AN EVALUATION OF MATHEMATICS TEACHER EDUCATION PROGRAM IN A UNIVERSITY IN KANO, NIGERIA

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AN EVALUATION OF MATHEMATICS TEACHER EDUCATION PROGRAM IN A UNIVERSITY IN KANO, NIGERIA

by

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LIST OF ABBREVIATIONS

CIPO	Context, Input, Process and Outcomes
BMAS	Basic Minimum Academic Standard
CIPP	Context, Input, Process and Product
CK	Context Knowledge
CVI	Content Validity Index
CVIA	Content Validity Index Average
D.E	Direct Entry
I.D	Item Difficulty
D.I	Discrimination Index
ESSPIN	Education Sector Support Program in Nigeria
FME	Federal Ministry of Education
I-CVI	Item Content Validity Index
IJMB	Interim Joint Matriculation Board
KR-20	kuder Richardson Formula 20
ILO	International Labor Organisation
M.E	Measurement of Error
MKT	Mathematical Knowledge for Teaching
MTPEQ	Mentor Teachers Program Evaluation Questionnaire
NCE	Nigerian Certificate of Education
NERDC	National Educational Research and Development Council
NPE	National Policy on Education
NTI	National Teachers Institute
NUC	National Universities Commission
PCK	Pedagogical Content Knowledge

PMT	Pre-service Mathematics Teachers
S-CVI	Scale Content Validity Index
S-CVIA	Scale Content validity Index Average
S-CVIA	Scale Content Validity Index Universal Agreement
SMCT	School Mathematics Content Test
SPSS	Statistical Package for the Social Sciences
SD	Standard Deviation
TITS	Teachers in Training Service
TTAMP	Teachers Trainers Assessment of Mathematics Program
TAPEQ	Teachers Assessment of Program Effectiveness Questionnaire
UME	University Matriculation Examination
UNESCO	United Nation Education, Scientific and Cultural Organization

PENILAIAN PROGRAM PENDIDIKAN GURU MATEMATIK DI SEBUAH UNIVERSITI, DI KANO, NIGERIA

ABSTRAK

Tujuan kajian ini adalah untuk menilai Konteks, Input, Proses dan Hasil program pendidikan guru matematik di Sebuah di Universiti, di Kano, Nigeria. Kajian ini menggunakan model penilaian Context, Input, Process and Outcomes (CIPO) Scheerens (1990). Kajian ini menggunakan reka bentuk kaedah campuran yang dipandu oleh model kajian. Sampel seramai 130 orang guru matematik pra-perkhidmatan dan 5 orang pensyarah program tersebut terlibat dalam kajian ini, dengan menggunakan Ujian Kandungan Matematik Sekolah, Penilaian Guru mengenai Keberkesanan Program, Borang Penilaian Latihan Mengajar, Protokol Temu Bual dan Senarai Semak Kandungan sebagai instrumen kajian. Dapatan kajian menunjukkan bahawa objektif program tersebut adalah memadai, bersesuaian dengan keperluan masyarakat dan mencerminkan objektif dasar negara, tetapi latihannya tidak mematuhi sepenuhnya rangka kerja NUC dalam proses mencapai objektif yang ditetapkan. Dapatan penilaian menunjukkan perbezaan antara kandungan kurikulum program tersebut dengan kurikulum matematik sekolah di mana guru matematik pra-perkhidmatan dilatih untuk mengajar selepas tamat pengajian. Dapatan menunjukkan bahawa program tersebut dapat membangunkan lima daripada enam (iaitu 83.33%) kemahiran mengajar yang diperlukan dan Kecekapan guru pra-perkhidmatan, termasuk penulisan rancangan pengajaran yang baik, kemahiran komunikasi yang baik, pengurusan bilik darjah yang baik, teknik penilaian yang baik, dan personaliti pengajaran yang baik. Dapatan menunjukkan bahawa objektif program tersebut mungkin tidak dapat dicapai, kerana lebih daripada

50% guru matematik pra-perkhidmatan mempunyai tahap pengetahuan yang tidak mencukupi tentang mata pelajaran yang dilatih untuk mengajar selepas tamat pengajian. Hal ini menunjukkan bahawa tahap pengetahuan guru matematik pra-perkhidmatan tentang mata pelajaran matematik sekolah boleh digunakan sebagai alat ramalan keberkesanan program dan asas bagi pengambilan bekerja guru matematik pra-perkhidmatan selepas tamat pengajian.

AN EVALUATION OF MATHEMATICS TEACHER EDUCATION PROGRAM IN A UNIVERSITY IN KANO, NIGERIA

ABSTRACT

The purpose of this study is to evaluate the Context, Input, Process and Outcomes of mathematics teacher education program in a University in Kano, Nigeria. This study adopt Scheerens' (1990) Context, Input, Process and Outcomes (CIPO) evaluation model. The study employed mixed-method research design which was guided by the model of the study. A sample of 130 pre-service mathematics teachers and 5 lecturers of the program were involved in the study, using School Mathematics Content Test, Teacher Assessment of program Effectiveness, Teaching Practice Assessment Form, Interview Protocol and Content Checklists as the research instruments of the study. The finding of the study revealed that the objectives of the program are adequate, compatible with needs of the society and has reflected national policy objectives, but the training does not strictly adhere to NUC framework in the process of achieving the set objectives. The results of the assessment indicated a discrepancy between the program curriculum contents and school mathematics curricular for which the pre-service mathematics teachers have been train to teach after graduation. The finding shows that the program was able to develop five out of six (i.e. 83.33%) of the required teaching skills and competency to the pre-service teachers, which includes good writing of lesson plan, good communication skills, good classroom management, good evaluation technique, and good teaching personality. The finding revealed that the objectives of the program might not be achieved, because over 50% of the pre-service mathematics teachers have inadequate level of knowledge of the subject matter for which they

have been train to teach after graduation. This suggest that the level of knowledge of pre-service mathematics teachers of school mathematics subject matter can be used as a predictable tool of effectiveness of the program and basis for pre-service mathematics teachers employment after graduation.

CHAPTER 1

INTRODUCTION

1.1 Structure of Education in Nigeria

The current system of education operated by the Nigerian government is centralized system of education, in which all the educational resources are provided and regulated by the central government. The system of education was divided into three levels of education (i.e. Primary School Education, Secondary School Education and Tertiary Institution Level). Tertiary institution level is the post-secondary school level of education. Post-secondary school level consists of Universities, Polytechnics, Monotechnics, and Colleges of Education (National Policy on Education, 2004).

Nigerian teacher training institutions are those institutions that are mandated in the National Policy to prepare students who are aspiring to become school teachers immediately after graduation. The policy mandates the institutions to offer both pre-service and in-service training by preparing school teachers who attain the highest standard of quality education, "since no education system can rise above the quality of its teachers, teacher education shall continue to be given major emphasis in all educational planning and development" (NPE, 2004, p. 39).

However, the national policy on education has set a guideline on the minimum requirement for teaching in school as: "minimum qualification for entry into the teaching profession shall be Nigerian Certificate of Education (NCE)" (NPE, 2004). To attain the set target of minimum qualification for entry into teaching profession,

the following are the teacher training institutions mandated by the policy to provide teacher training:

Faculties of Education in Nigerian Universities

1. Institutes of Education
2. Colleges of Education
3. National Teacher Institute (NTI)
4. School of Education in the Polytechnics
5. National Institutes for Nigerian Language
6. National Mathematics Center.

Furthermore, Colleges of Education are mandated to train primary school, junior secondary school, and technical college teachers. School of education in polytechnics and institutes of education are require to provide professional Diploma in education, teacher training and workshop. Faculties of Education in Nigerian universities are to prepare both pre-service and in service teachers who will shoulder the responsibility of teaching at secondary school and colleges (Federal Ministry of Education, 2005). The training should equip both pre-service and in service teachers with adequate pedagogical skills and subject matter knowledge relevant to the national policy objectives of the training (National Universities Commission, 2012).

Interestingly, to actualize the set target of minimum qualification for teaching in schools, Nigerian government endorsed and registered as member of UNESCO lifelong education. The endorsement of UNESCO lifelong education has formed the genesis of policy on education (Osuji, 2009). National policy on education has stipulated certain objectives to achieve on teacher training which are:

1. To provide highly motivated, conscientious, and efficient classroom teachers for all levels of educational system.

1. To encourage further spirit of enquiry and creativity in teachers.
2. To help teachers to fit into the social life of the community and society at large and to enhance their commitment to nation objectives.
3. To provide teachers with intellectual and professional background adequate for their assignment and to make them adaptable to any changing situation not only in the life of their country but in the world.
4. To enhance teachers commitment to the teaching profession.

However, section 8B (item 74) of the national policy on teacher education has reaffirm the objectives of the training, in which the training should give more emphasis on the important of curriculum and teaching method. Pre-service teachers should be prepare based on the standard of teacher training and expose to innovations in their profession. The implementation of the policy has task university teacher education with certain responsibilities which include (NUC, 2012):

- Faculty of education in university should train pre-service teachers who will be employed to teach at secondary school and higher education.
- The preparation should be based on standard of teacher education, which will make their product adaptable to any changing situation.
- They should also provide Master's and PhD training in education.

Hence, to maintain and ensure quality assurance on the responsibility reposed on Nigerian universities, National University Commission (NUC) was first established in 1962. The function of the commission is similar with universities commission in

Britain, New Zealand, and Australia (NUC, 2018). The commission was set to advise central government on planning and development of Nigerian universities and advice government on the financial needs of Nigerian universities.

Furthermore, in 1974 the function of NUC was expanded by enacting a new decree N0. 1 of 1974 that transformed NUC function from advisory capacity on regional university education to centralized university education (NUC, 2012). The amendment of NUC function from regional education to statutory body has empowered NUC:

> To lay down minimum standards for all Universities in the Federation and to accredit their degrees and other academic awards after obtaining prior approval therefore through the Minister from the President, Commander-in-Chief of the Armed forces; provided that the accreditation of degrees and other academic awards shall be in accordance with such guidelines as may be laid down and approved by the Commission from time to time. (NUC, 2012, p. 7).

The new decree of 1974 has mandates the commission to ensure and maintain quality assurance among the Nigerian universities, and set a benchmark on minimum academic standard (BMAS) for all programs offered in Nigerian universities. The commission set the following guideline as criteria for running teacher education program (NUC, 2012).

Approval: The first condition for running teacher education program in any Nigerian university is to get approval from the commission and submitting a propose course of study. The commission will reviews and assessed their proposal based on the requirement and standard set for running teacher education program.

Certification: All universities that are running teacher education program in Nigeria are mandated to prepare pre-service teachers based on the benchmark on minimum academic standard set by the commission for the certification of degree in education. The pre-service teachers must complete a coursework, undergo teaching practice exercise and pass the test of basic skills. Certification requirement of the program will serve as an indicator for effectiveness of the program. Therefore, teacher training institution should comply and stick to the certification requirement so that public will view their program as effective and achieve the set objective of the program.

Accreditation: The decree N0. 49 empower the commission to accredit Nigerian universities and ensure they are complying and consistent with the commission guideline in all the categories they set for running any program. Consequently, on the basis of the above expression and national policy objectives of teacher education, faculties of education were task by the commission achieve the following (NUC, 2017, p. 7):

1. To produce prospective teachers with a sound knowledge and good leadership qualities
2. To produce teachers with the knowledge of subject matter, pedagogical knowledge and skills and attitudes, this will enable them to contribute to the growth and development of their communities in particular and their nation in general.
3. To produce teachers who have sound mastery of their subject matter knowledge and the ability to impart such knowledge to their students.

4. To equip teachers with a mastery of different problem solving skills and method of applying it.
5. To produce highly motivated, conscientious and efficient classroom teachers for all levels of education who are capable of and ready to teach.
6. To help teachers to fit into the social life of the community and society at large and enhance their commitment to national objectives.
7. To provide teachers with the intellectual and professional background, adequate for their alignment and to make them adaptable to any changing situation, not only in the life of their country but in the wide world.
8. To encourage the spirit of enquiry, creativity and entrepreneurship in teachers.
9. To enhance teachers commitment to the teaching profession.
10. To enhance the skills of teachers in the use of new technologies.

Furthermore, it's on the basis of the above national policy objectives of teacher education; the objectives of mathematics teacher education programs are set. Mathematics teacher education training should: Enable student teachers to acquire the various concepts, principles, theories and laws of mathematics; Enable student teachers to acquire necessary teaching skills and other aspects of methodology of teaching mathematics; Help student teachers to become effective classroom teacher; Acquire the ethics of teaching as a profession; Become professional mathematics teacher; Disseminate information in mathematics to the society; Develop positive values and attitudes for efficient discharge of their duty as teachers (NUC, 2017, p. 8).

1.2 Background of the study

Globalization is the continuous expansion of social relationship and skills that link different localities across the globe, with global happening by preparing and shaping local with global consciousness and skills based on standard scales and rapid growth in education. Lechner's (2001) defined globalization as consolidation of world society, through expansion of global linkages, organization of social life on a global scale and the growth of a global consciousness. Similarly, Burbules and Torres (2000) describe globalization as: "the intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vise versa" (p. 29).

Hence, with continuous changing and unprecedented development in education, the field requires global skills and competency which will promote and enhance globalization. The inculcation of the required teaching skills and competency are necessary for global understanding and functioning, since teaching is very essential in bringing different locality together across the globe. The field of education requires necessary skills which will promote and enhance globalization in education. Moreover, the increase of emigrating teaching professionals around the globe has necessitated globalization and 21st century skills, therefore, teacher preparation and professional development should be based on global standard, and the pre-service teachers should be capable of implementing them (Ntuli, Nyarambi, Agamba, & Ntuli, 2018).

Research literature has shown that the instrument through which globalization in education could be achieved is teacher education, since teachers are the transmitters of change through educating population. Therefore, it is necessary for teachers to acquire appropriate skills capable of transforming them to function in the society before meaningful change can occur (Ntuli et al., 2018).

Ntuli et al. (2018) highlighted the need for the teacher training institutions to concentrate on the global objectives of education and contents that will infuse 21st century skills and pedagogical knowledge. The content should facilitate change in pre-service teachers' attitude, knowledge and skills. They summarized the global objectives of teacher education as follows (Nakhat & Tazyeen, 2016):

1. To train the mind for overall development of personality and Character-Building.
2. To make a man, a human being.
3. To train for skilled personal and the cooperative.
4. To generate in people the consciousness of the environment.
5. To inculcate in children the habits of prudence, economy and self-improvement.
6. To equip an individual with knowledge a wisdom both.
7. To enhance quality of life of an individual.
8. To develop positive attitudes towards life and being.
9. To acquaint the people with deride level of knowledge information.
10. To promote universally shared values in children.
11. To improve, their ability to think and equip them with specialized skills useful in different areas of trade, commerce, industries and services (p. 3).

However, the assumption of ideal teacher preparation is for pre-service teachers to demonstrate higher level of knowledge of subject matter for which they have been train to tech. The level of understanding of subject matter knowledge and competency demonstrated by some school teachers is of more comparable with understanding of pupils they were teaching (Obioma, 2005). Similarly, Aluede and Idogho (2014) argued that the quality of teachers' turns out in the country has raised issue of concern to all stakeholders over the quality of teacher training institution product in both educational sector and non-educational sector. Kuiper, Thomas, Olorisade, Adebayo, Maiyanga, & Mohammed (2008) noted that, the challenge to teacher education training institution is the continues complaints about the quality of newly appointed teachers, who demonstrated low levels of knowledge of numerical skills as well as inadequate knowledge of subject matter.

Available literatures have revealed that the effectiveness of teacher training can be asses from the quality of pre-service teachers (Subedi, 2015). Daniela and Gerri (2015) have noted that to better understand the effectiveness of teacher preparation, the perspectives of pre-service teachers on their needs should be assessed. In 2008, the participants of partnership for 21st century skills have identified 3 skills that are necessary for effective teacher preparation and each pre-service teacher must possess those skills before being qualified as effective school teacher (Partnership for 21st century skill, 2008, p. 20):

- A blend of content knowledge, specific skills, expertise and literacy's.
- Critical thinking, problem solving skills, creative skills, effective communication skills and collaboration, self-directed learning as a base for core academic knowledge.

- Skills needed to make adoption to the rapidly changing technologies and vital to working and living in an increasingly complex, rapidly changing global society.

Moreover, teachers as key personnel to the attainment of national objectives of providing quality education, there is need for teacher training institutions to equip pre-service teachers with essential knowledge and skills of lifelong education, for them to shoulder the responsibilities entrusted on them, and effectively influence the students in their thought and behavior (Kolo, 2009). Lifelong education has been defined by Candy (2000) as:

> a continuously supportive process which stimulates and empowers individuals to acquire all the knowledge, values, skills and understanding they will require throughout their lifetimes and to apply them with confidence, creativity and enjoyment in all roles, circumstances and environments. (p. 6).

Mathematics teacher education program is a teacher preparation training that is specifically designed to equip school teachers with mathematics subject matter, knowledge and teaching skills. The objective of the training is to prepare secondary school mathematics teachers who are ready to accept teaching task immediately after graduation. The vision and mission of the program in the national policy on education is to groom quality school mathematics teachers who will help government to achieve national objective of lifelong education by providing education that is qualitative, comprehensive and in line with aspiration of the society of quality at all level of education (Federal Republic of Nigeria, 2013).

The program was designed to train pre-service teachers for period of four years, by undergoing a rigorous training in mathematics, education and teaching practice exercise to practice teaching in schools based on the knowledge and skills they received during their pre-service years. However, in spite of the national objectives for mathematics teacher education program as a guide to teacher training institution, for grooming mathematics teachers who are competent in their subject area and capable to help government to attain national objectives of lifelong education, there is course of alarm over the inability of teacher training institution to produce adequate, trained and qualified mathematics teachers (Okori & Jerry, 2017; Udonsa, 2015).

Previous studies have shown that the teacher training institutions in the country have tended to neglect their duty by preparing teachers with inadequate subject matter knowledge and pedagogical (Odia & Omofonmwan, 2007). The challenge to teacher education training institution is the continual complaints about the quality of newly appointed teachers. The teachers demonstrated inadequate mastery of the subject matter and teaching skills for which they have been employed to teach.

Previous studies have examined the quality of teachers prepared by teacher training institution. They reported that the lack of mastery of the subject matter knowledge displayed by some mathematics teachers has raised issues of concern to the stakeholders to the extent that many people doubt about the process they acquired the certificate they possessed (Anaduaka & Okafor, 2013; Omorogbe & Ewaansiha, 2013). The level of understanding of schools' mathematics subject matter knowledge displayed by some school teachers was very poor, to the extent that many teachers cannot be relied upon to raise the quality of school they were teaching (Musa, 2011).

Consequently, David and John (2010) suggested that when an individual or group of individuals were assigned or exposed to treatment (undergo a training) if they did not response to the treatment as set by the objectives of the training. It is the convenient time to evaluate the effect of the offer of treatment (training). Similarly, Bickman and Peterson (1990) suggested that evaluators should regularly apply program evaluation theory to assess where and how to improve the program and identify its worst problem and best features.

Therefore, this study has set the objectives to evaluate mathematics teacher education program in a University in Kano. Nigeria. Theory of program evaluation will be use as a guide to the model of the study to assess the effectiveness of the program. Previous researches have shown that different evaluation models were used by researchers in the field of education in evaluation of teacher education program or some components of teacher education program. Tan (2011) evaluated postgraduate school based teacher education program in Malaysia using mixed method in a theory driven evaluation as model of the study.

She evaluated each component of the training using theory driven evaluation as a guide to the study. The components evaluated in the study are: treatment domain (modules and tutorials), implementing environment domain (tutors competency etc.), intervening mechanism domain (time and commitment etc.), impact domain (teachers in training service competency), and outcome domain (goals and objectives of the program) (Tan, 2011).

Ariawan, Sanjaya, and Divayana (2016) evaluated implementation of practice teaching program for prospective teachers at Genesha University, Indonesia using CIPP evaluation model as theoretical framework of the study. The study evaluated all components of the program, which includes; context of the program, inputs of the program, process of the program, and product of the program. Chang and Lin (2017) evaluated internalization in higher education institution in Taiwan, using CIPO model of evaluation. The study evaluates the four dimension of internalization in higher education training which includes; context, inputs, process, and outcomes dimension.

However, to the best of researcher's knowledge, evaluation studies in the context of Nigerian teacher education training have only been carried out in small number areas, only little studies were conducted. Anakwue (1997) evaluated training program for primary school mathematics teachers in Nigeria. The study used quantitative approach in evaluation of initial stage for student admission and level of understands of pre-service mathematics teachers as a basis for school teaching after graduation.

Emarievbe (2013) evaluated English language teacher education program in two colleges of education in Niger Delta region of Nigeria. A case study and naturalistic inquiry were used in the study. The study examined trainers of the program, on how they interpret objectives of the program through classroom practice and reflect teaching needs of pre-service teachers. Lawyer and Oritsebemigho (2015) evaluated English Language curriculum implementation of Nigerian Certification of Education (NCE) program in three colleges of education. They used CIPP evaluation model to assess all the implementation dimension of the program. The implementation

dimensions includes; context, inputs, process and product of the curriculum. Thus, in reference to national policy objectives of mathematics teacher education program and above evaluation studies conducted in the context of Nigerian teacher education program, none of the studies evaluate the effectiveness of the system through mathematics teacher education program in Nigerian universities were provided.

With this regard, the researcher deems it necessary to use Scheerens' (1990) Context, Input, Process, and Outcomes (CIPO) models to evaluate mathematics teacher education program in a university in Kano, Nigeria. This is because the model has been described by Scheeren's (1990) as basic school system models that can be applued to any educational level to assess school functioning. The model was identified as a system level model, school level model, and classroom level model (Scheeren, 2015). The model serves as analytical framework through which quality education can be assessed, and the objective of this study is to evaluate the effectiveness of mathematics teacher education program in a university in Kano, Nigeria (Cuyvers, 2002). Therefore, the model was relevant to the set objectives of the study.

Veen (2015), suggested that in order to maintain and ensure quality assurance in education system, the system should be seen as a production process, whereby educational contexts of the program influenced input, process and outcome of the program. Under this study, national policy of education objective, mathematics teaching and learning needs of the pre-service teachers will be seen as the main factor to influence the input, process and outcomes of the program. Moreover, all elements of CIPO model are interconnected to each other in a form of context gives the input and input provided the resources to the process and sets requirement to the

outcome. Therefore, CIPO model can be used to apply Veen's (2015) concept to maintain and ensure quality assurance in mathematics teacher education program.

Moreover, Education Inspectorate (2010) has classified function of each element of CIPO as follows:

Context: This component is concerned with development and national policies that influence education such as needs, economic development and society. The context of education determines the goals and standard of education.

Input: This component is concerned with educational resources and facilities such as building, books, curriculum, and level of students' knowledge at commencement, students' characteristics and teacher's qualifications.

Process: This component is concerned with implementation on how the activities are organized to get the desirable output.

Outcome: This component is concerned with actual students' knowledge or achievement at the end of educational process.

The CIPO model will be use as a conceptual framework of the study, which will guide the researcher in assessing and exploring effectiveness of mathematics teacher education program in achieving the set objectives.

Mathematics teacher education program in a university in Kano, Nigeria, is a teacher education program. The program was designed to train professional and competent school mathematics teachers who will teach mathematics at secondary school level and colleges immediately after graduation (NPE, 2004). The pre-service

teachers are expected to register the basic and minimum requirement courses for graduation, undergo teaching practice and pass the test of basic skills (NUC, 2012). At the end of the training the pre-service teachers are expected to demonstrate adequate subject matter knowledge, pedagogical skills, problem solving skills and method of applying it.

Unfortunately, several issues of concern has been raised over the quality of pre-service mathematics teachers when employed to teach secondary school mathematics). A substantive body of literature has shown that most of the mathematics teachers do not have the pre-requisite knowledge to teach the course (Awofala, 2017; Eniayeju & Jibrin, 2018; Steven, Akwana & Ma'aji, 2012). Similarly, poor quality of mathematics teachers in terms of subject matter knowledge and pedagogical skills has been identified as one of the factor that affects effective classroom instruction in schools (Ajai, 2018; Okereke, 2006; Salami & Popoola, 2016; Zalman & Wonu, 2017))

1.3 Statement of the problem

Weick (1976) in Delima (2007) argued that for educational institution to maintain their goal and objectives, more time should be spent in examining the possibility that educational organization (in which teacher training institution are included) are most usefully viewed as ineffective system. He noted that the concept of organizational as ineffective system can have a substantial effect on the existing perspective about organization (Delima, 2007).

Mathematics teacher education program should continuously be evaluated at a fixed interval, to enable mathematics educators and administrators at any time to

identify problem areas (i.e., context, input, and process of implementation) that need remedial attention (Bessong & Felix, 2018).

Consequently, this study has set the objective to evaluate mathematics teacher education program in Nigeria, as research literatures show that the fundamental challenges to mathematics education is the lack of trained and qualified mathematics teachers (Onah, 2017; Thomas Mbwas, 2014). The problem of the lack of trained and qualified mathematics teachers in Nigeria has seriously affects teaching in schools, by impeding students from active involvement in problem solving (Adedeji, 2017; Lassa, 2004).

Against this background there is serious issue of concern on the quality of mathematics teachers in schools. The finger of accusation in most cases goes round, sometimes on government inability to improve teachers' quality and efficiency through professional development and sometime the accusation goes directly to the student's initial secondary schools poor quality without necessary going deeply into the roots of the problem. Teacher training institutions are the bedrock of teaching in any society, the quality of pre-service teachers is largely depended on the effectiveness of the system through which they received their training (Ibrahim, Wun, & Nordin, 2020). Melnar (2002) posited that a poor process of teaching will likely produce poor students.

There is a problem in Nigerian Universities, compliance with the National Universities Commission (NUC) Basic and Minimum Academic Standard for running their programs. Despite NUC effort to maintain and ensure quality assurance among the Universities by accrediting their program, the universities connived with

the accreditation personnel to fake the process (Akpan & Etor, 2016; Jekayinfa & Akanbi, 2011; Otokunefor, 2015). This has negatively affected the quality and productivity of their graduates in discharging their duty, because majority of them have inadequate level of knowledge of the subject matter and pedagogical skills (Ajai, 2018; Akwana & Ma'aji 2018, Zalman & Wonu, 2017). A possible cause of this problem is non compliance with the NUC BMAS by the universities and failure of the accreditation personnel to discharge the responsibilities reposed on them. Perhaps a study which investigates the effectiveness of mathematics teacher education program in a University, in Kano, Nigeria by using CIPO model of program evaluation could help resolve the situation.

Hence, the vision, mission and objectives of mathematics teacher education program in the national policy on education are to train competent secondary school mathematics teachers, who attained the higher standard of quality education. The activities of the program are more of academic pursuit than the intended objectives of the program of grooming quality school mathematics teachers. March and Olsen (2010) noted that the issue of concern to teacher training institutions is their inability to specify their achievable objectives within the available resources. Similarly, Anakwue (1997) posited that: "Mathematics teachers training program in Nigeria are not achieving their intended objectives because there are contradictions between their stated aims and the curricular provisions for training" (p. 2).

Perhaps the contradiction between the stated objectives of groomigg quality school mathematics teachers and curriculum provision in the training was related with the non compliance with the NUC guideline. It is because NUC has set a Basic Minimum Academic Standard for running teacher education training. Equally, the

objectives of the training should reflect and align with national policy objectives of grooming quality school mathematics teachers who attained higher standard of education. Unfortunately,

> There is low understanding among teacher trainers of the objectives and philosophy of teacher education in Nigeria. Most teacher trainers believe that the main purpose of training is to help student teachers develop enthusiasm and intellectual ability for further mathematics (Anakwue, 1997, p. 2).

A large body of literatures has shown that the main objective of mathematics teacher education program is to prepare competent school mathematics teachers, who will raise the quality of schools. Unfortunately, there is disparity between the program curriculum contents and school mathematics curricular for which the pre-service mathematics teachers have been trained to teach (Afe 2006; Aluede & Idogho, 2014; Buari, 2011). Similarly, Adeosun (2011) posit that "there is gap between the curriculum taught to teacher trainees and the reality that exist in school" (p. 106).

Furthermore, Adeosun (2011) has compiled the report of Ajeyalemi (2005); Education Sector Analysis (2002 & 2008); Education Sector Support Program in Nigeria (ESSPIN) in put visit report (2010), National Teacher Education Policy (2007); and Akebukola (2005) on the current state of teacher education training, in which they came up with following results:

1. The teacher training curriculum in the country does not fully acknowledge the new age environment in schools and classroom. There is not a sufficiently strong link between the school' curriculum and the teacher education curriculum.

2. Learning materials are not consistently available (students depend on their own notes copied from the blackboard) and thus written materials do not play a coherent and pervasive role in the provision of a strong cognitive and structure- giving basis for the development of the required professional knowledge, skills and attitudes of an effective teacher (p. 106).

Moreover, several attempts have been made by many researchers to explain the inadequacy of subject matter knowledge displayed by some school mathematics teachers, in which many stakeholders raised their concern over the quality of the teachers. Okebukola (2012) has provided in-depth analysis on the lack of the subject matter knowledge displayed by some school teachers, in which he found that the inadequacy was associated with inability of teacher training institution to expose pre-service teachers to adequate teaching practice. Similarly, Afe (2006) posits that the teacher training institutions are deficient in providing pre-service teachers with adequate intellectual and professional background that are necessary for teachers to discharge their duty.

Previous research has shown that the curriculum activities for which the pre-service teachers have been exposed to was inadequate to equip pre-service teachers with required subject matter knowledge and skills (Aluede & Idagho, 2014). Similarly, Nwokeocha (2011, 2013) has argued that the period through which the pre-service mathematics teachers have been exposed to, was inadequate to groom them with adequate subject matter knowledge and skills, which will enable them to practice their chosen profession effectively.

In addition, the ability to manipulate and solve mathematical problems has been identified as one of the teaching characteristics that each school mathematics teacher should possess to be able to guide his students (David & Matthew, 2017). Unfortunately, the level of teaching competency and skills displayed by some mathematics teachers has raised issue of concern to the extent that many stakeholders doubt about the process in which they acquired the certificate they possessed (Anaduaka & Okafor, 2013; Omorogbe & Ewansiha 2013). Similarly, Kuper et al. (2008) has provided an in depth analysis of stakeholders' perspectives on the quality of teacher education training as:

> Complaints about newly appointed teachers, who have low levels of numeracy and literacy skills as well as inadequate knowledge in their chosen areas of subject specialization, are commonplace. The low quality of graduates from the teacher training colleges and universities who are joining the teaching profession is a major issue. (p. 5).

Hence, in view of the above problems raised by this study on the existing mathematics teacher education program provided by Nigerian teacher training institutions, the researcher deems it pertinent to use CIPO model to evaluate the program. The model will be use to explore the effectiveness of the system through which the training was provided and explore possible difference in the intended objectives of the program, whether these differences are related to context, input or process of the program.

1.4 Objectives of the Study

The purpose of this study is to evaluate the Context, Input, Process, and Outcomes of mathematics teacher education program in a University in Kano, Nigeria. The specific objectives of the study are:

1. To evaluate whether the vision, mission and objectives of the mathematics teacher education program reflect national policy on education objectives of mathematics teacher education. (Context)
2. To explore the mathematics teaching and learning needs of pre-service mathematics teachers. (Context)
3. To evaluate whether curriculum content, staff, student admission, instructional materials and learning environment in the university are adequate and align with NUC basic and minimum standard on mathematics teacher education. (Input)
4. To evaluate whether total teacher training experience offered by the university are implemented in line with the NUC Standard in terms of contents, practical, curriculum activities and teaching practice.(Process)
5. To evaluate whether the teacher training provided by the university are able to develop the required teacher competency and skills. (Process)
6. To examine pre-service mathematics teachers' level of knowledge of secondary school mathematics subject matter? (Outcomes)
7. To explore the strengths and weaknesses of mathematics teacher education program in the university.(Outcomes)

1.5 Research Questions

The research will provide answers to the following questions:

1. Do vision, mission and objectives of the mathematics teacher education program reflect the national policy on education objectives of mathematics teacher education?

2a. What are the mathematics teaching needs of pre-service mathematics teachers?

2b. What are the mathematics learning needs of pre-service mathematics teachers?

3. Do the curriculum content, staff, students' admission, instructional materials and learning environment in the university are adequate and align with NUC basic and minimum standard on mathematics teacher education?

4. Do the total teacher training experiences offered by the university are implemented in line with the NUC standard in terms of contents, practical, curriculum activities and teaching practice?

5. Do the teacher training provided by the university are able to develop the required teacher competency and skills?

6. What is the pre-service mathematics teachers' level of knowledge of secondary school mathematics subject matter?

7. What are the strengths and weaknesses of mathematics teacher education program in the university?

1.6 Significance of the Study

The finding of this study might provide an insight to teacher education training institutions, pre-service mathematics teachers, teachers, curriculum planners, policy makers and society at large in the following ways:

The finding of this study might be of immense benefit to teacher training institution by reviewing their admission policy and criteria, so that the policy will meet and align with the NUC BMAS. It will also help the teacher training institution to understand mathematics teaching and learning needs of the pre-service teachers.

Perhaps this will provide them with the information of areas of their needs, and guide them to review the program based on the pre-service teachers teaching and learning needs. Moreover, the finding of this study might be useful to teacher training institution by providing them with details information on the strengths and weaknesses of the program in achieving the set objectives.

Pre-service mathematics teachers might find this study valuable when completed, as it will identify the required mathematics teaching skills and knowledge for effective classroom instructions. It will also help the pre-service mathematics teachers to understand the objective of the program, such will guide the pre-service mathematics teachers on the subject matter knowledge and skills they might require to qualify as effective classroom teachers. Teachers might also find this research useful when completed, as it will help them to understand the global standard of teacher education and 21st century skills for attaining lifelong education. This will enable them to update their mathematics teaching knowledge and skills, and provide effective classroom instruction. It will also provide them with a hint on the essential knowledge and skills they might require for improving their teaching competency. This will enable them to qualify as effective school mathematics teachers.

This research when completed might provide an avenue for curriculum planners to review or come up with a new curriculum for mathematics teacher education program, which will reflect all the mathematics teaching and learning needs of the pre-service mathematics teachers, and align with the NUC BMAS. It will also provide a hint to curriculum planners to design a curriculum which will equip the pre-service mathematics teachers with the secondary school mathematics subject matter knowledge and 21st century skills for attaining lifelong education.