STEAM

EDUCATION

EQUITY BASED STEAM EDUCATION MANUAL

Alumni Engagement Innovation Fund (AEIF) 2023 in Gabon

STEAM

SCIENCE . TECHNOLOGY .
ENGINEERING . ARTS . MATHEMATICS

ELISHA DORCAS

TABLE OF CONTENTS

Exploring Non-Tech STEAM Activities

Promoting equitable STEAM education to ALL

Leveraging easily accessible materials to teach STEAM.

STEAM LEARNING

INTRODUCTION

In traditional classrooms, teachers lecture while students passively receive information. However, STEAM (Science, Technology, Engineering, Arts, Mathematics) education empowers students to take control of their learning.

STEAM learning has evolved over time involving a lot of hands-on activities. It focuses on the implementation of five subjects; science, technology, engineering, arts, and mathematics as the core basis of teaching. This technique centers on embracing approaches such as observation, research, innovation, and problem-solving.

STEAM gives students the opportunity to explore and relate to day-to-day activities. STEAM can be seen in our everyday lives, and it is everywhere. A good example of science is seen in our natural environment. Technology is applied on a daily basis from simple tools to complex appliances which are used to make our work easier and faster.

Engineering applies science, math, and technology to solve problems. Engineering is using materials, designing, crafting and building. It helps us understand how and why things works. We experience the beauty of engineering in our buildings, transportation system etc.

STEAM LEARNING

Arts involves active and self-guided discovery at its core to arts, unveiling students' creativity as they engage in painting, writing, music, etc. The act can be experienced through various forms of entertainment.

Math is numbers and operations, measurement, patterns, geometry, and spatial sense. From simple calculations of the distance from our home to our offices, how long it takes to complete the trip, measurement of cooking spice or calculating our finances. It also includes the informal knowledge of more and less, shape, size, sequencing , volume etc. STEAM is fully woven into our daily lives.

In this educational book, we embark on a journey to explore the multifaceted realm of STEAM Education. We will delve into various Non-Tech models of teaching STEAM. Through the pages that follow, we will uncover the ways in which STEAM Education inspires curiosity, fosters critical thinking, and empowers learners to become problem solvers of global challenges.

QUOTE

We will always have STEM with us. Somethings will drop out of the public eyes and will go away, but there will always be science engineering and technology . And there will always, always be Mathematics.

Katherine
Johnson

CHAPTER ONE

STEAM EDUCATION

WHAT IS STEAM EDUCATION ?

The ever-evolving landscape of education, one term has gained increasing prominence in recent years - "STEAM." It is not merely an acronym; it represents a transformative approach to learning that has the power to shape the future of education. Welcome to the world of STEAM Education, where Science, Technology, Engineering, Arts, and Mathematics converge to ignite young minds and prepare them for a world defined by innovation, creativity, and problem-solving.

STEAM Education utilizes Science, Technology, Engineering, Arts, and Mathematics to guide student learning through inquiry, dialogue, and critical thinking. STEAM activities foster problem-solving, critical thinking, creativity, innovation, collaboration, and communication skills. The integration of these subjects promotes deeper learning, allowing students to grasp topics thoroughly and take ownership

UNDERSTANDING STEAM

Science

S

The Natural environment where everything comes from

Technology

T

Tools and innovative devices, that we use to simplify processes and enhance abilities

Engineering

E

Purposeful innovation, creation and analysis

ARTS

A

Humanities, ethics, ideals and expressions

Mathematics

M

Identifying patterns, interpreting data, producing measurements, managing finance

EQUITY IN STEAM EDUCATION

Equity in STEAM education is not merely an aspiration; it is an imperative. It embodies the fundamental principle that every student, regardless of their background, should have equal access to the enriching opportunities offered by Science, Technology, Engineering, Arts, and Mathematics.

Equity in STEAM Education acknowledges that talent and potential are distributed universally, but opportunities are not. It calls for breaking down barriers that have historically limited access to quality education and empowering underrepresented groups, including women, minorities, and economically disadvantaged individuals, to participate fully in the STEAM disciplines.

Ensuring equity in STEAM education is not only a moral imperative but also a strategic investment in our collective future, as it harnesses the diverse perspectives and talents of all, driving innovation, and progress in an increasingly complex and interconnected world.

Contrary to the misconception that STEAM is expensive and challenging to implement in traditional classrooms, the document seeks to change this perception. It emphasizes using affordable and recyclable materials to teach STEAM concepts effectively.

It promotes low-tech or Non-Tech activities in teaching STEAM

WHY LOW-TECH/NON-TECH ACTIVITIES

Low and no-tech activities in STEAM education are essential for several reasons. Firstly, these activities are more accessible and cost-effective, making them feasible for resource-constrained communities where access to advanced technology and infrastructure can be limited.

They enable students to engage in hands-on learning experiences that do not rely on expensive equipment or internet connectivity, ensuring that education remains inclusive and equitable.

Additionally, low and no-tech STEAM activities foster creativity and problem-solving skills by encouraging students to innovate with the materials they have readily available, promoting a culture of resourcefulness.

They also respect local contexts and traditions, allowing students to connect their learning to their communities, thus making education more relevant and impactful. In essence, integrating low and no-tech activities into STEAM education in Africa not only overcomes infrastructure challenges but also empowers students to become resilient, adaptable, and imaginative learners in a rapidly changing world.

Examples of Non Tech Activities

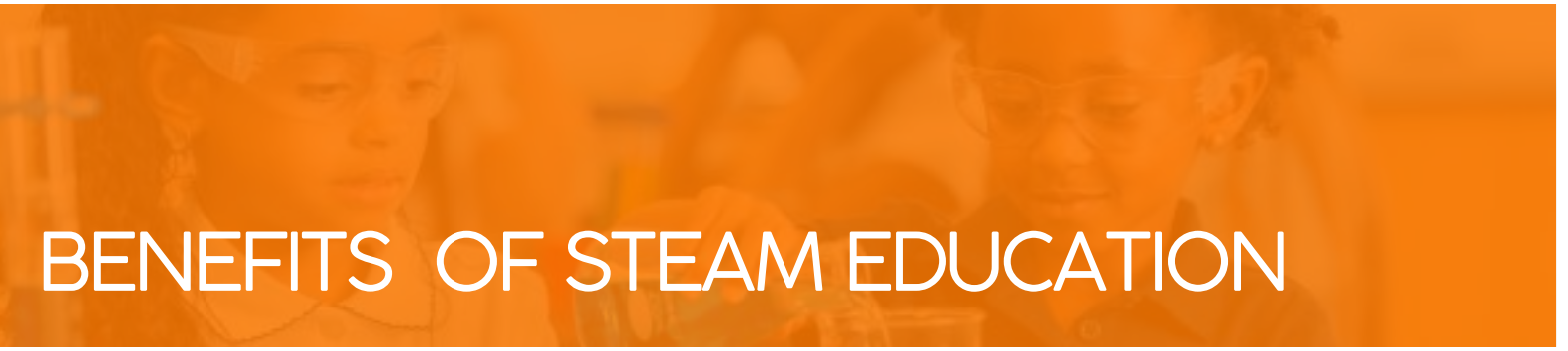
STEAM activities engage students with practical exercises that involve experimentation and exploration. Here are a few examples:

Paper Planes Challenge
Design, create, and test a paper airplane for maximum distance or time in the air. Learn about lift, drag, and propulsion.

Popsicle Stick Tower Competition
Build the tallest tower possible using only popsicle sticks and hot gum. Learn about structural engineering and stability.

Balloon Rockets
Create a balloon-powered rocket to learn about Newton's Third Law of Motion.

Nature Walk and Journaling
Explore the natural world and journal your discoveries. Observe, draw, or take photos of plants and animals, and learn about biology, ecology, and environmental science.



BENEFITS OF STEAM EDUCATION

Integrating STEAM education creates a wide range of benefits that can positively impact students, educators, and society:

- Creativity and Inspiration: STEAM Challenges student's creativity and inspiration through exploration and experimentation in real world projects.

- Critical and Analytical Thinking: STEAM Stimulate students to develop analytical and critical thinking skills, preparing them for future challenges in a competitive and risk ridden job market.

- Communication and Collaboration: STEAM helps students learn to work in groups, communicate their ideas effectively, and jointly solve problems with others

GROUP ACTIVITY

DEVELOP A NON TECH STEAM ACTIVITIES USING THE MATERIAL ON THE TABLE TO EXPLAIN THE FOLLOWING CONCEPTS

- MOTION
- FLOATATION
- BALANCE
- GRAVITY

STEAM is so important because it ignite the imagination and set the soul on fire. It allows students create endless ideas. And allow students explore the world through their fingertips! The possibilities that it provides for learning are limitless.

Kelley
Bradshaw

CHAPTER TWO

FINDING STEAM

EveryWhere and EveryDay

STEAM is our everyday reality as we learn, exploring its concept from the environment and the various man-made objects that surround us. This is an educational approach that encourages students to become natural investigators of the world.

By observing and interacting with their surroundings, students can gain hands-on experience in applying science, technology, engineering, arts, and mathematics principles, fostering a deeper understanding of how these concepts shape the world they inhabit.