

Scientific Empowerment of African Languages Initiative

(SEAL Initiative: African languages matter, in science and beyond)

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Overview

The Scientific Empowerment of African Languages (SEAL) initiative aims to promote and develop African languages as tools for scientific communication and education, especially in primary and middle school. The project seeks to address the significant underrepresentation of African languages in scientific discourse and in education, hindering the continent's scientific progress and development. This initiative is also part of the drive to protect African languages from the gradual disappearance which they are facing.

Objectives:

1. Develop and standardize African language terminology in science, technology, engineering, and mathematics (STEM) fields.
2. Create resources, including textbooks, dictionaries, glossaries, and style guides.
3. Establish a network of African language experts and scientists for collaboration and knowledge sharing.
4. Develop and implement African language-based educational materials.
5. Promote African languages as languages of instruction in STEM fields.
6. Foster innovation in African languages, including in machine intelligence.

Methodology:

1. Conduct work on terminology development.
2. Engage with African language experts, scientists, and educators.
3. Develop and disseminate language resources and educational materials.
4. Launch an online platform aimed at providing access to educational resources and fostering a collaborative community.
5. Organize workshops, conferences, and training programs.
6. Collaborate with institutions, organizations, and governments.

Expected Outcomes:

1. Standardized African language terminology in STEM fields.
2. Improved accessibility and quality of science education.
3. Increased use of African languages in scientific communication and in education.
4. Enhanced collaboration and knowledge sharing among African scientists.
5. Empowerment of African languages and cultures.

Impact:

The SEAL initiative will contribute to the scientific and socioeconomic development of Africa, promoting inclusivity, diversity, and multilingualism in science. By empowering

African languages, we can unlock the potential of African scientists, educators, and students, driving innovation and progress across the continent.

Previous works

Here are some of the previous works done :

1-The leader of the project, Dr. Mouhamadou Sy, has published several books of mathematics and outreach articles of sciences in Fula language ¹.

- *Book on a presentation of mathematical concepts and topics*, 2016
- *Book on basic topics in mathematics (Algebra, Geometry, Probability and Statistics)*, 2019
- *Book on an introduction to Mathematical analysis*, 2022
- *Book on an introduction to scientific methods and critical thinking*, 2024

In these works, and in other outreach articles, the fundamental terminology and scientific discourse were developed.

2- Later on, many other authors used the terminology and, in a larger measure, the methods developed in the above-mentioned works, based on the linguistic features of Fula, to produce books and articles in other areas (biology and health, astronomy, geology and environmental sciences, etc.)

3 - Several Associations for the promotion of African languages have adopted some content of these books in their programme. Dr. Sy has already delivered trainings of mathematics in Fula language for educators acting in such associations and schools.

A 1-year goal (the first step): *Developing and Testing STEM Resources in some African languages*

The previous works cited above suggest to start with an experimental step aiming at organizing and exploiting the already available materials developed in Fula language, where the project leader was very active, and in one more African language to be selected depending on existing literature and representation. This step involves

1- The setting up of a **multilingual platform delivering STEM resources** in as many languages as possible, with a continuous effort of translations to other languages, and holding a collaborative community of users.

2- **Design and publishing** courses, tutorials, workbooks and glossaries.

3- **Training aimed at the educators and students** in collaboration with existing university programme.

4- **Organization of workshops** involving scientists, educators and decision-makers to take new steps in the promotion of the languages as tools for science learning in public instruction.

¹ Also called Pulaar or Fulfulde, a transnational language, spoken in at least 18 African countries: Benin, Bissau Guinea, Burkina Faso, Cameroon, Central African Republic, Gambia, Ghana, Guinea, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Soudan, South Sudan, Tchad, Togo.

How SEAL can contribute to IDIL 2022-2032 of UNESCO ?

The SEAL (Scientific Empowerment of African Languages) initiative is a groundbreaking program that aligns perfectly with the goals of the International Decade of Indigenous Languages (IDIL). By developing and promoting African languages in science and mathematics, SEAL contributes to the preservation, revitalization, and promotion of indigenous languages. Here's how:

- 1. Language documentation:** SEAL creates resources and materials in African languages, documenting and standardizing them for future generations.
- 2. Education and literacy:** SEAL's focus on science and mathematics education in African languages enhances literacy and understanding, empowering indigenous communities.
- 3. Cultural preservation:** By using African languages in scientific contexts, SEAL helps preserve cultural heritage and traditional knowledge.
- 4. Community engagement:** SEAL involves local communities in language development and education, fostering ownership and pride.
- 5. Capacity building:** SEAL trains educators, researchers, and linguists, building capacity for sustainable language development.
- 6. International collaboration:** SEAL partners with global organizations, sharing best practices and expertise, aligning with IDIL's global cooperation goals.
- 7. Digital innovation:** SEAL leverages technology for language learning, resources, and communication, ensuring accessibility and reach.

By supporting SEAL, we can make a meaningful impact on the IDIL goals, ensuring the long-term viability and vibrancy of African indigenous languages.

Estimation of the budget for the 1-year goal

Program administration: 18,000 euros (1 person x 12 months x 1500 euros). A full time program manager will be hired to play a crucial role of coordinating the project activities. It involves in particular: project planning, monitoring, partnership development, communication, preparing monthly reports etc.

Online platform building: 5,000 euros. This is a digital platform aimed at providing free access to STEM educational resources, promoting African languages, and fostering a community of learners, educators and experts. It is supposed to be nonprofit, delivering multilingual resources, languages learning tools, including a community forum for scientific exchanges, an expert corner, a newsletter focused on STEM in African languages.

Production and Tutoring: 12,600 euros (3 people x 12 months x 350 euros). Three scientific assistants will be hired to produce documentations, feeding the platform, and to conduct tutoring during trainings. The sale of a research assistant in Senegal is about 350 euros/month.

Workshops : 10,000 euros. At least 2 workshops will be organized to gather different actors (educators, linguists, scientists, and stakeholders, representatives from partner organizations) to deliver trainings, promote educational resources that have been developed, and to expose the works to decision-makers.

Note: The workshops are expected to be in person for the following reasons:

- *More interaction: Conducting in-person workshops with decision-makers and representatives of partner institutions is crucial to expose the work that has been achieved and demonstrate its efficiency regarding the goals of the project. This is intended to encourage the decision-makers to take actions.*
- *More technical control on the programme: For training workshops we expect to involve educators who are usually based in locations that can face difficulty in accessing to internet.*

Total of the 1-year program: 45,600 euros.

About the leader of the initiative

Dr Mouhamadou Sy, a young African mathematician from Mauritania, born on January 23, 1990, has made significant contributions to the field of mathematics. He holds a Ph.D. from the University of Cergy-Pontoise, France (2017) and has held prestigious research positions at the University of Virginia (2018-2021), Imperial College London (2021-2022), and Johns Hopkins University (2022-2023).

Since August 2023, he holds the German Research Chair in Mathematics and its Applications, funded by the Alexander von Humboldt Foundation, and located at AIMS Senegal. He is also a recipient of the DAAD grant in cooperation with Bielefeld University, funding the doctoral and postdoctoral program under his supervision at the African Institute for Mathematical Sciences.



Mouhamadou's research focuses on partial differential equations and stochastic analysis, with applications in fluid dynamics and nonlinear optics. He has published several research articles in peer-reviewed journals and delivered talks, including at top universities and international conferences.

Mouhamadou is dedicated to promoting African languages in science and mathematics. He has published 4 books on math and science in Fula language and several outreach articles on science in Fula. He is also the initiator of the "Scientific Empowerment of African Languages" project, aiming to develop sciences and mathematics in African languages.

Here are some events of Unesco in which Dr. Sy has been involved:

- African Regional Conference on Humanities, Bamako, 2017
- World Humanities Conference, Liege, 2017
- African Humanities Forum, Bamako, 2021

For more info about Dr Mouhamadou Sy, please consult his website: <https://m-sy.org>