

**CHINA-AFRICA
MATHEMATICS
COLLABORATIVE
RESEARCH AND
EDUCATION:**

**IMPORTANCE
AND
ESSENTIALITIES**

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IS MY NAME,
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AWKA,
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**CURRENTLY ON SABBATIAL LEAVE
AT FEDERAL UNIVERSITY OF
TECHNOLOGY, OWERRI,
IMO STATE, NIGERIA**



**MAIN ENTRANCE GATE TO
NNAMDI AZIKIWE UNIVERZITY,
AWKA, ANAMBRA STATE NIGERIA**



**MAIN ENTRANCE GATE TO
NNAMDI AZIKIWE UNIVERZITY,
AWKA, ANAMBRA STATE, NIGERIA**



**ROAD LEADING FROM THE
UNIVERSITY MAIN GATE TO THE
ADMINISTRATION BUILDING OF
THE UNIVERSITY**



**UNIVERSITY ADMINISTRATIVE
BUILDING**

THE UNIVERSITY HAS THREE (3) CAMPUSES AND TWO PREMISES, NAMELY:

- 1) **AWKA CAMPUS**
- 2) **NNEWI CAMPUS**
- 3) **IFITE OGWARI CAMPUS**
- 4) **OKO-OFIA PREMISE**
- 5) **AGULU PREMISE**

**CAMPUSES OF NNAMDI AZIKIWE
UNIVERSITY**

NNAMDI AZIKIWE UNIVERSITY IS MADE UP OF FIFTEEN (15) FACULTIES, namely:

- 1) **FACULTY OF AGRICULTURE**
- 2) **FACULTY OF ARTS**
- 3) **FACULTY OF BASIC MEDICAL SCIENCES**
- 4) **FACULTY OF BIOSCIENCES**
- 5) **FACULTY OF EDUCATION**
- 6) **FACULTY OF ENGINEERING**
- 7) **FACULTY OF ENVIRONMENTAL SCIENCES**
- 8) **FACULTY OF HEALTH SCIENCES AND TECHNOLOGY**
- 9) **FACULTY OF LAW**
- 10) **FACULTY OF MANAGEMENT SCIENCES**
- 11) **FACULTY OF MEDICINE**
- 12) **FACULTY OF MEDICAL LABORATORY SCIENCES**
- 13) **FACULTY OF PHARMACEUTICAL SCIENCES**
- 14) **FACULTY OF PHYSICAL SCIENCES**
- 15) **FACULTY OF SOCIAL SCIENCES**

**FACULTIES IN NNAMDI AZIKIWE
UNIVERSITY, AWKA**

**IT IS WITHIN THE FACULTY OF PHYSICAL SCIENCES THAT
MATHEMATICS DEPARTMENT FALLS. IN FACULTY OF PHYSICAL
SCIENCES, WE HAVE**

- 1) DEPARTMENT OF ARTIFICIAL INTELLIGENCE**
- 2) DEPARTMENT OF COMPUTER SCIENCE**
- 3) DEPARTMENT OF CYBER SECURITY**
- 4) DEPARTMENT OF CHEMISTRY AND INDUSTRIAL CHEMISTRY**
- 5) DEPARTMENT OF GEOLOGICAL SCIENCES**
- 6) DEPARTMENT OF GEOPHYSICS**
- 7) DEPARTMENT OF PHYSICS AND INDUSTRIAL PHYSICS**
- 8) DEPARTMENT OF MATHEMATICS**
- 9) DEPARTMENT OF SOFTWARE ENGINEERING**
- 10) DEPARTMENT OF STATISTICS**

FACULTY OF PHYSICAL SCIENCES

- ❑ **Discipline, Self Reliance and Excellence are the **MOTTO** of the University.**
- ❑ **Nnamdi Azikiwe University, Awka is founded on the **philosophy** that knowledge should be propagated and disseminated to individuals without let or hindrance.**
- ❑ **Teaching and research are anchored on the need of National and International Societies.**

MOTTO AND PHILOSOPHY OF THE UNIVERSITY

This talk is aimed at discussing the importance and essentialities of China-Africa Mathematics collaborative research and education, a topic which is highly relevant and timely. Such collaborative research and education can help build mathematical capacity at all levels in the collaborating institutions; and foster cultural exchange, promoting mutual understanding and respect among researchers from participating institutions cum nations. The importance and essentialities of such collaborative research, which of course, shall definitely include exchange of scientific knowledge and ideas cannot be over emphasized

ABSTRACT

- ❑ **Mathematics has long been a cornerstone of scientific progress and economic development , playing a crucial role in addressing complex challenges across various disciplines.**
- ❑ **As the world becomes increasingly interconnected, collaborative research in mathematics between nations has emerged as a vital strategy for fostering innovation, capacity building, and sustainable development.**
- ❑ **The partnership between China and Africa in mathematical research represents a particularly promising avenue for mutual benefits, given the complementary strengths and needs of both regions.**
- ❑ **This collaboration holds immense potential for advancing mathematical sciences, tackling pressing regional challenges, and promoting socio-economic development through the application of mathematical techniques and solutions.**

INTRODUCTION

- ❑ **In recent times, China and Africa have had fruitful handshakes in several areas of development.**
- ❑ **In Sub Sahara Africa, Nigeria for instance, China is actively investing across a wide array of sectors, aiming to fuel her industrialization, infrastructure overhauling, and technological advancement.**
- ❑ **Key areas of Chinese investment and Specific Projects are outlined as follows:**

- ❑ **INFRASTRUCTURE**
- ❑ **ENERGY AND POWER**
- ❑ **MANUFACTURING AND INDUSTRIALIZATION**
- ❑ **AGRICULTURE AND AGRO-PROCESSING**
- ❑ **MINING AND SOLID MINERALS**
- ❑ **AUTOMOTIVE AND EV MANUFACTURING**
- ❑ **TECHNOLOGY, ICT, FINTECH AND DIGITAL ECONOMY**
- ❑ **OIL, GAS AND PETROCHEMICALS**

HISTORICAL FACTS – China's Investment Focus in Nigeria

INFRASTRUCTURE

- ❑ **China continues to play a dominant role in Nigeria's infrastructure development.**
- ❑ **Rail projects like the Abuja–Kaduna and Lagos–Ibadan standard-gauge railways, built by Chinese firms, have transformed domestic transport.**
- ❑ **Other Chinese-backed construction and power installations span major seaports (e.g., the Lekki Deep Sea Port).**
- ❑ **China remains a key financier for infrastructure, such as China Exim Bank funding for roads, supporting critical industrial corridors. This continues China's long-term role as a funding partner in infrastructure projects across Nigeria.**

HISTORICAL FACTS - China's Investment Focus in Nigeria

ENERGY AND POWER

(including renewables)

- China supports both conventional and renewable energy projects.**
- China plays her part in contributing towards financing hydroelectric projects such as the Zungeru Hydropower Station (about 75% funded by China's Exim Bank) and the Gurara II Hydropower Project.**

MANUFACTURING & INDUSTRIALIZATION

- ❑ **A recent \$20 billion investment deal focuses on manufacturing, energy, steel, agriculture, and industrial parks—like the Ogidigben Gas Revolution Industrial Park in Delta State, Nigeria.**
- ❑ **These programs aim to scale local beneficiation, especially in mining, automotive, and electric vehicle (EV) industries, spanning the EV value chain from mineral extraction to battery and vehicle production.**

AGRICULTURE AND AGRO-PROCESSING

- Investments in agriculture and value added agro industries, moving beyond raw commodity exports to on-site processing and agro-manufacturing.**

MINING AND SOLID MINERALS

- ❑ Significant interest is being directed towards mining critical minerals like lithium for EV batteries, which aims at in-country processing and refining.**
- ❑ Nigeria is also taking steps to formalize mining operations and crack down on illicit extraction of certain minerals.**

HISTORICAL FACTS - China's Investment Focus in Nigeria

AUTOMOTIVE & EV MANUFACTURING

- Chinese partnerships aim to establish or expand Nigeria's automotive assembly and manufacturing capacities, especially in EVs and related infrastructure.**

TECHNOLOGY, ICT, FINTECH AND DIGITAL ECONOMY

- ❑ **Chinese tech companies like Transsion, PalmPay, and OPay have embedded themselves deeply in Nigeria's digital economy.**
- ❑ **Investments and support extend to fintech, smartphone manufacturing, telecommunication infrastructure, and digital services tailored to local needs.**
- ❑ **Other tech-related investment includes Solar PV Laboratories, Electric Tricycle Assembly, and Drone Technology Development.**

HISTORICAL FACTS - China's Investment Focus in Nigeria

OIL, GAS AND PETROCHEMICALS

- Chinese firms are active in Nigeria's oil sector, with roles in exploration, refining, and securing energy resources.**
- The large-scale Ogidigben Gas Industrial Park also forms part of a Chinese backed industrialization push.**

□ CHINA – AFRICA FORUM ON MATHEMATICAL RESEARCH AND EDUCATION

**is an initiative with great long
run potential and prospect,
and I must confess that it is
timely because it came at a
time it is needed most.**

**SIGNIFICANCE OF THE PRESENT
INITIATIVE**

- **Mathematics learning in Africa faces several challenges, but there are also opportunities for growth and innovative approaches.**

MATHEMATICS LEARNING IN AFRICA

- ❑ **LIMITED RESOURCES:** Many African schools lack adequate infrastructure, textbooks, and qualified teachers.
- ❑ **CULTURAL AND LINGUISTIC BARRIERS:** Mathematics instruction often relies on colonial languages, which can create barriers for students who speak local languages.
- ❑ **SOCIO-ECONOMIC FACTORS:** Poverty, inadequate healthcare, and conflict can hinder students' ability to focus on mathematics learning.
- ❑ **OUTDATED CURRICULA:** Mathematics curricula may not be aligned with modern needs and technological advancements

CHALLENGES

- ❑ **GROWING DEMAND FOR STEM EDUCATION:** Africa's growing population and economies create a high demand for Science, Technology, Engineering and Mathematics (STEM) Education.
- ❑ **INNOVATIVE TECHNOLOGIES:** Mobile technology, online platforms, and educational software can enhance mathematics learning and increase access to quality resources.
- ❑ **AFRICAN-LED INITIATIVES:** Organizations and governments are implementing initiatives to improve mathematics education, such as teacher training programs and curriculum reforms.
- ❑ **CULTURAL RELEVANCE:** Mathematics can be taught in a way that incorporates African culture, making it more relatable and engaging for students.

OPPORTUNITIES

- ❑ **MOBILE-BASED LEARNING:** Utilizing mobile phones and apps to deliver mathematics content, provide practice exercises, and facilitate teacher-student interaction.
- ❑ **GAMIFICATION:** Incorporating game design elements to make mathematics learning more engaging and interactive.
- ❑ **CONTEXTUALIZED LEARNING:** Using real-world examples and applications relevant to African contexts to illustrate mathematical concepts.
- ❑ **PEER-TO-PEER LEARNING:** Encouraging students to learn from and teach each other, promoting collaborative problem-solving and critical thinking.
- ❑ **TEACHER TRAINING AND SUPPORT:** Providing ongoing professional development for teachers to enhance their mathematics knowledge, pedagogical skills, and ability to use technology effectively.

INNOVATIVE APPROACHES

□ By addressing challenges and leveraging opportunities, innovative approaches can help improve mathematics learning outcomes and empower future generations to tackle complex problems and drive development.

FACTS

□ China-Africa Mathematics Collaborative Research and Education in my belief shall offer numerous benefits, it may have some challenges, but opportunities for growth should serve as a driving force.

RESEARCH COLLABORATION

- ❑ **KNOWLEDGE EXCHANGE AND INNOVATION:** Collaborative research fosters diverse perspectives, leading to comprehensive findings and groundbreaking discoveries.
- ❑ **ENHANCED RESEARCH PRODUCTIVITY:** Sharing resources, expertise, and technology can strengthen research quality and impact.
- ❑ **CAPACITY BUILDING:** Partnerships can facilitate mentorship, skill development, and integration of young researchers into professional networks.
- ❑ **ADDRESSING COMPLEX CHALLENGES:** Collaborative efforts can tackle pressing regional issues, such as sustainable development and environmental concerns.

BENEFITS

- ❑ **COMMUNICATION BARRIERS:** Language differences and time zone variations can hinder effective communication and collaboration.
- ❑ **POWER IMBALANCES:** Institutional priorities, funding disparities, and prestige differences can create tension and stifle open dialogue.
- ❑ **CULTURAL AND LINGUISTIC DIFFERENCES:** Varied cultural backgrounds and languages can lead to misunderstandings and misinterpretations.
- ❑ **DISTANCE AND COORDINATION:** Physical distance between collaborators can complicate scheduling and resource sharing.

CHALLENGES

- ❑ **CLEAR GOALS AND EXPECTATIONS:** Establishing a well-structured research plan with defined timelines, milestones, and resource-sharing agreements enhances efficiency and innovation.
- ❑ **CHOOSING THE RIGHT PARTNERS:** Selecting collaborators with complementary skills and expertise fosters diverse perspectives and strengthens problem-solving.
- ❑ **EFFECTIVE COMMUNICATION:** Regular updates, open dialogue, and clear communication channels can mitigate misunderstandings and ensure successful collaboration.
- ❑ **MUTUAL BENEFIT:** Ensuring that all partners benefit from the collaboration, whether through knowledge sharing, capacity building, or resource access, promotes a productive and sustainable partnership.

STRATEGIES FOR SUCCESSFUL PARTNERSHIP

□ By understanding these benefits, challenges, and strategies, China-Africa Mathematics Collaborative Research and Education can go a long way to open up its full potentials and drive meaningful scientific contributions.

FACTS

- Cultural exchange and understanding cultural differences are crucial for effective collaboration, especially in international research partnerships.**

CULTURAL EXCHANGE

❑ **IMPROVED COMMUNICATION:**

Appreciable knowledge of cultural differences shall definitely help prevent misunderstandings, miscommunications, and unintended offenses.

❑ **ENHANCED COLLABORATION:** Cultural awareness fosters trust, respect, and empathy among team members, leading to more effective collaboration.

❑ **INCREASED CREATIVITY:** Diverse cultural perspectives can bring innovative ideas and approaches to problem-solving.

❑ **BETTER CONFLICT RESOLUTION:** Understanding cultural differences helps resolve conflicts more efficiently and effectively.

**WHY CULTURAL UNDERSTANDING
MATTERS**

- ❑ **COMMUNICATION STYLES:** Direct versus indirect communication, high-context versus low-context cultures, and language barriers.
- ❑ **WORK ETHIC AND TIME MANAGEMENT:** Different attitudes towards punctuality, deadlines, and work-life balance.
- ❑ **DECISION-MAKING PROCESSES:** Hierarchical vs. consensus-based decision-making, and the roles of authorities.
- ❑ **SOCIAL NORMS AND VALUES:** Respect for hierarchy, individualism versus collectivism, and attitudes towards uncertainty.

KEY ASPECTS OF CULTURAL DIFFERENCES

- ❑ **CULTURAL TRAINING AND EDUCATION:** Provide training on cultural differences, norms, and values.
- ❑ **OPEN-MINDEDNESS AND CURIOSITY:** Encourage team members to ask questions, learn from each other, and be open to new perspectives.
- ❑ **ACTIVE LISTENING AND EMPATHY:** Foster a culture of active listening, empathy, and understanding.
- ❑ **FLEXIBILITY AND ADAPTABILITY:** Be willing to adapt to different cultural norms and practices.

STRATEGIES FOR EFFECTIVE CULTURAL EXCHANGE

□ By embracing cultural differences and fostering a culture of understanding, China-Africa Mathematics Collaborative Research and Education can go a long way, unlock its full potentials, and accomplish to a reasonable extent its aim and objectives.

FACTS

GOOD NEWS



NNAMDI AZIKWE CONFUCIUS INSTITUTE



NNAMDI AZIKIWE CONFUCIUS INSTITUTE

尼日利亚纳姆迪·阿齐克韦大学孔子学院



Confucius Institute at Nnamdi Azikiwe University



NNAMDI AZIKIWE CONFUCIUS INSTITUTE



ON GOING LECTURE AT THE CONFUCIUS INSTITUTE



ONGIONG LECTURE AT THE CONFUCIUS INSTITUTE



A STUDENT PRACTICING DURING TUTORIAL CLASS AT THE CONFUCIUS INSTITUTE

□ Building mathematical capacity in collaborating institutions through the China-Africa Mathematics Research and Education can be achieved through several strategies.

CAPACITY BUILDING

- ❑ **TRAINING AND EDUCATION:** Provide training courses, workshops, and seminars for scientists and researchers in mathematical sciences. China and participating African Countries can leverage their expertise in mathematics and technology to offer degree programs, certifications, or online courses tailored to Chinese needs and the needs of participating African Countries.
- ❑ **RESEARCH COLLABORATION:** Encourage joint research projects between Chinese and African Mathematicians to foster knowledge exchange, mentorship, and co-authorship. This can lead to publications, patents, and innovative solutions addressing possible challenges faced by the participating countries, and their Continents in general.

CAPACITY BUILDING STRATEGIES

❑ INFRASTRUCTURE DEVELOPMENT:

Invest in building research infrastructure, such as laboratories, libraries, and computational facilities, in participating institutions. China's experience in infrastructure development can be invaluable in this regard.

❑ MENTORSHIP AND PARTNERSHIPS:

Establish partnerships between Chinese and African universities, research institutions, and industries to facilitate mentorship, knowledge transfer, and collaborative problem-solving.

CAPACITY BUILDING STRATEGIES

❑ **FUNDING AND GRANTS:**

Offer research grants, scholarships, and fellowships to students and researchers to pursue mathematical studies and research in Asia or Africa, particularly in the participating Countries or Nations.

❑ **CAPACITY BUILDING PROGRAMMES:**

Implement programs like the Africa Research Management Capacity Strengthening Programme, which focuses on building research management capacity in African institutions through training, mentorship, and institutional strengthening.

CAPACITY BUILDING STRATEGIES

- ❑ **The China-Africa Science and Technology Partnership Plan (CASTPP) has funded collaborative research initiatives, encouraged knowledge exchange, and provided training for scientists and technicians.**
- ❑ **The Consortium for Advanced Research Training in Africa (CARTA) offers PhD fellowships and training programs to build research capacity in African institutions.**
- ❑ **The Science for Africa Foundation supports research management capacity, strengthening programs and provides funding for research initiatives.**

SUCCESSFUL INITIATIVES

- ❑ **Enhanced research productivity and quality.**
- ❑ **Increased mathematical literacy and problem-solving skills.**
- ❑ **Improved research management and leadership capacity.**
- ❑ **Strengthened partnerships and collaborations between Chinese and African institutions**
- ❑ **Addressing African and Chinese challenges through mathematical sciences and innovative solutions**

KEY BENEFITS

□ By adopting these strategies and building on successful initiatives, China-Africa Mathematics Collaborative Research and Education can significantly enhance mathematical capacity in not only African institutions, but in fact, in all the collaborating institutions.

CONCLUSION

□ This collaboration, if put in place, has the capability of promoting education development, cultural exchange and economic cooperation between China and Africa.

CONCLUSION

□ By working together, common challenges can be addressed and mutual benefits shall be inevitable.

CONCLUSION

**PERMIT ME TO PAUSE
HERE FOR A MOMENT**

END OF PRESENTATION

- ❑ **The 2024 Summit of the Forum on China-Africa Cooperation, that is, Sommet du Forum sur le Cooperation Sino-Africaine 2024.**
- ❑ **China-Africa Science, Technology and Innovation Collaboration (2024) – a comprehensive display of China-Africa Cooperation in Science, Technology and Innovation.**
- ❑ **Current Enrollment and Training Situation of African Students in China: Case Study of Sino-Africa Joint Research Centre - a study on the training and education opportunities provided by China to African students.**
- ❑ **Exploring China's Emerging Role in Africa's International Research Collaboration – an analysis of china's role in Africa's international research collaboration using data from African scientific publications.**
- ❑ **China-Africa Research Collaboration and Training – a study on the research collaboration and training between China and Africa.**
- ❑ **Sino-Africa Joint Research Center (SAJOREC): A platform for scientific cooperation between China and Africa, focusing on biodiversity-related research, wildlife protection, and climate change monitoring.**
- ❑ **China-Africa Research Initiative (SAIS-CARI): A research initiative based at Johns Hopkins University, promoting evidence-based understanding of China-Africa relations through data collection, field research, and collaboration.**
- ❑ **The China-Africa Knowledge Project: A multiyear program of activities designed to deepen understanding of China's engagement with Africa and situate emergent scholarship on China and Africa within broader scholarly and policy discourses.**

REFERENCES

THANK YOU

THANK YOU FOR
LISTENING

THANK YOU SO
MUCH !