Science + Art: Designing Accessible Education for Students in Nigeria

Hauwa Ibrahim, J.D. S.J.D, M.L.
LaShawnda Lindsay-Dennis, Ph.D

September 19, 2019
1:00-2:00 pm

© 2019, Hauwa Ibrahim, J.D., S.J.D., M.L., and LaShawnda Lindsay-Dennis, Ph.D.
The Team
Special Courtesy

Dr. Layli Maparyan

Wellesley Centers for Women

Wellesley College
Background

A nation’s ability to compete in global society is heavily dependent upon the quality of the education sector and citizens’ access to quality education.

Nigeria is in a unique position as the world's 7th most populous country (200 million residents as of 2019) and is projected to become the 3rd largest country by 2050.

National efforts to improve educational opportunities, especially in the fastest growing industries related to science, technology, engineering and mathematics (STEM), are an engine of the country’s economic growth and influence Nigeria’s standing in global society.

© 2019, Hauwa Ibrahim, J.D., S.J.D., M.L., and LaShawnda Lindsay-Dennis, Ph.D.
Schools in rural areas of Nigeria, especially in the northeastern region, often lack basic educational materials such as textbooks, not to mention instructional material related to STEM and the arts.

The S.T.E.A.M. Summer Program was designed to address these gaps by delivering culturally informed, hands-on S.T.E.A.M. instruction to students in northeastern Nigeria, including the states of Gombe and Bauchi.
Project Rationale

To excite students, teachers, and administrators on the prospect of STEAM education using a hands-on, student centered approach.

To fill in educational gaps, in practical ways, using 500 of the innovative STEMkits designed and created by Wellesley College students in collaboration with researchers at the Wellesley Centers for Women.

© 2019, Hauwa Ibrahim, J.D., S.J.D., M.L., and LaShawnda Lindsay-Dennis, Ph.D.
What is S.T.E.A.M.?

Science
Technology
Engineering
Art
Math
Curriculum Design and Development

Initial interest from other projects

○ Boston Museum
○ STEMkit

Collaboration between multiple partners to build STEMKits embracing all content areas:

○ STEMkit Team – videos, experiments, teacher’s manual, with assistance from individuals and institutions
○ Content area experts (science, art, math, technology/engineering)
Educational Approach to STEAM Camp

Interdisciplinary

Student-centered (Great School Partnerships, 2014)

Experiential

Culturally responsive and sensitive

Community engaged

© 2019, Hauwa Ibrahim, J.D., S.J.D., M.L., and LaShawnda Lindsay-Dennis, Ph.D.
<table>
<thead>
<tr>
<th></th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Science</strong></td>
<td>Genetics &amp; Fingerprinting</td>
<td>pH Indicator/ Density</td>
<td>Period of Pendulum</td>
<td>Blood Typing Kits</td>
</tr>
<tr>
<td></td>
<td>Osmosis/ Density</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>**Technology/</td>
<td>Egg Drop (Shock Absorption)</td>
<td>Vinegar Rocket</td>
<td>Da Vinci Bridge</td>
<td>Electric Circuit &amp; Pulley Systems</td>
</tr>
<tr>
<td><strong>Engineering</strong></td>
<td></td>
<td></td>
<td></td>
<td>Playground</td>
</tr>
<tr>
<td><strong>Art</strong></td>
<td>Custom Cubes</td>
<td>Beading Local Drummers and</td>
<td>Free Drawing</td>
<td>Handprint Flag Playdough</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Singers</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Math</strong></td>
<td>Paper Cup Calculator</td>
<td>Math Dice</td>
<td>Math Memory Game</td>
<td>Math Race Challenge</td>
</tr>
<tr>
<td></td>
<td>Calculator</td>
<td>Math Snakes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

© 2019, Hauwa Ibrahim, J.D., S.J.D., M.L., and LaShawnda Lindsay-Dennis, Ph.D.
Project Materials

Imported Material (20%)

- STEMkits
  - Measuring tapes
  - Plastic bag
  - Pipettes
  - Timer
  - Double ball pendulum
  - Test tubes
  - Pictocolors
- Laser Cut Wood Presskit
- Pencils
- Markers
- Crayons

Local Materials (80%)

- Hibiscus tea
- Soap
- Oil
- A4 paper
- Carbon paper
- Tissue paper
- Plastic cups
- Strings
- Salt
- Tape
- Yam
- Vinegar
- Bleach
- Baking powder
- Plastic bottles
- Beads
- Chalk
- Scissors
- Lemon Juice
- Pipe cleaners
- Wood planks and sticks
- Jars/Vase
- Liquid glue
- Paints
- Skewers and toothpicks
- White fabric
- Paint
- Large plastic bags
- Plastic spoons
- Plastic bottles
- Flip Flop
- Batteries
- Copper wires
- Lightbulbs
- Newspaper
- Plates
- Corn flour
- Wheat flour

© 2019, Hauwa Ibrahim, J.D., S.J.D., M.L., and LaShawnda Lindsay-Dennis, Ph.D.
Theoretical Approach

African Worldview

- Ubuntu (I am because we are)
  - Collective Responsibility
  - Interdependence
- Fluidity of time
- Harmony with nature
Participants

1250 students between the ages of 10 and 14 from 115 schools in Northern Nigeria:

- Bauchi (urban city)
  - 3 Days
  - 272 students

- Hinna (rural village)
  - 4 Days
  - 667+ students
  - 2 sessions per day

- Gombe (urban city)
  - 5 Days
  - 311 students
  - 2 sessions per day
Technology/ Engineering
Lessons Learned

Credibility as currency and capital

A need for pre-travel workshops on identity and culture

Importance of community buy-in for project success and sustainability

Understanding, valuing, and creating programs and policy from the African worldview
Building Credibility Through Local Relationship Building

- Inspector General of Police
- Minister of Information (past)
- Director General of State Security Service
- Chief Judge of Abuja
- Commissioner of Police
- Bashir Dalhatu
- Director of States Security Service
- Member-House of Representatives
- Local Security Apparatus (Hunters)
- Chief Mullah of Bauchi
- Village Vigilantes
- Chief Judge of Bauchi
- Local Youth Leaders
- Emirs of Gombe, Bauchi
- Friends and Associates
- Perims of Gombe, MoE –Gombe
- Village Heads
- Nigerian Ambassador of Italy
- Chief of Hinna
- Local Security Apparatus
- Village Heads

© 2019, Hauwa Ibrahim, J.D., S.J.D., M.L., and LaShawnda Lindsay-Dennis, Ph.D.
Next Steps

Development of a strategic plan for the project.

Ownership and sustainability through collaboration with the Ministry of Education, the University of Gombe, and Office of the Vice President of the Federal Republic of Nigeria.

Development of comprehensive curriculum and teacher professional development on student centered teaching and learning.

Facilitation of continuous dialogue between Ministry of Education, traditional institutions, local teachers, and schools.

Manuscript development focused on the design and implementation of 2019 STEAM Summer Camps.
Acknowledgements

Wellesley Centers for Women
Wendy W. Robeson
STEMkit

Wellesley College Students:
Tabi Silver
Angelina Zhang
Emma Miller
Nikki Mauldin
August Agyemang
Rebecca Arrango
Xian Boles
Tehya Stockman
Sophia Abdelraham
Juliana Robeson
Caitlyn Bann
Terri Liu
Corinne Cressman
Diana Smith
Arlene Lieberman
Stacy Scott
Isabella Nebel
Tracie Sciacca

University of Rome Students:
Ann Salama
Silvio Dionisotti
Simon Mullier
Masa Awad
Roderigo Vassallo
Cornelius Balle
Sadeen Qurdan
Bashir Dalhatu
Abubakar Musa
Labaran Maku
Chief Justice of Bauchi, Rabi
Chief Justice of FCT, Justice
Ishak Bello
Virgilio Dionisotti
Mallam Abdulhali
Yaya Dija
Suleiman Halliru
Jhahil Tafawa Balewa
Babayo Liman
Inspector general of Police

Police Commissioners of Bauchi and Gombe
Director General of the State Security Service of Nigeria
Directors of State Security Services of Abuja, Bauchi, and Gombe
President, University of Gombe
Chief of Hinna, Abubukar Aliyu
Emir of Gombe
Emir of Bauchi
Emir of Dutse
Ali Baba Dalhatu
Aisha Maigari
Aisha Muhammad
Binta Shuia’bu
Muhammad Shuia’bu
Kabiru Adamu
Abubakar Meshellia
Hauwa Muhammad-Goggo
Vigilantes
Uncle Mohammed (Driver)
Uncle Abullahi (Cook)
Teachers from Supporting Schools in Nigeria
Many other unsung heroes

Joe Mutuah
Denis (CSO)
MoE Bauchi
MoE Gombe
Secretary Gombe State Government
Nisa Premier Hospital Abuja
Abubakar Ibrahim Ajiya
Zainab Yunusa Kaltungo
Audu Magaji
Hinna Elders and Youths
Dauda Batari
Baba Hussaini
Affiya Dalhatu and family
Barbara Slayer
Sarah Cannon Holden
Amy Post
Lena Park Fab Lab
Laila Pearson
Photographers:
AMA
Nasiru
Security agents

© 2019, Hauwa Ibrahim, J.D., S.J.D., M.L., and LaShawnda Lindsay-Dennis, Ph.D.
Work Hard....Play Harder!
Sharing & Questions