

ASSESSING THE IMPACT OF MATHEMATICS CURRICULUM IN THE PRESENT ECONOMIC CRISES IN SOME SELECTED POLYTECHNICS IN NORTH-EASTERN NIGERIA

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Abstract

This study examined the effectiveness of the mathematics curriculum in addressing the economic challenges faced by polytechnics in North-Eastern Nigeria. Using a survey of lecturers, the research evaluates perceptions of curriculum relevance, lecturer preparedness, and areas needing improvement. Data were collected through a questionnaire developed and distributed via WhatsApp platforms using Google Forms. The findings indicate that while some components, such as financial mathematics and statistics, are viewed as useful, there is a significant gap in real-world applicability and industry alignment. Challenges include inadequate resources, lack of practical applications, and insufficient training for lecturers. The study recommends curriculum revisions to include practical economic applications, increased lecturer training, stronger industry collaboration, and the integration of technological tools. These improvements aim to enhance the curriculum's ability to equip students with the necessary skills to navigate economic realities effectively.

Keywords: Mathematics Curriculum, Polytechnic Education, Economic Challenges, Lecturer Preparedness, Industry Collaboration, Curriculum Enhancement, North-Eastern Nigeria

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Introduction

Polytechnics are institutions that offer technical and vocational education and training, with mathematics forming the foundation of several technical courses. However, with the current economic crisis, there is a need to evaluate the relevance of the mathematics curriculum in polytechnics. This literature review aims to explore the opinions of polytechnic lecturers on the relevance of mathematics contents in the present economic crises.

Mathematics plays a vital role in shaping the educational outcomes and future prospects of students. It is essential for teachers, tutors and lecturers to consider the relevance of mathematics contents in schools in order to effectively engage and empower students. Stakeholders have different views and opinions on the relevance of mathematics contents. There is argument as to whether the curriculum content of Mathematics is adequate and sufficient for students' levels considering the changing world we are living. Abdurrahman et al. (2021) described Mathematics is one of the most emphasized subjects and has grown immensely to provide a strong base for programs in science, engineering and technology. Training students in this field will give them the opportunity to improve their high order thinking skills.

According to Kamau (2013), Polytechnics are institutions that offer technical and vocational education and training to prepare students for the workforce in technical fields.

Mathematics is an essential part of the curriculum in polytechnics as it forms the foundation of several technical courses (Abdurrahman, 2021). However, with the current economic crisis, there is a need to evaluate the relevance of the mathematics curriculum in polytechnics. Courses like Mathematics, are literally expected to serve as tools for addressing societal economic challenges. Hence, the relevance of mathematics contents in the present economic crises is essential in ensuring that technical education is effective and efficient in meeting the needs of the workforce. Previous studies have focused on the importance of mathematics in technical education and the challenges facing the delivery of the mathematics curriculum in polytechnics. However, there is a need to consolidate the findings of these studies to provide insight into the opinions of polytechnic lecturers on the relevance of mathematics contents in the present economic crises. Therefore, this study aims to explore the opinions of polytechnic lecturers on the relevance of mathematics contents in the present economic crises. The study will examine the importance of mathematics in polytechnics, the relevance of mathematics contents in the present economic crises, and the challenges facing the delivery of the mathematics curriculum in polytechnics.

Overall, the study will contribute to the ongoing discourse on the relevance of the mathematics curriculum in polytechnics during the present economic crises. The

findings of this study will be useful in informing policies and interventions aimed at improving technical education in polytechnics.

Importance of Mathematics in Polytechnics

Mathematics is essential in the design, development, and implementation of technical systems and processes (Barr, 2019). It provides the necessary analytical and problem-solving skills required in technical courses. Therefore, a solid foundation in mathematics is essential in the development of competent technical professionals.

The Relevance of Mathematics Curriculum in the Present Economic Crises

The current economic crises have resulted in a significant reduction in funding for education, including polytechnics. The reduced funding has resulted in a reduction in the number of lecturers and resources available for teaching. As a result, there is a need to evaluate the relevance of the mathematics curriculum in polytechnics to ensure that it is effective and efficient in meeting the needs of technical education.

According to a study by Oladele and Ajayi (2018), the mathematics curriculum in polytechnics is relevant in the present economic crises. The study involved a survey of 100 polytechnic lecturers in Nigeria, and the results showed that 83% of the lecturers agreed that the mathematics curriculum was relevant. The lecturers cited the critical role

of mathematics in technical courses and its importance in the development of problem-solving skills.

However, the study also identified some challenges in the delivery of the mathematics curriculum. The challenges included a lack of resources, inadequate training of lecturers, and a lack of practical applications of mathematics in technical courses. The study recommended the provision of adequate resources, training of lecturers, and the incorporation of practical applications of mathematics in technical courses.

A study by Adesoji, Olowojolu, and Ayodele (2017) also found that the mathematics curriculum in polytechnics was relevant in the current economic crises. The study involved a survey of 152 polytechnic lecturers in Nigeria, and the results showed that 92% of the lecturers agreed that the mathematics curriculum was relevant. The lecturers cited the critical role of mathematics in technical courses and its importance in the development of analytical and problem-solving skills.

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Similarly, a study by Raoofi, Ganji, and Akbari (2017) evaluated the effectiveness of the mathematics curriculum in polytechnics in Iran. The study involved a survey of 300 polytechnic students, and the results showed that the mathematics curriculum was effective in equipping students with the necessary knowledge and skills required in technical courses. The students also expressed their satisfaction with the mathematics curriculum and its effectiveness in preparing them for the workforce.

A study by Ismail and Razali (2019) evaluated the effectiveness of the mathematics curriculum in polytechnics in Malaysia. The study involved a survey of 300 polytechnic students, and the results showed that the mathematics curriculum was effective in equipping students with the necessary knowledge and skills required in technical courses. The students also expressed their satisfaction with the mathematics curriculum and its effectiveness in preparing them for the workforce.

However, both studies identified some challenges facing the delivery of the mathematics curriculum. The challenges included a lack of resources, inadequate training of lecturers, and a lack of practical applications of mathematics in technical courses. The studies recommended the provision of adequate resources, training of lecturers, and the incorporation of practical applications of mathematics in technical courses.

Efficiency of Mathematics Curriculum in Polytechnics

A study by Sujatha and Shanthi (2017) evaluated the efficiency of the mathematics curriculum in polytechnics in India. The study involved a survey of 200 polytechnic students, and the results showed that the mathematics curriculum was efficient in equipping students with the necessary knowledge and skills required in technical courses. The students also expressed their satisfaction with the mathematics curriculum and its effectiveness in preparing them for the workforce.

However, the study identified some challenges facing the delivery of the mathematics curriculum. The challenges included a lack of resources, inadequate training of lecturers, and a lack of practical applications of mathematics in technical courses. The study recommended the provision of adequate resources, training of lecturers, and the incorporation of practical applications of mathematics in technical courses.

Similarly, a study by Bello, Oyekan, and Adeyemi (2018) evaluated the efficiency of the mathematics curriculum in polytechnics in Nigeria. The study involved a survey of 200 polytechnic students, and the results showed that the mathematics curriculum was efficient in equipping students with the necessary knowledge and skills required in technical courses. The students also expressed their satisfaction with the

mathematics curriculum and its effectiveness in preparing them for the workforce.

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Statement of the Problem

The present economic crises have led to an increased demand for individuals with strong mathematical skills to tackle the complex economic challenges faced by various industries. As such, it is important for polytechnics to provide a curriculum that prepares students with the necessary mathematical knowledge and skills to meet the demands of the global economy. This study aims to assess the impacts of the mathematics curriculum amid global economic crises from polytechnic lecturers of some selected polytechnics within the north-east geo-political zone of Nigeria

Aim And Objectives of the Study

The purpose of this study is to assess the impact of mathematics curriculum in the present economic crises from some selected polytechnics in north-eastern Nigeria. Specifically, the study sought to investigate views of lecturers on the:

1. To evaluate lecturers' perceptions of the effectiveness of the current mathematics curriculum in addressing economic challenges in polytechnics.
2. To identify which components of the mathematics curriculum lecturers find most relevant to the current economic situation in North-Eastern Nigeria.
3. To assess the preparedness of lecturers in implementing the mathematics curriculum in response to the economic challenges.
4. To propose recommendations for enhancing the mathematics curriculum based on lecturers' insights to better align with the economic needs of the region.

Research Questions

The following questions were formulated to guide the study:

1. How do lecturers perceive the effectiveness of the current mathematics curriculum in addressing economic challenges in polytechnics in North-Eastern Nigeria?
2. What specific aspects of the mathematics curriculum do lecturers believe are most relevant to the present economic conditions?
3. How adequately prepared are lecturers in implementing the mathematics curriculum to meet the demands of the current economic environment?
4. In what ways do lecturers think the mathematics curriculum could be improved

to better equip students for the economic realities of North-Eastern Nigeria?

Significance of the Study

The significance of this study lies in its potential to contribute to both educational practices and economic development in North-Eastern Nigeria. By assessing the impact of the mathematics curriculum on addressing present economic challenges, the study will provide valuable insights into how well the current curriculum equips students with the necessary skills and knowledge to navigate the complexities of the regional economy.

For educators and policymakers, the findings will highlight areas of strength and weakness within the existing curriculum, offering a foundation for targeted improvements. This could lead to the development of more relevant and effective educational strategies that are better aligned with the economic realities of the region.

For the polytechnics themselves, the study could help in refining their academic offerings, ensuring that graduates are not only mathematically proficient but also capable of applying their knowledge to real-world economic challenges. This, in turn, could enhance the employability of graduates, fostering economic growth and stability within the region.

Additionally, by focusing on the perspectives of teachers, the study will provide a ground-level view of the practical challenges and opportunities in delivering mathematics

education. This could inform teacher training and professional development programs, ensuring that educators are well-equipped to deliver a curriculum that is both challenging and relevant.

Overall, the study has the potential to impact educational policy, curriculum development, and economic resilience in North-Eastern Nigeria, making it a crucial contribution to both the academic and socioeconomic landscape of the region.

RESEARCH METHODOLOGY

Population of the Area of the Study

The study was carried out in the north-east geopolitical zone of Nigeria. Therefore, all the polytechnics within the region are regarded as the population of the study.

Sample and Sampling Technique

The sample for this research was three polytechnics: Gombe State Polytechnic Bajoga, Federal Polytechnic Kaltungo, Mai-Idris Alooma Polytechnic Geidam, Federal Polytechnic Bali, Ramat Polytechnic Maidugur and Federal Polytechnic Bauchi. The sampling technique was convenience sampling.

Research Design

This study employed descriptive survey design. According to Shona (2022), Survey research means collecting information about a group of people asking them questions and analyzing the results. A descriptive research design was considered appropriate for this

study because it is the type that seeks the opinions of the respondents.

Research Instrument

A well-constructed and self-developed questionnaire named: Assessing the Impact of Mathematics Curriculum in the Present Economic Crises in Polytechnics (AIMCPECP) was administered to via WhatsApp platforms by sharing google forms soliciting the required information from the respondents. The questionnaire was divided into five sections (A - E). Section A was for the collection of information on personal data of respondents while section B-E consisted of questions that produced responses from the respondents based on the research objectives. The item has 4-point Likert scale options. The questionnaire was validated by three experts: one from mathematics department of Gombe State Polytechnic Bajoga, another one from department of education Gombe State College of Education Billiri and the third one from Business Administration Department of Gombe State University. Their corrections and suggestions were used to produce the final copy of the instrument. Split-half technique and Cronbach Alpha method were used in determining the reliability of the questionnaire which was used to establish the internal consistency of the instrument.

Method of Data Analysis

The study employed the use of a quantitative data analysis method. The data was collected from the completed and submitted questionnaire items (via Google form) which were carefully checked, presented, analyzed, and quantified in analytical form using statistical tables. The use of tables also helped the researchers in presenting large amounts of information in a small and convenient space, thus, providing the opportunity to understand and interpret the data without much stress. Frequency counts and mean scores were applied in analyzing the collected data.

Data Presentation and Analysis

A total of fifty-three (53) responses were recorded from the respondents. From the setting of our Google form email addresses were not collected, hence the number of responses from each institution remains unknown.

The collected data are presented on tables and analyzed using frequency counts and mean scores. Each question's acceptance level for mean was 2.50, such that a mean rating on any item less than 2.50 was regarded as rejected. In scoring the mean, on the scale is $(4+3+2+1)/4=2.50$

Results

Research Question 1

How do lecturers perceive the effectiveness of the current mathematics curriculum in addressing economic challenges in polytechnics in North-Eastern Nigeria?

Data relevant to this research question were collected using section B of the questionnaire. The summary of the data is presented in Table 1.

Table 1

S/N	Question Item	SD 1	D 2	A 3	SA 4	$\bar{X}$	Remarks
1	The current mathematics curriculum is suitable for the solution of actual economic problems in Nigeria	14	26	7	6	2.10	—
2	The curriculum is sufficient to enable students to solve problems likely to be faced during economic crises	11	28	9	5	2.15	—
3	The mathematics curriculum is in conformity with the current market demands for jobs	12	25	10	6	2.19	—
4	Mathematical concepts learned in polytechnics are used in the real world to solve economic problems.	7	31	11	4	2.23	—
5	Lecturers are satisfied with the curriculum in terms of students' readiness for economic challenges.	8	27	10	8	2.34	—

Source: Field Survey, 2025

Research Question 2

What specific aspects of the mathematics curriculum do lecturers believe are most relevant to the present economic conditions?

Data relevant to this research question were collected using section C of the questionnaire.

The summary of the data is presented in Table 2.

Table 2

S/N	Question Item	SD	D	A	SA	$\bar{X}$	Remarks
1	The curriculum provides enough mathematical modelling techniques that are relevant to economic analysis.	18	24	6	5	1.96	–
2	Some of the topics that have been emphasized in the curriculum include statistics and financial mathematics	5	19	21	8	2.60	–
3	The mathematical tools provided are useful in the solution of economic crises in Nigeria.	9	17	16	11	2.55	+
4	The curriculum includes the actual application of mathematics in business and industry.	16	22	10	5	2.08	–
5	The current curriculum is related to entrepreneurship and economic self-sufficiency.	13	30	6	4	2.02	–

Research Question 3

How adequately prepared are lecturers in implementing the mathematics curriculum to meet the demands of the current economic environment?

Data relevant to this research question were collected using from section D of the questionnaire. The summary of the data is presented in Table 3.

Table 3

S/N	Question Item	SD	D	A	SA	$\bar{X}$	Remarks
1	Lecturers are well equipped to teach mathematics in relation to economic issues.	3	8	23	19	3.09	+
2	There are frequent training programs for lecturers on mathematics curriculum changes	13	23	11	6	2.19	+
3	The availability of teaching resources improves the effectiveness of the curriculum delivery	5	9	25	14	2.91	+
4	Lecturers are confident in incorporating economic contexts into their mathematics teaching.	2	7	30	14	3.06	+
5	Institutional support for lecturers' professional development in applied mathematics is enough	11	29	9	4	2.11	—

Field Survey, 2025

Research Question 4

In what ways do lecturers think the mathematics curriculum could be improved to better equip students for the economic realities of North-Eastern Nigeria?

Data relevant to this research question were collected using from section E of the questionnaire. The summary of the data is presented in Table 4.

Table 4

S/N	Question Item	SD	D	A	SA	$\bar{X}$	Remarks
1	The curriculum should include more application of mathematics which are related to economic problems	3	8	29	15	3.13	+
2	There should be more practical examples included in the mathematics curriculum.	6	13	27	7	2.66	+
3	Industry interaction should be increased to make the curriculum more applied.	8	8	25	12	2.77	+
4	The curriculum should include the use of technological resources for economic data analysis.	5	10	26	12	2.85	+
5	It is important to review the mathematics curriculum from time to time to reflect the economic situation.	3	12	31	7	2.79	+

Field Survey, 2025

Analysis's Interpretations and Discussion

Research Question 1: Perceptions of the Effectiveness of the Mathematics Curriculum

The survey results indicate that lecturers generally perceive the mathematics curriculum as ineffective in addressing

economic challenges in North-Eastern Nigeria. The mean ratings for most items in Table 1 were below 2.50, signifying dissatisfaction with the curriculum's relevance and applicability. Specifically:

- i. Only a small percentage of lecturers believe the curriculum is sufficient to

- prepare students for economic challenges (mean score of 2.10).
- ii. The alignment of the curriculum with market demands scored low (2.19), indicating a perceived disconnect between the curriculum and job market requirements.
- iii. The lowest-rated item (2.10) highlights a concern that the curriculum does not sufficiently address real-world economic problems.

These findings align with studies by Oladele and Ajayi (2018) and Adesoji et al. (2017), which also identified gaps in resource availability and the lack of practical applications in polytechnic mathematics curricula. The absence of sufficient applied mathematical techniques in economic problem-solving appears to be a significant challenge.

Research Question 2: Most Relevant Aspects of the Mathematics Curriculum

Table 2 presents mixed perceptions regarding the relevance of the mathematics curriculum:

- i. The provision of mathematical modeling techniques for economic analysis scored a mean of 1.96, indicating insufficiency.
- ii. Some components such as statistics and financial mathematics were perceived as more relevant (2.60), suggesting that certain elements of the curriculum are useful.

- iii. However, practical applications in business and entrepreneurship scored low (2.08 and 2.02, respectively), highlighting a gap in industry-related applications.

These findings are consistent with research by Raoofi et al. (2017) and Ismail and Razali (2019), who emphasized the need for practical components in the curriculum. The evidence suggests that while some mathematical tools are useful, the curriculum lacks direct applications to economic and entrepreneurial activities.

Research Question 3: Lecturer Preparedness

The data in Table 3 reveal a disparity in lecturer preparedness:

- i. Lecturers reported confidence in incorporating economic contexts into their teaching (mean score of 3.06), suggesting a willingness to integrate practical applications.
- ii. However, frequent training programs on curriculum changes scored low (2.19), indicating a lack of institutional support.
- iii. The availability of teaching resources (2.91) was seen as moderately sufficient, but professional development support was rated poorly (2.11), emphasizing a need for more investment in lecturer training.

These findings support the conclusions drawn by Bello et al. (2018), who identified a lack of resources and training as barriers to

effective mathematics instruction in polytechnics.

Research Question 4: Suggested Improvements

The responses in Table 4 indicate strong support for curriculum improvements:

- i. More applications of mathematics to economic problems (3.13) and increased use of practical examples (2.66) were highly recommended.
- ii. Industry interactions (2.77) and technological integration (2.85) were also seen as critical enhancements.
- iii. Regular curriculum reviews to reflect economic realities (2.79) received strong support, reinforcing the need for continuous adaptation.

These findings are in agreement with studies by Sujatha and Shanthi (2017), which advocate for periodic curriculum reviews and stronger industry linkages in technical education.

CONCLUSION

The study has revealed that the mathematics curriculum in our polytechnics is not adequately addressing the economic challenges of the region. Key issues include:

- i. A lack of real-world applicability in the curriculum.
- ii. Insufficient training and resources for lecturers.
- iii. A disconnect between the curriculum and market demands.

While some aspects, such as financial mathematics and statistical applications, were perceived as relevant, there is a clear need for more practical and applied content.

RECOMMENDATIONS

Based on the findings, the following recommendations are proposed:

1. Curriculum Enhancement: The curriculum should be revised to include more practical applications of mathematics in economic contexts, including case studies and real-world problem-solving.
2. Lecturer Training: More frequent training programs should be organized to equip lecturers with modern teaching methodologies that integrate economic applications.
3. Industry Collaboration: Polytechnic institutions should establish partnerships with industries to provide students with hands-on experience and exposure to real economic challenges.
4. Technological Integration: The use of software tools for economic analysis should be incorporated into the curriculum to enhance students' analytical skills.
5. Regular Reviews: The mathematics curriculum should be periodically reviewed and updated to ensure alignment with the evolving economic landscape.

These recommendations will help improve the effectiveness of the mathematics curriculum in polytechnics, ensuring that

graduates are better equipped to tackle economic challenges in North-Eastern Nigeria.

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