and protects his/her money.
3. **Credit and debit cards:** It makes transaction from any part of the world easy and quick.
4. **Account number**: It identifies the ownership of an account. Note that no two persons can have the same account number thus, it is unique.
5. **Engine and car numbers:** They give unique identification to each car and make recovery easy in case of loss or theft.
6. **Budgeting:** Calculating daily, weekly and monthly budgets for food, transportation and other expenses keep the family free from financial tensions.
7. **Comparative analysis:** Prices of items in markets or shopping malls help one to make objective comparison before purchasing.
8. **Technology:** Changing the channels on TV using numbers makes choice easy.
9. **Accurate Measurements:** Telling and keeping of time make appointments easy and meaningful.

In essence, Mr. Vice-Chancellor sir, our lives revolve around numbers, that is, the power of numbers.

4.0 The Beauty of Numbers Influenced My Research at Different Levels of Education

a. Primary Level
b. Secondary Level
c. Tertiary Level

4.1 Primary Level: Numbers and Time

The Egyptians were the first to measure time using the solar calendar. With the advancement in science, time was no longer measured by observing heavenly phenomenon but

by numerical calculation and chronology. Numbers and time are abstract, complex and often difficult to grasp.

The primary school is the foundation of the formal education system. The child's first experience with numbers and mathematics is therefore crucial at this stage. These experiences can affect the child's attitude towards mathematics for the rest of his or her life, Dienes (1960). The child's failure to reach a satisfactory understanding of the basic mathematical concepts taught in the primary school affects his/her chances in more advanced areas of the subject. This is because of the hierarchical nature of Mathematics. At this level, I looked at the use of numbers in time concept development among primary school pupils. Time affects anything that is tangible in the real world. Clairborn (1970) defines time as a paradox that everybody is aware of and yet nobody can define. Lucas (1973), a mathematician, defines time as continuum stretching from the past to the present and to the future. Rogers (1967), defines time as a fourth dimension.

The concept of time at the primary level is included in the curriculum in a spiral form from primary one to six. This important concept extends into the secondary school mathematics, physics, chemistry, biology and economics. For example, the economic value of money is examined over a period of time, taking our naira for example, the exchange rate has continued to change over time. Patriaca Alleman (1987), observed that time concept is difficult to develop because unlike other concepts that have standard reference in the real world, time is unobservable and untouchable. The importance of time concept is demonstrated by its high percentage of 30 in two intelligent Iowa tests. There is no other concept that has such a high percentage as time in the intelligent test. The implication is that children and all are expected to be temporarily oriented to the world around them. Discoveries also confirm that even animals and plants measure time too.

The study investigated the effects of the following variables in the development of time concepts among pupils from primary three to six: class, age, sex, type of school (public and private) and socio-economic background of pupils.

Table 1a: Mean and Standard Deviation of Pupils' Performance on Each Test Component According to Class

Test	Class	Number	Mean	Percentage	Standard Deviation
I	3	227	4.83	43.90	2.76
	4	240	5.44	49.45	3.14
	5	240	6.83	62.10	2.24
	6	223	7.59	69.0	2.69
II	3	227	5.13	28.50	4.19
	4	240	8.00	44.44	4.52
	5	240	9.63	53.50	4.70
	6	223	11.15	61.94	4.46
III	3	227	3.29	23.5	2.90
	4	240	5.30	37.85	2.58
	5	240	5.86	41.85	2.38
	6	223	6.35	45.36	2.95
IV	3	227	3.09	20.6	3.14
	4	240	5.39	35.99	3.33
	5	240	6.05	43.21	3.43
	6	223	7.61	54.35	2.78
V	3	227	1.01	14.47	1.54
	4	240	2.0	28.57	1.90
	5	240	2.56	36.57	2.68
	6	223	7.61	54.35	2.78
VI	3	227	2.82	20.21	3.42
	4	240	4.14	29.57	3.51
	5	240	6.98	49.85	3.56
	6	223	7.96	56.87	2.56
Math Test	3	227	8.15	20.37	4.45
	4	240	12.01	30.02	4.51
	5	240	15.46	38.65	5.27
	6	223	19.48	48.70	7.08

The improvement over the class runs in each component of the time concept test. The improvement was significant because the F-value obtained from the statistics is 172.11

Table 1b: Comparison of the Scores of Pupils in Classes Three to Six

Sources	df	MS	SS	F
Class	3	155005.96	51668.65	172.11*
Within	926	277995.87	300.21	
Total	929			

Table 2a: Mean and Standard Deviation of Each Age Group on Time Tests

Age	Number	Mean	Standard Deviation
7	43	31.30	10.90
8	145	37.12	19.86
9	194	42.34	12.56
10	238	49.73	22.52
11	152	55.93	20.63
12	107	52.81	16.68
13	39	53.62	16.30
14	12	44.66	15.91

Table 2b: Comparison of the Performance of the Different Age Groups

Sources	df	SS	MS	F
Class	9	48250.24	6892.89	16.52*
Within	922	38475.59	417.89	
Total	929	433001.8		

There was a steady improvement from age seven to eleven. The next set of ages, from twelve to fourteen recorded an oscillation. These difference in age was also found to be significant as F-value obtained was 16.52. Two other variables were also found to affect time concept development in children. These are type of school and socio-economic background. Sex did not have any effect. Jantz (1976) pointed out that time is an abstract concept because its principles are formulated upon abstract relational concepts that require association between two attributes and characteristics. Therefore, in the course of the study, I used some materials with the pupils to measure time. These included dripping water clock, sinking water clock and pendulum clock.

Figure XIX: Dripping Water Clock   Pendulum Clock   Sinking Water Clock

Using these devices, children were taken through activities that could be completed in a second, a minute, five minutes, etc. With these activities, children had better understanding of time concept. It also help them to keep to time in their daily activities. Moreover time management is one of the 21st century skills.

Mr. Vice- Chancellor sir, I will suggest that such activities should be included in the orientation of new students and new staff in the University. This will cure the syndrome of '**African time**'.

4.2 Secondary Level

4.2.1. Number, Mathematics and Gender

Gender and sex are used interchangeably in everyday life; however, the terms are distinguishable. Sex is a natural

condition genetically determined and defined by the gonad. It is the biological and physical state of organism that refers to fixed genetics and anatomical characteristic. It divides humans into two and opposite groups of male and female.

Gender comes from the word, 'genus' and it conveys the meaning of kind or race. It is nurtured and therefore subject to cultural influences and interrelations as well as limitation. Gender refers to one's feeling of 'maleness' or 'femaleness' irrespective of one's sex. It is generally classified into masculine and feminine and is concerned with attributes that describe males and females in the social and cultural context. It has to do with the peculiar responsibilities and roles of men and women that are established in the families, societies and cultures. Gender describes the personality traits, attributes, behaviours, values, relative power, influence roles and expectations (femininity and masculinity) that society ascribes to the two sexes on differential basis. Obasi (2006) views gender as the social and psychological aspects that are regarded as appropriate to men and women. Thus, such terms as 'gender-roles', gender stereotypes', 'gender identities' and 'gender disparity' imply that these are subject to social and cultural influences. Gender roles are those functions that are culturally allotted to individuals on the basis of their gender but not related to biological functions. The roles are set of expectations as to what ought to be the appropriate behaviour for men and women under particular circumstances.

Gender differences are both similar to and different from cultural differences. Certainly, there are physiological differences between the sexes, but these differences do not extend to inherent differences in ability to succeed at school or work. The effect of gender on learning and achievement in Mathematics is constructed by culture. In many societies, girls are expected to behave more passively than boys. Boys are expected to be active and curious often to the point of getting into trouble, which is considered normal and acceptable. Typically, our culture describes male behaviour as aggressive, assertive and competitive. Females, on the other hand are described as collaborative and supportive. Boys are encouraged to develop skills in fields like Mathematics, Engineering and Computer Sciences, while girls are often discourage from participating in these fields. However, this perception is gradually changing.

Gender has continued to be an issue of concern to education and researches especially in Mathematics. There is no conclusive result on the effect of gender on student's achievement. Aside from gender, there are other psychological factors that affect the learning of Mathematics. These include anxiety and attitude. Richardson and Suinn (1973) defined mathematics anxiety as the feeling of tension and anxiety that interfere with the manipulation of numbers and the solving of Mathematical problems in a wide variety of ordinary life and academic situation. Mathematics anxiety precipitates mathematics avoidance. Tobias (1976) found that anxiety results from cultures that make mathematics ability a masculine attribute thus inadvertently discouraging females who are interested in mathematics related courses. Sylvia (2011) on the other hand found that there is a significant correlation between attitude and achievement. Wardehn (1966) also found that the difference in attitude can be a significant predictor of achievement in arithmetic. Hogg and Vaughan (2005) define attitude as a relatively enduring organisation of beliefs, feelings and behavioural tendencies towards socially significant objects, groups, events or symbols. For education teachers and students attitude plays a significant role in the achievement of educational objectives.

I carried out a study to verify the effects of these psychological factors in addition to sex on secondary school students. A random sample of one hundred and sixty (160) students, eighty (80) boys and eighty (80) girls participated in the study. Three research instruments: Mathematics

Attitude Scale (MAS); Mathematics Anxiety Rating Scale (MARS) and Mathematics Achievement Test (MAT) were used for the study. The data collected were analysed using Pearson product moment correlation and T-test. The results obtained are in *Tables 3 and 4*.

Table 3: Pearson Product Correlation of the Relationship between Learning Mathematics Anxiety and Mathematics Achievement of Students

Variables	No. of Students	df	R-Calculated	R-Critical
LMA(X)				
MAT(Y)	160	158	0.21*	0.16

The result reveals that there is a significant relationship between mathematics anxiety and mathematics achievement. This implies that mathematics achievement is affected by anxiety.

Table 4: Pearson Correlation of the Relationship between Students' Attitude and Mathematics Achievement

Variables	No. of Students	df	R-Calculated	R-Critical
LMA(X) MAT(Y)	160	158	0.35*	0.16

The value of 0.35 is significant. Hence there is a positive relation between attitude and mathematics achievement.

The next three tables verified the effect of sex on the following variables: achievement, anxiety and attitude.

Table 5: T-test Analysis of the Difference in Achievement between the sex

Sex	Number	Mean	Standard Deviation	t-cal	t-critical
Male	80	42.39	11.30	0.64	1.98
Female	80	41.23	11.62		

Table 6: T- test Analysis of Mathematics Anxiety and Sex

Sex	Number	Mean	Standard Deviation	t-cal	t-critical
Male	80	27.33	7.61		
Female	80	24.68	8.84	0.34	1.98

Table 7: T- test Analysis of Attitude to Math and Sex

Sex	Number	Mean	Standard Deviation	t-cal	t-critical
Male	80	90.85	12.056	1.020	1.98
Female	80	88.64	15.177		

The results in *Tables 5-7* showed no gender differences in mathematics achievement, mathematics anxiety nor attitude to mathematics. This implies that the anxiety and attitude of the boys and girls in the study are not significantly different though their means vary slightly. These results contradict that of MacCann-Roberto (1995), which studied gender difference in college students in eight subjects. However, the results support that of Fennama (1997), which found out that the performance in Mathematics was neither dependent on gender nor anxiety. The result contradicts a meta-analysis on gender differences in mathematics anxiety carried out by Hyde et al. (1990), where the girls score slightly higher than the boys though the difference was negligible. The inconclusiveness of gender and psychological variables on students' achievement in Mathematics still continues.

4.2.2 Information and Communication Technology, Numbers and Gender

United Nations Educational Scientific and Cultural Organisation (UNESCO) 2007 defines Information and Communication Technology (ICT) as an umbrella term that is used to transmit, process, store, create, display, share or exchange information by electronic means. It covers technologies such as radio, television, video, DVD,

telephones, satellite system and computer system and network (hardware and software) as well as equipment and services associated with the technologies such as video conferencing, e-mails and blogs.

Information and Communication Technology (ICT) in education has also created social stereotypes and gender inequalities, Markauskaite (2005). ICTrelated activities have been viewed as a male domain for some time (Brosnan B. David, 1996). This is fully captured by Wajeman (2006):

> *As with science, the very language of technology, its symbolism is masculine. It is not simply a question of acquiring skills, because these skills are embedded in culture of masculinity that is largely contentious with the culture of technology. Therefore to enter this world, to learn its language, women have just to forsake their femininity.*

Thus, the old stereotypic gender differences in attitude and achievement previously existing in mathematics and technological disciplines were extrapolated to the area of ICT. Many research and meta-analysis on ICT summarised that boys were more interested in ICT than girls, the boys were also found to be heavier users of computer with more positive attitude.

ICT is a potent force in transforming social, economic and political life globally. New technologies are now indispensable aspects of learning, work and everyday life. The gender gap in ICT is probably more intent and more complex. This confirms the word of Koffi Annan, the Secretary General of the United Nations in 2003 that *"the so-called digital divide is actually several gaps in one. There is gender divide with women and girls enjoying less access to information technology than men and boys"*. In addition, male and female students are likely to be different in types of computer use rather than in all areas of ICT application. The advocates of gender equity in education are spearheading single sex schools. Warrington and Younger (2001), states that *"a single-gender setting may increase female participation and interest in Mathematics and Science"*. Studies by Streitmather (1997), Warrington and Younger (2001), found that females perform better and feel better about themselves in a single gender environment. In Nigeria, the relationship between the development of ICT penetration and use in educational programmes and its diffusion into the programmes in education is dependent upon government policies. Knowledge of the extent of involvement of female students will enable government plan adequately to cover both sex.

A joint work I did with one of my Ph.D. students who had graduated and now a lecturer in the University of Education, Winneba, Ghana is presented next (Odogwu and Nyala, 2010).

The work was to find out female students' competence in the use of ICT and their future career. A descriptive survey method was adopted to explore the competency level in the use of ICT of female students in secondary schools in Lagos State. One hundred and nine female students participated in the study. The instruments used were a questionnaire and an interview. An interview was conducted on a one-on-one or focus group. Each phase of interview, either one-on-one or focus group concentrated on the students' experiences of computer and the types of job they plan to take up in future. The data collected are presented in three categories as follows: experience, capability and career plans in *Table 8*.

Table 8: Frequency Presentation of Respondents by Course and Category

Course	Experience		Capability		Career Plans	
	Some Experience	None	ICT Literate	Sustainability	Professional	Domain
Science	50	2	48	30	34	30
Arts	36	2	24	22	18	20
Commercial	15	1	14	15	15	15
No Selection	3	0	1	1	0	0
Total	104	5	87	68	67	65

In all, 104 out of the 109 students indicated that they have some experience with computers. They have either used computers at home, school or cybercafé. Of these, 50 out 52 science students have access to computers. The length of time or duration on the computer for those who indicated some experience varied from one to four hours daily, either at home, school or cybercafé. Unfortunately, all students in the study indicated that their teachers do not use computers to teach at school neither do they offer it as a subject at the senior school certificate examination.

From *Table 8*, 87 out of the 109 students indicated that they are computer literate; some of them indicated increase in self-confidence and self-esteem ever since they enrolled in girls only schools. Thus, it is clear that the girls in this study felt more secured and capable in their females' only schools than mixed schools.

In the career plan category, all statements were related to choosing between staying with or without the new technologies, availed opportunities with the technologies and personal future aspirations. They include statements such as: "I don't see any connection between my future career and ICT" and "I do not think ICT can help in my future career". Of the109 female students, 65 were positive that they have better prospects with ICT. All the students in the commercial class felt ICT was relevant to them as future bankers, accountants and marketers. More than half in the

Arts class agreed that ICT was relevant to their future career. Many in the science class felt it was indispensable to their future career by this statement from one of them, *"Information can be gotten from the computer concerning my career to improve me in my filed."*

These findings of female capabilities are supported by those of Gillibrand et al. (1999), Streitmather (1997), Warrington and Young (2000); that there were differences in confidence and participation levels of females in the single-gender environments. In fact, Gillibrand et al. (1999), found that females in the single-gender learning setting had increased confidence and participation levels and were more willing to participate in discussion to seek help, when it was needed, and share ideas. It was thus discovered that females in their own setting have a better feeling of their confidence, improved attitude towards ICT and better future plans for computerrelated activities and careers.

We were glad that we have opened up an important first step towards developing the girls' potential in this area. We suggest that computer rooms, where they exist in schools, should be opened up to students especially the females who are usual shy. This will encourage them to participate in computing, thereby opening up more job opportunities for them.

The study of female participating in ICT and its usage was extended to the University in a joint study with a colleague, Dr. Anthonia Maduekwe in a study entitled: "Use of the Internet by Nigeria Female Undergraduates: Implication for inclusive Higher Education" (Odogwu and Maduekwe, 2010). This study was propelled by the realisation that access and use of information and communication technologies is directly linked to the vision of inclusive developmental strategies in global economies of the twenty-first century. In the study we investigated the female undergraduate utilisation of the new technologies and its

implications for inclusive higher education. Using stratified random sampling, six hundred and seventy-five (675) females were drawn from eight Faculties of the University of Lagos. Data obtained were analysed using simple percentages and chi-square statistics. The findings are presented in *Tables 9-16*.

Table 9: Distribution of Subjects by Faculty, Level and Age

Faculty	N	Ratio (%)	Level	N	Ratio (%)	Age Range	N	Ratio (%)	X^2
Bus Admin	136	20.1	100	133	19.7	< 20	127	18.8	
Environmental	100	14.8	200	219	32.4	20-25	430	63.7	
Engineering	113	16.7	300	157	32.4	25-30	84	12.4	67.5
Science	118	17.5	400	56	8.3	> 30	10	1.5	
Education	85	12.6	500	29	4.3	Missing	24	3.4	
Law	10	1.5	Missing	81	12.0	**Total**	675	100	
Social Science	44	6.5	**Total**	675	100				
Arts	69	10.2							
Total	675	100							

The frequency of visit to the Internet was tested using the options of daily, weekly, fortnightly and monthly and never for the variables of faculty (discipline), level and age (*Table 9*). For those using internet facilities, daily or weekly, the Faculty of Management had the highest number of students while the Faculty of Law had the fewest. The chi-square test showed significant variations in frequency of the use of internet facilities across faculties.

Table 10: Frequency of Visit to the Internet Cross Tabulated with Faculty (Discipline)

Frequency of use of the Internet Facilities						
Faculty	Daily	Weekly	Fortnightly	Monthly	Never	X^2
Business Admin	22	46	12	35	12	
Environmental	7	34	28	25	3	
Engineering	17	49	17	24	6	65.36
Science	9	34	21	39	10	
Education	3	34	16	22	5	
Law		5	2	1	2	
Social Sciences	2	13	6	19	2	
Arts	8	13	14	23	10	
Total	68	228	116	18	54	

X^2_{cal} 65.36> X^2_{tab} 43.77

The chi-square value for frequency was significant, implying differences in the visit to the Internet by the female undergraduates across the disciplines.

Table 11: Frequent Visit to the Internet Cross Tabulated with Level

Frequency of use of internet Faculties							
$	Daily	Weekly	Fortnightly	Monthly	Never	Total	X^2
100	14	38	22	39	16	10	
200	18	73	35	70	18	214	
300	16	61	34	33	9	153	
400	10	20	7	14	9	55	
500	4	13	7	4	1	29	
Total	62	205	105	160	45	280	137.08*

X^2_{cal} =137.08 > X^2_{tab} 31.41

The chi-square value of 137.08 was found to be significant. This indicates variations on frequency of visit to the Internet across different levels in the university among the females.

Table 12: Frequent Visit Cross Tabulated with Age

Age	Daily	Weekly	Fortnightly	Monthly	Never	X^2
Less than 20	15	43	18	41	9	
20-25	41	143	78	117	36	
25-30	12	35	15	15	5	
Above 30	-	1	1	8	1	
Total	68	222	112	181	51	20.08

X^2_{cal} =20.80 < X^2_{tab} 26.30

The chi-square value was not significant for age. The reasons (**Table 13**) for the subjects' visit included sending email, making friends, sourcing materials for assignment, networking with other students in other countries against the variables of the faculty (discipline), level and age.

Table 13: Purpose of Visit to the Internet Cross Tabulated with Faculty

Purpose of Visit to the Internet					
Faculty	Send emails	Make Friends	Source materials for Assignments	Networking with students in other countries	X^2
Business Admin	65	5	34	4	
Environmental	11	2	57	13	
Engineering	32	6	43	14	
Science	33	9	38	4	
Education	41	3	25		
Law	7	1			
Social Sciences	30		7		
Arts	42		1	9	
Total	261	30	213	35	90.11

X^2_{cal} =90.11 > X^2_{tab} 41.34

The value of 90.11 was significant, indicating varieties of purpose of visit to the internet by female students based on faculty or discipline.

Table 14: Purpose of Visit to the Internet Cross Tabulated with Level

Level	Purpose of Visit to the Internet Send email	Make Friends	Source materials for Assignments	Networking with students in other countries	Others	Total	X^2
100	59	3	39	6	8	115	
200	82	15	65	10	28	115	
300	58	8	55	11	14	146	
400	27	2	17		4	50	
500	3		19	2	3	27	
Total	229	28	195	29	57	538	33.4

$X^2_{cal} = 33.43 > X^2_{tab}\ 26.30$

The chi-square value for purpose of visit was significant across different levels of studies among the females in the university.

Table 15: Purpose of Visit to the Internet Cross Tabulated with Age

Age	Purpose of Visit to the Internet Send emails	Make Friends	Source materials for Assignments	Networking with students in other countries	Others	Total	X
Less than 20	51	8	35	10	14	118	
20-25	166	18	137	19	47	387	
25-30	32	3	30	4	7	76	
Above 30	3		5	1		9	
Total	252	29	207	34	68	590	8.788

$X^2_{cal} = .8.788 < X^2_{tab}\ 26.30$

There was no difference in the purpose of visit to the Internet among the female students across the different age groups. The overriding aim of sourcing materials for assignments may have led to no difference in purpose of visit to the Internet by females across the different age groups. *Table 16* shows the result of the use of the Internet

after graduation, cross tabulated with faculty. The results indicate that a high percentage of 89.36%, will use the Internet after graduation irrespective of discipline. The calculated chi-square of 27.40 is greater than table value of 14.07. Hence, there is a significant variation in the use of the Internet by the females after graduation based on their disciplines.

Table 16: Use of the Internet after Graduation Cross Tabulated with Faculty

Faculty	Use of the Internet after Graduation Yes	No	Total	X^2
Business Admin	79	21	100	
Environmental	91	3	94	
Engineering	97	8	105	
Science	94	9	103	
Education	69	6	75	
Law	7		7	
Social Sciences	38	3	41	
Arts	46	12	58	
Total	521	62	583	27.40*

$X^2_{cal} = 27.40 > X^2_{tab}\ 14.70$

Our major aim of carrying out this study was to determine the extent of female access and use of the Internet and its implication for inclusive higher education. Significant differences were noted among female students at different levels both in frequency and purpose of visit to the Internet centres (*Tables 11 and 14*). This result supports the work of Haywood et al. (2004) which found differences in computer skills among university new entrants and older students in the university. This difference could be attributed to the greater acquisition of computer skills by the university female undergraduates as they progress in their course of study. Interestingly, we may argue that the number of assignments requiring resources from the Internet may have also increased as students' progress in the course and are aware of the need to use digital technologies to enhance understanding of the content of their academic work.

The findings in *Tables 12 and 15* show no statistical difference in the frequency and goals of using the Internet across the age groups. However, females in the group of 20-25 had the highest representation, indicating that they were the most users of the Internet. This contradicts the findings of Murtherg (2005) and Rae 2004. However, Fontaine (2002) noted that undergraduate students worldwide had common goals in the use of the Internet irrespective of age. The Internet is therefore capable of delivering opportunities as "receptable" for knowledge and social contact between previously isolated people and through this contact provide empowerment for individuals and groups that are historically underserved especially females.

Modern economic, social, political and technological requirements demand that all members of society have a minimum level of basic education and number literacy. People without the ability to acquire essential knowledge and skill will be deprived of their contributions to the society (Udeani, 2006). Implicitly, selective opportunities for higher education must reflect equity, and concerns so that in this age of rapid educational change, disparities by gender, region or social groupings are not propagated. The use of technology in education is incontrovertible. The real issue is to harness the power of technology to meet the challenges of the 21st century and make education more relevant, responsive and realistic for everyone, anywhere, and anytime; irrespective of gender.

4.3 Mathematics Teachers, Information and Communication Technology (ICT) and Gender

The teacher is the key factor in the success of any educational endeavours at all levels. There is an interlocking relationship between all factors in education

from primary to higher institutions, in the mathematics curriculum which demands that teachers at all levels must be equipped and involved in educational plans to give the education continuum the required excellence. Researchers like Niner and Wajeeh Daher (2013), found positive contributions of Information and Communication Technology (ICT) use in Mathematics teaching and Learning.

The British Educational Commission and Technology Agency (BECTA) summarised the main benefit of ICT use in Mathematics teaching and learning as follows:

It increases the collaboration among students and increases communication and knowledge sharing; it increases quick and adequate feedback for the learners which consequently leads to positive motivation; it allows students to focus on strategies and interpretations of answers instead of wasting time on unnecessary computations and it supports constructive pedagogy: that is, the students discover mathematic ideas and quickly understand them.

In the same vein, the National Council of Teachers of Mathematics (NCTM, 2000) points to technology as essential for the teaching and learning of Mathematics because it affects what the teachers teach and students learn, and improves the students' learning. The NCTM also declares that students use technology to learn Mathematics in depth. Both NCTM and BECTA point at technology as enabling as well as encouraging students to concentrate on reflection, verification, decision making and problem solving. There are various factors that influence the use of ICT in teaching, especially in mathematics. These factors can be categorised into three: the school, the teacher and the technology tools in the system. The most crucial among these factors is the teacher. There are cases where schools have provided the tools but the teachers are reluctant to use them. Ritche (2002) stressed that even with the ubiquitous of computer, its use for instructional purposes will remain a huge challenge without the teachers being equipped with the prerequisite knowledge and skills and the nursing of the right kind of attitudes needed to deplore it for pedagogical use.

I and one of my postgraduate student (Odogwu and Mbah, 2015) carried out a research on "Mathematics Teachers' attitude and competence in the use of ICT in teaching mathematics in Lagos State". Three hundred and ten (310) mathematics teachers participated in the study. The instrument for the study was designed by us. The questionnaires consisted of four sections (A, B, C, and D). Section A sought information about the respondents Biodata. Section B sought to know the level of utilisation of ICT facilities by the teachers. A three-point scale rating of Always Used coded 3, Occasionally Used coded 2 and Rarely Used coded 1 was employed. Section C sought to know the attitudes of teachers towards the use of ICT facilities. A five-scale of rating of Strongly Agreed (SA coded 5), Agreed (A coded 4), Disagreed (D coded 3), Strongly Disagreed (SD coded 2) and Undecided (UN coded 1) was used. Section D sought information on the competence of teachers on the use of ICT facilities. A five-point scale rating of Fully Competent (FC coded 5), Confident User (CU coded 4), Need Further Training (FT coded 3), Struggling with Application (SA coded 2) and Not Aware of this Application (NA coded 1) was used.

The study had four research questions and two hypotheses. *Tables 17 to 21* provide the data to answer the questions and test the hypotheses.

What are the Levels of Mathematics Teachers' Awareness and Use of ICT Devices in Teaching and Learning?

Table 17: Level of utilisation of ICT Facilities

S/N	ICT Facilities	Always (%)	Occasionally (%)	Rarely used (%)	M	SD
1.	Internet Facilities	134(43.2)	140(45.2)	36(11.6)	2.31	0.68
2.	Projector	57(18.4)	169(54.5)	84(27.1)	1.91	0.68
3.	e-mail	138(44.5)	137(44.2)	35(11.3)	2.32	0.68
4.	Computer-Aided Instruction/CD/DVD	113(36.5)	153(49.4)	44(14.2)	2.22	0.69
5.	Computer	175(56.5)	123(39.7)	12(3.9)	2.52	0.59
6.	GSM	244(78.7)	47(15.2)	19(6.1)	2.75	0.59
7.	Library	145(46.8)	149(48.1)	16(6.2)	2.41	0.60
8.	Visual Aid	201(64.8)	90(20.0)	19(6.1)	2.58	0.62
9.	Audio Visual Aid	96(31.0)	163(52.6)	51(16.5)	2.14	0.68
10.	Digital Calculator	184(59.4)	108(34.8)	18(5.8)	2.53	0.62

Table 17 shows the overall picture of mathematics teachers' level of utilisation of information and communication technology facilities. Actual numbers and percentages for responses to the specified level of use are also shown. Among the ten ICT tools listed, the GSM has the highest percentage of usage with 78.7%. Projector had the least with 18.4%. The projector should be one of the aids used most by mathematics teachers to give fleshiness to the abstract concepts in mathematics. The table also presents different levels of use for each of the items. The mean value for five of the items is lesser than 2.5 which is the accepted minimum. The summary is that the level of use of these items is still low in many mathematics classes.

Five participants were observed by us. It was observed that teachers actually used information and communication technology facilities for educational purposes. Mathematics teachers also used these facilities to teach mathematics. A teacher used Computer-Aided Instruction on mathematics in one of his classes, where he employed the use of a computer and a projector to teach Number Base System and Simultaneous Equation. The students were happy with the process, this would eventually motivate them and thus reinforce their interest. These psychological variables are very important in the learning of mathematics. Another teacher used spreadsheet application to teach his students how to do some calculations and plot different graphs using the computer, after teaching them the conventional way in their previous lessons. Another teacher taught his students how to solve different equations (Linear Equation and Quadratic Equation) with the use of their scientific calculator.

What is the Influence of Mathematics Teachers' attitude on the Use of ICT?

Table 18: Teachers' Attitude towards the Use of Information and Communication Technology

S/N	Items	SA/A (%)	SD/D (%)	UN (%)	M	SD
1.	I enjoy using computer to teach	284(91.6)	20(6.5)	6(1.9)	4.13	0.75
2.	I browse the Internet to get information	297(95.8)	10(3.2)	3(1.0)	4.67	0.70
3.	ICT enhances students' learning	297(95.8)	9(2.9)	4(1.3)	4.50	0.68
4.	Teacher's education should include ICT	307(99.0)	9(2.9)	3(1.0)	4.60	0.60
5.	ICT provides better learning experience	298(96.1)	0	3(1.0)	4.55	0.65
6.	I would teach better if I could use ICT	290(93.5)	17(5.5)	3(1.0)	4.35	0.74
7.	Using ICT facilities is a waste of time	9(2.9)	295(95.2)	6(1.9)	2.17	0.49
8.	I have phobia for ICT equipment	22(7.1)	282(91.0)	6(1.9)	2.47	0.71
9.	ICT can't address the needs of mathematics in school system	39(12.6)	265(85.5)	6(1.9)	2.54	0.80
10.	I like using digital calculator to teach mathematics	231(74.5)	67(214.6)	12(3.9)	3.76	0.94

Table 18 reveals mathematics teachers' attitude towards Information and Communications Technology. Actual numbers and percentages for responses to each statement are shown. *Table 18* reveals that over ninety percent of mathematics teachers agreed that ICT enhances teaching and learning of mathematics. They all agreed that it should be included in the programme for teachers' preparation. Only seven percent of the teachers had phobia for ICT while none of them disagreed with the statement that ICT provides better learning experience.

What is the Level of Mathematics Teachers' Competence in the Use of ICT?

Table 19: Competency of Teachers in Information and Communications Technology Use

S/N	Items	FC/CU (%)	FT/SA (%)	NA (%)	M	SD
11.	I can locate and run an application programme e.g. Ms Word	284(91.6)	20(6.5)	6(1.9)	4.13	0.75
12.	I can connect the computer and its peripherals	297(95.8)	10(3.2)	3(1.0)	4.67	0.70
13.	I can access information on CD/DVD	297(95.8)	9(2.9)	4(1.3)	4.50	0.68
14.	I can use spreadsheet package very well	307(99.0)	9(2.9)	3(1.0)	4.60	0.60
15.	I can create a Basic presentation package	298(96.1)	0	3(1.0)	4.55	0.65
16.	I can access an internet site via its website address	290(93.5)	17(5.5)	3(1.0)	4.35	0.74
17.	I can download files from the Internet	9(2.9)	295(95.2)	6(1.9)	2.17	0.49
18.	I can send and receive e-mail messages	22(7.1)	282(91.0)	6(1.9)	2.47	0.71
19.	I can save text and images from the web packages	39(12.6)	265(85.5)	6(1.9)	2.54	0.80
20.	I can communicate online with other mathematics teachers to share ideas	231(74.5)	67(214.6)	12(3.9)	3.76	0.94

Table 19 shows mathematics teachers' competence in Information and Communication Technology. Actual numbers and percentages for responses to each statement are also shown. The table reveals that more than 80 percent of mathematics teachers are fully competent and confident users of Information and Communication Technology, that is, (I can locate and run an application programme, e.g. MS Word; I can connect the computer and its peripherals, I can access information on CD/DVD; I can use spreadsheet package very well; I can create a basic presentation package, I can access an internet site via its website address; I can download files from the Internet, I can send and receive e-mail messages; I can save text and images

from the web packages and I can communicate online with other mathematics teachers to share ideas. The next two tables are used to test the hypotheses.

Will There Be Any Difference between the Attitude of Male and Female Mathematics Teachers?

Table 20: Mean, Standard Deviations, and T-test on Attitudes towards Information and Communication Technology of Mathematics Teachers According to Gender

Variables	N	Mean	SD	t-cal	t-cab	Remarks
Female	98	17.50	1.25	12.71**	1.96	Rejected
Male	212	15.72	1.40			

**significant; p=0.05; df=308

The t-value was found to be statistically significant. Thus, there was a significant difference between the attitude of male and female mathematics teachers' towards ICT.

Is There Any Difference between the Competence Level of Mathematics Teachers Based on Gender?

Table 21: Mean, Standard Deviations, and T-test on Mathematics Teachers Competence in Information and Communication Technology According to Gender

Variables	N	Mean	SD	t-cal	t-cab	Remarks
Female	98	124.89	5.62	53.46**	1.96	Rejected
Male	212	140.18	5.40			

**significant; p=0.05; df=308

Table 21 shows a significant difference between male and female mathematics teachers' competence.

The female mathematics teachers had more positive attitude than their male counterparts (*Table 20*). This could imply that they would be ready to learn and integrate ICT in their mathematics teaching. The males had more competence than the female mathematics teachers. This supports many earlier studies like Kennelwell & Morgan (2003) and Malor (2007).

ICT is gradually replacing the traditional teacher centred teaching and learning environment in education. Also emphasis has shifted from the teachers to the learners. It becomes imperative that all teachers, irrespective of their gender, adopt the use of ICT in facilitating teaching and learning.

Contribution to Human Resources Development

Mr. Vice- Chancellor sir, research and teaching are a subset of the work of academics in the University, I have been fully involved in the supervision of students' projects and theses at all levels. An estimate can only be given in this area using numbers again.

Undergraduate projects	400
Masters projects	100
PhD graduates	2
PhDs still under supervision	3

Sabbatical Leave

- My sabbatical leave at the National Open University of Nigeria (NOUN), 2013/14 brought a new and objective way in assessing the academic staff for promotion in the School of Education.
- I was a member of the accreditation team that prepared the School of Education for accreditation.
- The question Bank of the School of Education was made richer with two thousand multiple choice objective questions from which the school is still harvesting.

Contribution outside the University

Mr. Vice Chancellor sir,

1. I was an item writer for the Federal Ministry of Education for JET QUIZ for young scientists.
2. I was a presenter of Mathematics for the Nigerian Television Authority during the Instructional Television Series for Science and Mathematics from 1989 to 1991.
3. I was an examiner and a team leader for the West African Examination Council (WAEC) for Mathematics from 1988 to 1992.
4. I anchored USAID's programmes in the Teacher Incentive and Sanctions under the Literacy Enhancement and Advancement Programme (LEAP) 2001 to 2003.
5. I was in the team for accreditation of Colleges of Education for National Commission for Colleges of Education (NCCE) from 2003 to 2006.

I am an external examiner to many universities among which are:

I. University of Nigeria, Nsukka.
II. Obafemi Awolowo University, Ile- Ife.
III. University of Calabar.
IV. University of Port-Harcourt.
V. Lagos State University (LASU).
VI. National Open University of Nigeria (NOUN).
VII. University of Cape Coast Ghana.
VIII. Institute of Science and Technology Education (ISTE) University of South Africa

Conclusion and Recommendations

Mr. Vice- Chancellor sir, in the course of this lecture, I have traced the origin of numbers and its stages of development to the present, I have also shown some of the beauty and power of numbers in the development of Mathematics, Science and Technology and even in ICT which has revolutionised the world. Mathematics will continue to

occupy a central place in the curriculum of the nation and the world at large because of its power and usefulness in every sphere of life both to the illiterate and literate .The importance of competent teachers to teach this important subject cannot be overemphasised. I have highlighted some of my research work on this important subject at the primary, secondary and tertiary levels. Although ICT is included in the teachers' professional training, it is not comprehensive and much still depend on the teachers personal effort and motivation.

I recommend a paradigm shift in the training of teachers by introducing ICT in a more practical and dynamic way in the preparation of teachers. This can be done by establishing and equipping the approved Training and Learning Technology Unit (TLTU) in the Department of Science and Technology Education. The unit should be a theatre for preparing all student teachers before they embark on teaching practice. The micro-teaching should include hands-on in the use of ICT. This will achieve a double purpose towards the goal of the National Policy of Education on Teacher Education and ICT.

The Unit will be a melting place for the University and the larger community in providing pre-service and in-service training for teachers. Recently a state Government sacked many teachers in schools because they failed test on the level of the pupils they were teaching. A facility like the TLTU will help in training the trainee who will go back to train teachers on constant basis. This is the practice all over the world. Teachers are constantly undergoing in-service training in the use of ICT for instruction to keep them abreast in the task of training children and youths of the 21st century and Information Age.

Acknowledgements

Mr. Vice- Chancellor sir, I acknowledge with gratitude in my heart, to God Almighty who has given me all that pertain to life and godliness. I joined the University of Lagos service in 1978 as a teacher in the staff school, today by God's grace I am at the peak of my career. He only has made all things beautiful in His own time. Unto Him be praise and Glory forever!

I appreciate the management of the University of Lagos, starting from the Pro-Chancellor and the chairman of Council, Dr. Wale Babalakin (SAN, OFR); The Vice-Chancellor, Professor Oluwatoyin Ogundipe; Deputy Vice-Chancellor, Academic and Research, Professor Oluwole Familoni; Deputy Vice- Chancellor, Management Services, Professor B. E. O. Ogbojafor; Deputy Vice-Chancellor, Development Services, F. T. Ogunsola; Registrar Dr. Mrs. Taiwo Ipaye; The Bursar Mr. Nurudeen Olalekan Ajani Lawal; The Librarian, Dr Oluremi Fadehan.

I want to express my gratitude to my elementary and secondary school teachers and classmates. They are the ones whom God used to lay the foundations for today's lecture. My gratitude especially to former Miss Mary Maduekwe of blessed memory, my principal and mathematics teacher at Anglican Girls Secondary School, Ogidi. God used her to sharpen my interest and hunger for mathematics. My lecturers at the Advanced Teachers' College Kano did a wonderful job. At the end of my course, I was in a dilemma of whether to continue with Chemistry or Mathematics. I am grateful to them all.

My lecturers at the University of Lagos were the best. They include Late Dr. Popoola, Professor Adu, Dr Kasumu, Late Dr Esan and Professor Ajala. I am privileged to be taught Mathematics by two prominent Mathematician and renowned men of God today: the General Superintendent of the Deeper Life Christian Ministry: Dr. W. F. Kumuyi and the

General Overseer of the Redeemed Church of God: Dr. E Adeboye. Dr. W. F. Kumuyi simplified complex analysis in his classes by removing all complexities through his teaching. The final year in the Department was the most remarkable. It was the year of meeting the world renowned Mathematician, Late Professor Chike Obi. Attendance in his class was with fear and admiration. Then came the day final year students wanted to inquire about our performance in his course (Differential Equation). Nobody had the courage to go alone so we decided to go as a class. The decision was to find out from his secretary if he would be willing to see us. Fortunately and unfortunately as we opened the secretary's office, we met the professor himself. Out of fear, the greetings were as varied as our number. Some greeted "good morning sir, some good afternoon sir and some good evening sir" He eventually attended to us, he then asked me to report back to him on my performance in other courses because by the grace of God, I scored the highest in his course. That marked the beginning of my career as an academic. He was instrumental to my employment as a graduate assistant in Mathematics Department. I will ever remain grateful to him. May the Good Lord grant him eternal rest.

I enjoyed the companionship of my colleagues during that training period. We were three women, Mrs. Ogbonna, Mrs. Nwokeoma and myself. The late Vice- Chancellor, Prof Sofoluwe was new to the Department then, he used to tease us when we stayed late to solve problems or mark students' assignments from tutorials with the words, "You women go home, don't let the men suffer." On the other hand, he would encourage us to do the work for posterity. May his soul rest in perfect peace. Dr. A. Adeniran was a year our senior, we cherished his advice, and the friendship which has continued even till date. The lecturers in the Faculty of Education prepared me for the pedagogical part of my profession. I remember today with gratitude, to my lecturers: late Professors Osiyale, Obe, Fagbamiye and my

greatest mentor Late Professor Kalejaiye. He supervised my undergraduate project and PhD thesis. It was under his tutorship that I learnt the skill for textbook writing for secondary schools. My first textbook was a joint one with him and another mathematics teacher, Mr Okuboyejo: titled "Round up Mathematics for Senior Secondary Certificate Examination", today I am one of the authors of the "New Concept Mathematics Textbook for Secondary Schools" by Learn Africa used across many states in the country.

Professor Lozzonski supervised my M.Sc. thesis for Mathematics. I am grateful to him for his patience being the only student in the class, it was a challenging experience for two of us. My appreciation also goes to Professor G. Olusanya who made it possible for me to move from Mathematics Department to Correspondence and Open Studies Institute (COSIT). I cherish the interaction with the academic, administrative and technical staff of the Institute, which has now metamorphosed to Distance Learning Institute (DLI).

I moved to Faculty of Education as a Lecturer I in 1993. It was like coming home. I have worked with several Deans since then. I am greatly indebted to the immediate past Dean, Prof. Supo Jegede. He was very supportive during the last accreditation exercise in the Department of Science and Technology Education. I could call him at any time to clarify issues or make demands. Thank you for picking the calls at odd time and your support. Prof. Omoegun exhibited all the attributes of a mother in following up my promotion to a full Professor. God bless you ma. Among the other Deans is Professor Duro Ajeleyami. He was the Dean when I was first appointed the acting Head of Department in 2005/07. He gave me some tutorials on the duties of a Head of Department and was very supportive throughout my tenure as the Acting Head of Department. God bless you sir. Professor O. Obe made possible my transfer from COSIT to the Faculty of Education during his Deanship. He arranged

for my interview despite the fact that my letter came late by omission or commission. The Lord grant him eternal rest.

All the Deans I have worked with appointed me as the Chairman of one committee or the other during their tenure. Prof. Ajeyalemi appointed me Chairman of the Faculty Business Committee, Prof. Omoegun appointed me Chairman of the Teaching Practice Committee and Prof. Bidmus appointed me Chairman of the Faculty Office Allocation. I thank each of you for the confidence you have in me and the opportunity given to serve. I also want to thank the present Dean, Prof. M. Ubangha.

The senior Professors in the Faculty of Education have been my mentors at one time or the other. They include Professors Aloy Ejiogu, K. Adegoke, Lawal and Owotu. My other colleagues; Prof. Grace Otinwa, Prof. Ngozi Osarenren, Prof. Carol Opara, Prof. S. A. Oyebade, Prof. C. O. Oladapo, Prof. M. O. Olusakin, Prof. A. A. Alani, Prof. S. A. Bello, Prof. V. E. Onyenye, Prof. Obasoro, Prof. Hasatrup, Dr. I. P. Nwadinigwe, Dr. Nonye Ikonta, Dr. C. S. Madumere, Dr. N. N. Uzoka, Dr. M. A. Onwuama, Prof. (Mrs.) Lucy Ekwueme of blessed memory, Dr. Egenti and many others. You have impacted my life positively at one point or the other in the course of our interaction. Thank you all.

My colleagues in the Department of Science and Technology Education are wonderful and cooperative. They include Professor Uche Udeani the Director DLI, who is not just a colleague but a dependable friend and sister, Prof. Esiobu my HOD, Drs. C. O. Oke, S. Adenle, S. Adeyemo, N. Okafor, M. Odo, S. Olabiyi, J. Jimoh, V. F. T. Babajide, L. Maduagwu, T. Owoyemi. Dr. S. Fakorede (Departmental CITS Liaison Officer). Drs. R. Okunuga, I. O. Shobowale, A. A. Kareem, S. O. Akinoso, Abusonwon, O. T. Ojo, and all graduate assistants. Dr. Festus Olafare was very helpful both in the production and proofreading of this lecture's manuscript. We moved from being a Department to a family; God bless all of you. The other departmental staff have also been very cooperative, among who is Mr. M. Onoka. My special thanks to you all.

I appreciate Prof. Oye-Ibidapo Obe, former Vice-Chancellor, University of Lagos. It was during his tenure that I was appointed an Associate Professor and Acting Head of Department for the second time. Thank you sir.

I must not fail to appreciate the immediate past Vice-Chancellor Professor Rahman Bello, it was during his tenure that I became a full professor. In his humane manner, one of his questions during the interview as a Professor was "if the ages of my children is an 'arithmetic progression' or a 'geometric progression". He also appointed me the Head of Department while I was away on holiday outside the country. Thank you sir. I also recognise the Deputy Vice-Chancellors who worked during his tenure: Distinguished Prof B. I. Alo (Academics and Research) and Prof. Duro Oni (Management Services). I appreciate your encouragement at one time or the other in my academic career.

The University Team on accreditation to the Department during the 2016/17 session made up of the present Vice-Chancellor Prof. Toyin Ogundipe, Prof. S. A. Okunuga (Director Academic Planning), Prof. J. D. Olowokudejo and Prof. Eleshi (Provost College of Medicine) was very supportive. I also want to put on record the cooperation my Department received from the Deputy Director of Works, Engineer Oloyede and the acting Head of Department of Mechanical Engineering, Dr. Kamiyo during the preparation for the accreditation in 2016/17 session. Their support and cooperation yielded the good result of full accreditation for the programmes. God bless you all. Their support is instructive on the need for cooperation across Faculties and different sections of the university to continuously keep the

University as The University of first choice and nation's pride. I acknowledge all the students, at all levels that I have met in the course of my career. They are the platform for today's lecture. Remain blessed.

I moved into the University quarters at Ozolua Road in March 2012. I enjoyed the first Saturday monthly fellowship amongst the residents chaired by Professor T. Nubi and Engineer Akinwande. My immediate neighbours in Block 2 are very peaceful and loving families. They are professors Lawal, Adeleke (DSA), Maduagwu and Akinbulirie. My Engineer as I call Engineer Akinwande and his wife are not just neighbours but my family. Special thanks to Professor Maduagwu who also read this lecture and gave it a fine-tuning. I thank God for giving me such wonderful neighbours. I am favoured with wonderful friends. I express my unquantified gratitude to these friends, Dane Ifeoma Ugwunze, our friendship is as old as our lives. We were both born in Jos in the same year and have continued till today. She cut short her visit to USA to attend this inaugural lecture. The following are also appreciated Prof. Omiri, Mrs Nsoedo, Mrs Etisoro and Mrs Ofoneme and many others. They have supported me at one time or the other. I want to thank in particular Prof. and Mrs. Malaka. My friendship with Mrs Malaka cannot be fully described with words. We have been there for each other through thick and thin. Mrs Malaka has become my twin sister as some describe us. The Lord bless you real good.

This lecture would not have been possible without the support of my spiritual fathers. The General Superintendent of the Deeper Life Christian Ministry, Pastor W. F. Kumuyi, through his teachings, has continuously influenced me positively and strengthen my faith in the Lord. The Pastors in old Akoka group under the leadership of Pastor Andrew Umoru are indeed true Pastors. They have looked after the flock under their care as commanded by the Lord in Acts 20: 28. They are Pastors John Umoru, Innocent Ejiembe, Orji

(Ibo Church), Tobe Nnadiozie, Awoyele, Olaleru, Oyediran, Amuzie, Micky Obenede, Omoleye, A. Anyanwu, Igbokwe and many others.

The group pastors of old Bariga and Somolu, Adebisi and Ayebusi are appreciated for their prayers. The Lord will reward the labour of love of Pastor (Dr.) Adamson Tunde Lawal of the Redeemed Christian Church, Salvation Theatre, Birmingham, United Kingdom. I also appreciate members of the International Friendship League (IFL) that are present today.

My District Pastor, Pastor J. Ewenzie and his wife are appreciated and all members of Grace District. appreciate the Amichi professionals who organised a reception party for me as the first female Professor in the town. want to appreciate in particular Chief Chidi Anyaegbu the Chief Executive of Chisco Transport, Okeenyi of Amichi, (OON) Mr. Mike Igbokwe (SAN). The first Senior Advocate in Amichi, Barrister Sunny Ekwuwusi, Mr. Ifeanyi Odunwa, Nnodu Agu and many others who were present in that reception and today. Thank You. I also thank all my in-laws.

To my biological family; my parents Mr. Nelson Onubogu and Mrs. Virginia Onubogu of blessed memories left a legacy of hard work, honesty godliness and discipline in us by virtue of our training. These have remained a landmark in my life till today. My parents valued education and gave me full support. I recognise my sister and her husband Professor and Mrs Emma Nwokoro. All my other siblings. I also want to thank members of Odogwu family that are present here today, Mrs. Magaret Okafor (Nee Odogwu), Mrs. Kate Odogwu retired bank Manager, Dr. Dalu Odogwu Consultant at Lagoon Hospital, Lagos, etc. You are all honoured today. God bless all of you.

Finally, finally, at this point in time, I am indeed short of words as how best to express my gratitude to my dear

husband of blessed memory: Mr. Godson Chukwudi Odogwu; who went to be with the Lord eleven years ago on the 23rd March, 2007. How on earth would I have come this far without his fatherly support, love and care? He married me as a teenager and school certificate holder during the Nigerian civil war. After the war, he secured a job with the Kano State Government in 1971. He bought the form for the NCE programme and did school runs over a distance of 20 kilometres daily for three years until I completed the programme. He did not stop there, he bought the degree form and gave me all the encouragement and support I needed for the degree programme. It was the encouragement and support I got from home, that resulted in my making the best results in both NCE and degree programmes. In essence my husband of (blessed memory) held the academic ladder for me to climb to the top. He is not DEAD but alive in my heart. His interest in the achievement of his immediate family is also seen in the career of our children. Today all of them are doing well in their chosen professions. The first is a Mathematics' lecturer in Engineering Academy in Britain like his mother, He is here with his family. My daughter who is a dentist is unavoidably absent. The doctors are consultants in their areas of specialisation and fellows in their countries of practice. To God be all the glory.

Mr. Vice-Chancellor sir, this is my inaugural lecture and story.

"This is my story, this is my song
Praising my saviour all the daylong
This is my story, this is my song
Praising my saviour all the daylong"

Thanks for listening.

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