STEAM

EDUCATION

EQUITY BASED STEAM EDUCATION MANUAL

Alumni Engagement Innovation Fund (AEIF) 2023 in Gabon

STEAM

SCIENCE . TECHNOLOGY .
ENGINEERING . ARTS . MATHEMATICS

ELISHA DORCAS

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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

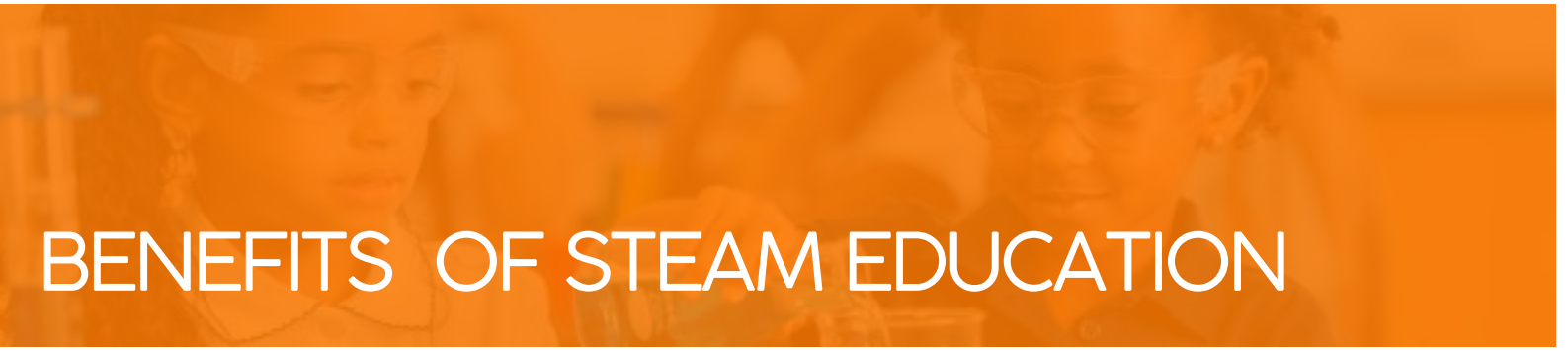
STEAM activities engage students with practical exercises that involve experimentation and exploration. Here are a few examples:

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.

STEAM DISCOVERY ACTIVITIES

Examples

01 OBSERVE DIFFERENT TEXTURES, SMELLS, AND SOUNDS.

02 MEASURE THE DISTANCE BETWEEN PLACES, FROM SCHOOL TO YOUR HOUSE.

03 PLANTS, STONES, AND STICKS CAN BE USED TO COUNT, BUILD, AND CREATE.

04 FEEL THE WIND AND WATCH HOW IT MOVES OBJECTS LIKE LEAVES OR PAPER.

05 OBSERVE PLANTS, INSECTS, BIRDS, AND OTHER ANIMALS.

06 INVESTIGATE SHADOWS, THE WIND, WEATHER.

07 SEE CHANGES CREATED BY SUNLIGHT ON SURFACES.

08 EXPERIMENT WITH SHADOWS AND REFLECTIONS.

09 LISTEN FOR SOUNDS DETERMINE IF THE NOISES ARE FROM NATURE OR FROM THE CITY.

10 COMPARE LIVING AND NON-LIVING THINGS.

STEAM LANGUAGE:

Speaking STEAM Daily

We unconsciously use STEAM language in our daily lives.

However, intentionally integrating it into our classroom discussions can significantly bolster students' interest in STEAM. This conscious effort aids in honing their STEAM skills.

The process cycle follows this sequence: OBSERVE, QUESTION, PREDICT, EXPLORE, DISCUSS.

THE FLOW

Question

- What are you curious about?
- What do you want to know?
- Are you wondering if…?

Predict

- What do you think will happen?
- What are your predictions?
- Why do you think that?
- How could we find out?

Observe

- What do you see?
- What do you hear?
- How do they sound and smell?
- How are they the same?
- How are they different?
- What happens when you try?
- You seem curious about…

Discuss

- What were your predictions?
- What happened?
- What did you notice?
- Why do you think that happened?
- What could we investigate next?

Explore

- Let's investigate.
- What do you notice?
- What is changing?
- What did you try?

OTHER PLACES YOU CAN FIND STEAM

There are other sources we can find STEAM as we go on with our day to day activities, Examples are :

- BOOKS/ LITERATURES
- POEMS AND SONGS
- MOVIES
- BUY AND SELLING
- FASHION etc

CLASS ACTIVITY

- NATURE WALK JOURNALING : Participants should should go out and observe the environment, from shapes, patterns, structure, buildings etc.

ACTION NEEDED

- TAKE NOTES
- TAKE PICTURES
- BRING IN MATERIALS THAT FASINATE YOU.
- Connect your chosen material/ Object to STEAM

If you can't make a mistake, you can't make anything

Maria collins

CHAPTER THREE

STEAM Mindsets and Skillsets

STEAM MINDSET

Mindsets are attitudes that impact motivation and achievement, influencing decision-making and how individuals approach challenges.

STEAM is more than just the subjects it represents (Science, Technology, Engineering, Arts, Mathematics). it can also be known as an acronym for "Self-starter, Thinker, Energizer, Adventurer, and Maker". STEAM mindset encourages exploration, experimentation, and learning across all areas of the curriculum.

Steam Mindsets Attributes

01

Self-Starter, Self-Motivated, Self-Driven

Individuals with this attribute possess confidence, self-awareness, and a strong sense of self-worth. They operate mindfully, setting specific goals and taking initiatives. They plan, strategize, communicate, persevere, and manage their own progress effectively.

02

Thinker, Embrace Technology

Thinkers exhibit critical, innovative, and creative thinking. They make informed decisions and use technology for sustainable problem-solving. They ask questions, apply knowledge to new situations, and reflect on their learning.

03

Energizers

Energizers radiate positivity, engaging and empowering those around them. They excel in building relationships, are ethical, empathetic, and skilled at collaboration. They contribute to others' growth and inspire teamwork.

04

Adventurer

Adventurers are curious explorers who learn through experimentation and investigation. They are authentic, risk-taking, analytical, and adaptable learners, embracing challenges and new experiences.

Steam Mindsets Attributes

01

Maker

Makers are motivated creators with a strong sense of purpose. They employ design thinking, tinkering, and generative learning to master their craft. They take action and make their voices heard.

HOW TO FOASTER STEAM MINDSET IN THE CLASSROOM

- **Creating a supportive environment for nurturing the mindsets.**
- **Building upon the growth mindset concept by encouraging self-compassion, quieting negative self-talk, and promoting creative practice**

Steam Mindset Strategies for the Classroom

There are some healthy classroom practices that helps foster STEAM mindsets in students, let's take a look at some simple actions that can lead to great impact.

01 Demonstrating a STEAM mindset as a facilitator.

02 Being aware of and managing our own negative self-talk.

03 Guiding learners away from fear or negativity by:

04 Encouraging willingness to take risks and emphasizing process over product. Praising experimentation and valuing mistakes for learning.

05 Promoting self-compassion by accepting imperfections and efforts to learn.

Steam Mindset Strategies for the Classroom

06 Cultivating empathy through active listening, suspending judgment, and seeking to understand unique perspectives.

07 Modeling enthusiasm and playfulness, expressing joy and curiosity while interacting with ideas, materials, and processes.

Encouraging learners to share highlights of their experiences and explore creative, even wild, ideas.

STEAM SKILLSETS

Skillsets are specific abilities that allow individuals to accomplish tasks. The STEAM skillsets are necessary for student success in a STEAM-rich future and 21st-century workplace.

THE FIVE ESSENTIAL STEAM SKILLS

- Critical Thinking: The ability of the student not to passively listen to information or instructions – but constantly question and form an independent analysis of facts to come to a decision.

- Problem-solving: This means tackling a problem head-on to come up with a potential solution.

- Creativity: It is hard to define. Originally meaning 'to bring into being', creativity can be thought of as producing or creating something using original and unusual ideas.

- Communication: Being able to listen well understand a topic and share with others well enough for them to understand.

- Collaboration: The ability of students to work together effectively to achieve a common goal.

EXAMPLES STEAM SKILLSETS

- CURIOSITY & IMAGINATION Students value originality, generate new ideas, investigate life with curiosity, and ask questions.

- COURAGE & RISK-TAKING Students work outside their comfort zones, embrace adventure, stay open to new ideas, and strive to achieve their goals.

- PERSISTENCE & GRIT Students see a task through to completion, push through obstacles, and work to create solutions to problems. Students see challenges as learning

- PROBLEM-SOLVING Students generate alternative solutions to problems, think critically, recognize solutions, and proactively develop creative solutions.

- RESOURCEFULNESS & ADAPTABILITY Students explore quick and clever ways to overcome challenges, with the understanding that they can always

- TEAMWORK Students learn from new people and work with people with diverse perspectives, skills, and talents.

- DESIGN THINKING Students learn processes for problem-solving that originate with empathy and compassion.

CLASSROOM DISCUSSIONS

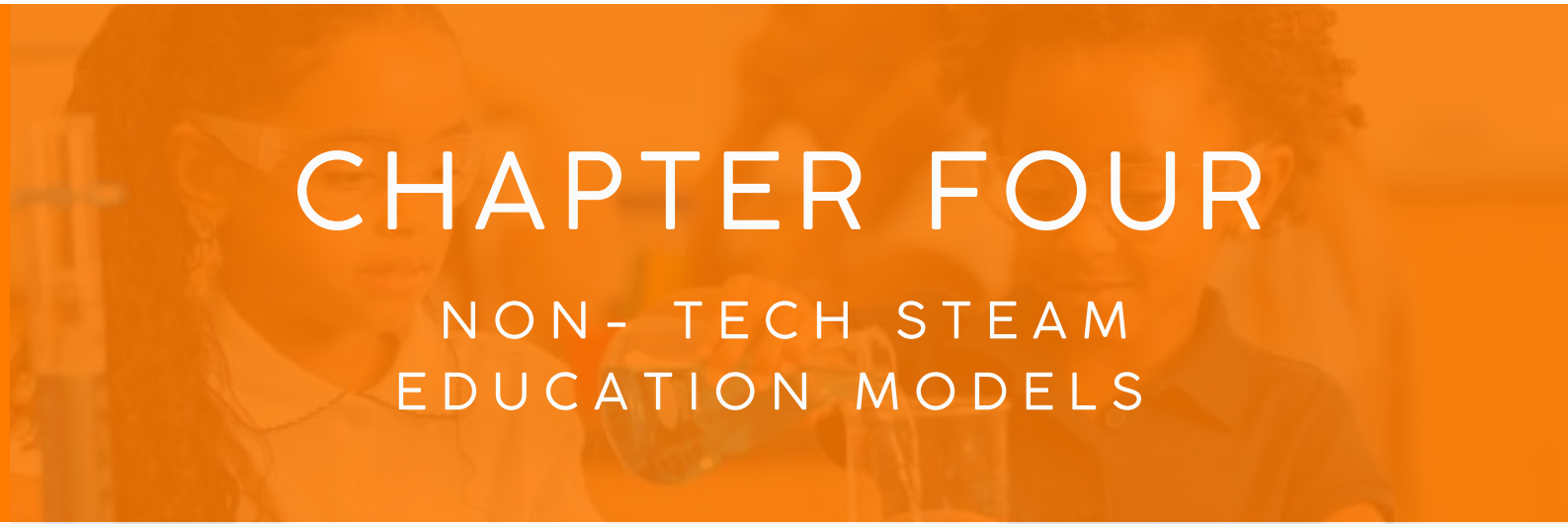
FAMOUS INVENTIONS THAT WAS A PRODUCT OF MISTAKES

CLASS ACTIVITY

DESIGN CHALLENGE
Create an artistic designs with the materials presented to you

Creativity is the secret sauce to Science, Technology, Engineering, Art and Mathematics.

Ainissa
Ramirez



CHAPTER FOUR

NON- TECH STEAM EDUCATION MODELS

There are various methods to teach STEAM education, including both high-tech and low-tech approaches. While high-tech activities are common, low-tech or no-tech activities can also effectively teach STEAM, particularly relevant for schools with limited resources or in rural areas.

STEAM education extends beyond robotics kits and coding; it emphasizes developing 21st-century soft skills through activities that don't necessarily require expensive equipment.
In this training, the focus is on using readily available materials to create engaging STEM activities.

Educators are encouraged to explore their environment to design context-based and creative activities, fostering local relevance and creativity.

NON-TECH MODELS

1. PLACED BASED STEAM EDUCATION
2. PROBLEM BASED LEARNING
3. PROJECT BASED LEARNING
4. TINKERING - REVERSED ENGINEERING
5. INQUIRY BASED TEACHING AND LEARNING

7.

8.

PLACE-BASED STEAM EDUCATION

Place-Based STEAM Education is an innovative approach that capitalizes on the unique characteristics and resources of a specific geographic location to enrich learning in the fields of Science, Technology, Engineering, Arts, and Mathematics (STEAM).

It recognizes that the environment, culture, and community of a particular place offer valuable opportunities for hands-on, contextually relevant education. By integrating local ecosystems, heritage, and challenges into the curriculum.

Place-based STEAM Education not only makes learning more engaging but also empowers students to become active participants in their communities and stewards of their environments.

This approach cultivates a deep sense of connection between learners and their surroundings, fostering a holistic understanding of STEAM concepts that extends beyond the classroom, ultimately equipping students with the skills and knowledge to address real-world issues in their backyards and beyond.

PLACED BASED STEAM EDUCATION

In essence, place-based learning revolves around understanding the relationship between the learning content and the local environment. It incorporates students' lived experiences and interactions with their surroundings into the learning process.

This approach can encompass problem-based learning, experiential learning, outdoor education, cultural awareness, and more. It engages students within their community, emphasizing their physical surroundings, culture, history, and people.

By involving students in their community's development and interactions, it enhances communication, inquiry skills, and their self-awareness in the global context.

GOALS

- Impact communities
- Improve student and teacher engagement
- Boost student's academic performance

BENEFITS

- Learning is grounded in local communities and contexts.
- The learning experience is student-centered and personalized.
- Learning is relevant and engaging. Students can be challenged to see the world through ecological, political, economic and social lenses.
- Students can have more agency and autonomy — boosting motivation and persistence.
- Social-emotional learning can be a priority.
- Instruction can be interdisciplinary.
- Lessons can be inquiry-based
- Students can meet deeper learning outcomes.
- Students can gain better appreciation and understanding of the world around them.
- Design-thinking can be encouraged

PBL DESIGN PRINCIPLES

LOCAL TO GLOBAL

LOCAL TO GLOBAL" EMPHASIZES STARTING THE EXPLORATION OF PLACE FROM SELF-AWARENESS AND EXPANDING OUTWARD TO LARGER CONTEXTS.

LEARNER- CENTERED

LEARNER-CENTERED" IT EMPOWERS STUDENTS TO ADDRESS COMMUNITY ISSUES AND PROPOSE SOLUTIONS.

INQUIRY BASED

INQUIRY-BASED" GROUNDED IN OBSERVATION, RELEVANT QUESTIONING, PREDICTION, AND DATA COLLECTION TO COMPREHEND THE ECONOMIC, ECOLOGICAL, AND SOCIO-POLITICAL WORLD.

DESIGN THINKING

Design Thinking" offers a structured approach for students to impact communities through the curriculum, fostering meaningful change.

COMMUNITY AS CLASSROOM

Community as Classroom" treats communities as learning environments, integrating local expertise, experiences, and places into the educational process.

INTERDISCIPLINARY APPROACH

Interdisciplinary Approach" aligns with the real world, integrating traditional subject content, skills, and attitudes through project-based, interdisciplinary teaching.

Placed Based Activities

EXAMPLES

INTERNSHIP WITH LOCAL BUSINESSES OR INSTITUTION

FIELD TRIPS

COMMUNITY SERVICES

WHAT CAN WE DO:

Community Asset Mapping

Asset mapping is a comprehensive method for identifying and documenting essential services, resources, and strengths within a community. This includes individual skills, organizational assets, physical spaces, institutions, associations, and local economic elements. It acknowledges that both individuals and communities possess valuable contributions that can aid local schools in their educational endeavors.

FIVE STEPS APPROACH IN ASSET MAPPING

- **Mapping Community Assets:** The initial step is to identify and document the available assets within the community, involving individuals, associations, businesses, and institutions that support STEAM education. This step aims to understand the existing STEAM resources in the community.

- **Building Internal Relationships**: The process fosters relationships among local assets, encouraging collaboration for problem-solving within the community. Diverse groups collaborate to engage in practical activities, potentially forming partnerships among teachers, schools, and parents to advance STEAM learning.

- **Asset Mobilization:** Asset mapping promotes the mobilization of community resources to support students' development. This involves identifying and utilizing local resources to create relevant learning content. For instance, partnerships with local businesses might provide opportunities for students to gain real-world experience through job shadowing or internships.

- **Building a Vision:** Asset mapping helps in designing a sustainable class learning vision by incorporating community assets. This ensures community support and commitment to students' educational growth.

- **Establishing External Connections:** Asset mapping not only involves insiders but also considers external stakeholders who align with the STEAM goals. This approach allows for broader engagement and partnerships to enhance students' learning experiences.

GROUP ACTIVITY

STEAM COMMUNITY ASSET MAPPING

Use your community Map
Identify as many STEM opportunities and organizations in your community from your asset map.

ASSET FEATURES

- Relationships
- Skills
- Institutions/Organisations

Questions

Using your community map, participants are to identify patterns on the map and can use the questions below as a guide.

1. What do you notice?

2. What do you wonder?

3. Where are our strengths?

4. Where are there fewer opportunities?

5. Where are the opportunities located?

6. Where do the learners typically underserved in STEAM live and go to school? Is there a relationship?

Questions

Using the same map as a guide, identify patterns on the map and can use the questions below as a guide.

1. What is the history of how these developed?

2. What connections, if any, exist between these various entities?

Create a table that organizes the assets identified on your map into a list with space to include contact information and notes about each asset.

Choose some of the opportunities on the asset map and discuss the nature of each opportunity and how learners would engage with each.

Science is simply the word we use to describe a method of organising our curiosity

TIM MINCHIN

CHAPTER FIVE

PROBLEM BASED LEARNING

Problem-Based Learning (PBL) is an educational approach in STEAM that places students at the center of their learning journey. It engages learners in real-world, complex problems or challenges, which they must investigate, analyze, and solve collaboratively.

PBL goes beyond the conventional rote memorization of facts and encourages critical thinking, creativity, and teamwork.

In the context of STEAM education, PBL immerses students in authentic scientific, technological, engineering, artistic, or mathematical problems, mirroring the challenges they might encounter in their future careers.

This method not only equips students with practical skills but also nurtures a deep understanding of STEAM concepts by connecting theory to practical application. It fosters a sense of ownership and curiosity, making learning an active and dynamic process, and ultimately preparing students to tackle the complex, multifaceted challenges of the modern world.

The Benefits of Problem Based Learning

1 **Encourages self-directed learning**

This student-focused approach fosters responsibility and initiative in learning. Through research and creativity, students develop skills that have lifelong value.

2 **Develops versatile skills:**

The skills cultivated extend beyond the classroom and subject boundaries, applicable to diverse academic areas and real-world scenarios, from leadership to practical problem-solving.

3 **Enhances engagement**

Instead of passive learning, students actively engage in problem-solving, employing critical thinking and creativity.

4 **Builds teamwork skills**

Collaboration is often integral to problem-based learning, pushing students to develop teamwork skills such as communication, cooperation, compromise, and attentive listening.

5 **Inspires intrinsic motivation**

The rewards of problem-based learning go beyond grades, encompassing a sense of accomplishment and satisfaction from solving puzzles, devising innovative solutions, or creating tangible outcomes.

EXPLORE PBL MODEL

DESIGN THINKING:
Entrepreneurship in the Classroom

Design thinking is a non-linear, iterative process that teams use to understand users, challenge assumptions, redefine problems, and create innovative solutions to prototype and test. It is a mindset approach to problem-solving and innovation anchored around human-centered design, It is people-centric.

Human-centered design is a problem-solving technique that puts real people at the center of the development process, enabling you to create products and services that resonate and are tailored to your audience's needs.

Entrepreneurship in the Classroom is a dynamic educational approach that equips students with the mindset and skills needed to thrive in an ever-evolving entrepreneurial landscape. This methodology encourages students to adopt a human-centered perspective, where they empathize with end-users to identify unmet needs or problems.

EXPLORE PBL MODEL

DESIGN THINKING:
Entrepreneurship in the Classroom

By emphasizing collaboration, creativity, and iteration, Design Thinking fosters innovation, enabling students to develop and prototype solutions that address real-world challenges. This approach not only cultivates an entrepreneurial spirit but also instills valuable life skills such as problem-solving, critical thinking, and adaptability.

Moreover, it empowers students to see themselves as active creators and problem-solvers, preparing them to navigate the complexities of the 21st-century workforce while fostering a deep sense of agency and purpose in their educational journey.

DESIGN THINKING OVERVIEW

1

Empathize: Research User Needs

Gain empathetic understanding of the problem through user research. Develop insights into users' needs and challenges, setting aside personal assumptions.

2

Define: State Users' Needs and Problems

Analyze and synthesize gathered information from the Empathize stage. Formulate clear problem statements that represent the core issues identified.

3

Ideate: Challenge Assumptions, Generate Ideas

Build upon insights gained in previous stages to generate creative ideas. Encourage thinking outside the box and exploring innovative solutions. Utilize brainstorming to explore diverse possibilities.

4

Prototype: Create Experimental Solutions

Develop scaled-down, cost-effective prototypes of potential solutions. Experiment with various ideas to identify the most promising approaches.

5

Monitor, measure, and optimize

Rigorously test prototypes to assess their effectiveness and viability. Gather feedback from users and evaluators to refine and improve solutions. Design thinking is iterative, allowing for redefinition of problems and further refinement.

WHO IS AN ENTREPRENEUR

An **entrepreneur** is an individual who creates and/or invests in one or more businesses, bearing most of the risks and enjoying most of the rewards. The process of setting up a business is known as "entrepreneurship"

Let's look at the definition from a human centered designer perspective

An entrepreneur identifies a problem that is shared by many, create solutions to the problem by connecting with the people in their community affected by the problem and
has an entrepreneurial mindset.

It can be anybody !

ENTREPRENEUR CHECKLIST

Entrepreneurship mindset

We must learn to think like a successful business person,
Keep this in mind :

- ***The best time to start is now***
- ***Opportunities are all around you***
- ***Fear is meant to be overcome***
- ***Failure can be a good thing.***

Marketing Brainstorming

What is the marketing plan for the business?

Skillsets Inventory

As you explore various marketing strategies, make informed choices. You need to take an inventory of your skill set.

- What skills do you have?
- What skills would you need to learn?
- What tools do you know how to use?
- What tools would you like to learn how to use?

Business Goal Setting

What business goals do you want to set for the month, quarter, and year?

CLASS ACTIVITY

PICK ANY OF THE CHALLENGE TO WORK UPON:

1. Research food wastage.

- What issues does it present?
- What solutions have others found?

Challenge & Brainstorming

- Design a service / product that helps reduce/ eliminate food wastage.

Execute & Present

- Build your prototype and get your peer feedback. Polish and present your ideas.

2. Research climate change and flooding in your country.

Challenge & Brainstorming

- Design a service / Product that help reduce flood within our communities

Execute & Present

- Build your prototype and get your peer feedback. Polish and present your ideas.

CHAPTER SIX

PROJECT BASED LEARNING

Project-Based Learning (PBL) stands as a cornerstone of STEAM education, where science, technology, engineering, arts, and mathematics converge to offer students an immersive and holistic learning experience. At its core, PBL centers on the idea that students learn best when they engage with real-world challenges and actively apply their knowledge and skills to solve complex problems.

In STEAM, PBL projects empower students to become investigators, designers, and innovators, immersing them in hands-on, collaborative experiences.

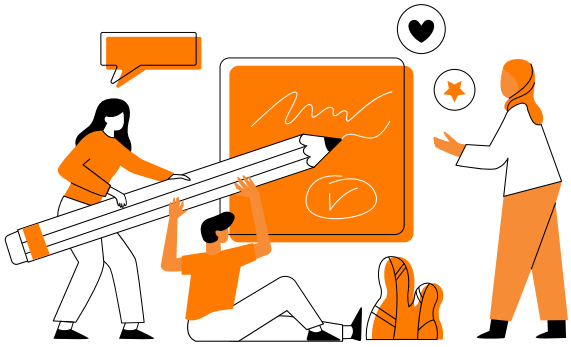
These projects can range from designing sustainable solutions to tackling engineering challenges, creating art with mathematical precision, or even crafting scientific experiments. PBL in STEAM not only equips students with deep subject knowledge but also hones their critical thinking, creativity, and teamwork, ultimately preparing them to excel in the multifaceted, interdisciplinary world they will encounter beyond the classroom.

It nurtures a passion for exploration, discovery, and lifelong learning while bridging the gap between theoretical knowledge and practical application in the diverse fields that STEAM encompasses.

STEPS IN IMPLEMENTING PROJECT BASED LEARNING

- **Defining the Problem:** Start with students asking questions to frame the problem context and potential benefits for end users.
- **Generating Ideas:** Encourage brainstorming to generate a variety of ideas while focusing on the problem.
- **Prototyping Solutions:** Create prototypes, like mock-ups or role-plays, to expand on ideas and convey potential solutions.
- **Testing:** Test prototypes in real settings to gather feedback, identify issues, and engage in critical thinking and reflection.

THE ROLE OF THE TEACHER IN IMPLEMENTING PBL



01

Facilitator

The teacher guides students through the PBL process, helping them define project goals, identify resources, and develop a plan. They support students in setting achievable milestones and encourage them to take ownership of their learning.

02

Designer

The teacher designs and structures the overall project framework. They create a well-defined driving question or problem statement that aligns with STEAM concepts and encourages critical thinking and exploration.

03

Content Expert

The teacher provides foundational knowledge and content related to the project. They introduce key STEAM concepts, theories, and skills, ensuring that students have the necessary background to tackle the project effectively.

04

Resource - Provider

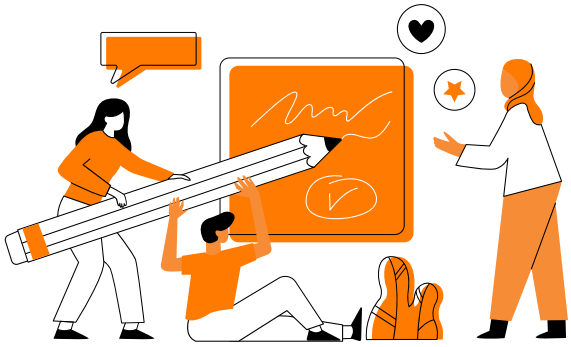
The teacher curates resources such as reference materials, tools, software, and equipment that students may need during the project. They offer guidance on how to access and utilize these resources effectively.

05

Collaborator

Collaborator: The teacher collaborates with students, working alongside them as a co-learner. This emphasizes the teacher's willingness to explore and discover new information, fostering a culture of collaboration and shared learning.

THE ROLE OF THE TEACHER IN IMPLEMENTING PBL



06

Connector

The teacher helps students connect the project to real-world applications and contexts. They emphasize how the STEAM concepts being learned are relevant in professional fields and everyday life.

07

Assessment Design

The teacher designs assessments that evaluate both content knowledge and skills acquired during the project. These assessments can include presentations, portfolios, demonstrations, and reflections, assessing not only the final product but also the learning process.

08

Promoter of Reflections

The teacher encourages students to reflect on their learning experiences, challenges faced, and lessons learned throughout the project. Reflection fosters metacognition and helps students understand their growth.

09

Cultivator of Curiosity

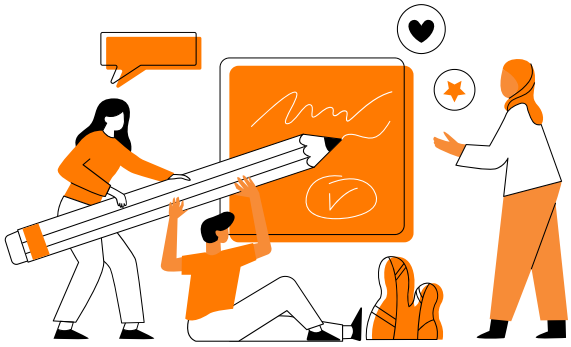
The teacher sparks curiosity and encourages inquiry by posing thought-provoking questions, suggesting intriguing avenues of exploration, and facilitating discussions that promote deeper understanding.

10

Time and Task Manager

The teacher assists students in managing their time effectively to meet project deadlines. They help students break down the project into manageable tasks and ensure progress is being made.

THE ROLE OF THE TEACHER IN IMPLEMENTING PBL



11

Adaptive Facilitator

The teacher adapts to students' individual learning styles, needs, and interests. They provide personalized support to each student, ensuring that the project meets their educational goals.

EXAMPLES OF PBL ACTIVITIES

- *Planning a climate Smart Garden, that meets specific designs and promotes green environment*
- *Launching a recycling program that solves an identified problem with existing recycling programs. This can be done at a school-level, neighborhood-level, or city-level.*
- *Solving the problem of negative and/or 'fake news.'*
- *Designing a new form of government (or democracy, specifically) that addresses some perceived shortcoming of existing democratic forms (partisanship, non-functioning checks-and-balances, etc.)*
- *Helping local businesses increase environmental sustainability (e.g., reduce waste).*

CLASS ACTIVITY

Choose any of the challenge below:

1. Unemployment
design a project that best addresses unemployment among youths.

2. Preventing soil erosion
build a seawall to protect a coastline from erosion, calculating wave energy to determine the best materials for the job.

3. Solving a city's design needs
Identify issues relating to things like transportation, the environment, or overcrowding — and design solutions.

4. Creating clean water
Build a water filtration system to promote access to clean water.

5. Improving the lives of those with disabilities
Using the materials available to you, to build an assistive aid to help a person with a disability move or carry stuff easily.

6. Building earthquake-resistant structures
Using the popsicle sticks to construct an earthquake resistant structure

Technology is just a tool in terms of getting the kids working together and motivating them. The teacher is the most important

BILL GATES

CHAPTER SEVEN

INQUIRY BASED TEACHING AND LEARNING

Inquiry-based learning is a teaching method that encourages students to ask questions and explore real-world problems across various subjects. The approach has numerous benefits, such as preparing the brain for learning, cultivating versatile skills, promoting curiosity, deepening understanding, enhancing critical thinking, and fostering ownership and engagement.

It works effectively in all disciplines and instills a lifelong love of learning.

TYPES OF INQUIRY BASED APPROACH

There are four types of inquiry based approaches:

1. Structured Inquiry Approach:
Sequential process guiding students through investigating problems using the scientific method.

2. Open-Ended Inquiry Approach:
Allows students to explore their interests and question topics freely, often seen in humanities classes.

3. Problem-Based Inquiry Approach:
Focuses on solving real-world problems, frequently used in math and engineering classes.

4 Guided Inquiry Approach:
Teacher-led process that supports students in asking questions and finding solutions, often found in elementary and middle school settings

TIPS FOR IMPLEMENTING INQUIRY-BASED TEACHING

There are tips to guide you as you,,explore this concept in your classroom.

1. Begin with a Question: Start the lesson with a thought-provoking question to engage students and stimulate their curiosity.

2. Foster Exploration: Allow students to independently explore the topic, promoting a deeper understanding of the material.

3. Encourage Discussion: Facilitate group discussions among students to share ideas and enhance comprehension.

4. Provide Resources: Offer students relevant resources, including online platforms, to aid their exploration and understanding.

5. Summarize Learning: Conclude the lesson with a summary of key takeaways to reinforce students' memory and learning

INQUIRY BASED TEACHING MODEL

There are various teaching models that helps guide your class activities for improved learning outcomes.

- **The Question Model:** Involves asking students questions to encourage critical thinking about the subject matter.
- **The Problem-Based Learning Model:** Challenges students with a problem to solve, promoting critical thinking and solution finding.
- **The Project-Based Learning Model:** Assigns students a project related to the topic for in-depth exploration and learning.
- **The Inquiry Cycle Model:** Allows students to ask questions, investigate a topic, and share their findings, fostering in-depth exploration and knowledge sharing.

TYPES OF INQUIRY BASED APPROACHES

01

Structured Inquiry Approach

Sequential process guiding students through investigating problems using the scientific method.

02

Open-Ended Inquiry Approach

Allows students to explore their interests and question topics freely, often seen in humanities classes.

03

Problem-Based Inquiry Approach

Focuses on solving real-world problems, frequently used in math and engineering classes.

04

Guided Inquiry Approach

Teacher-led process that supports students in asking questions and finding solutions, often found in elementary and middle school settings

EXAMPLES OF INQUIRY BASED ACTIVITIES

1. Science Experiment

This allow students to conduct experiments. This will encourage them to ask questions and think critically about the results.

2. Field Trips

Students embarking on an investigative field trip is another exciting way to promoting classroom inquiry. This will allow them to explore real-world problems and see how what they are learning in the classroom is relevant.

3. Classroom Debates

Classroom debates are another great way to encourage this type of learning. When students debate a topic, they are forced to think critically about both sides of the argument.

4. Projects

When students are given the opportunity to work on a project that is related to the topic they are studying, they will be more likely to learn and remember the information.

5. Group Work

When students work in groups, they are able to share their ideas and thoughts with others. This helps them to understand the material better

CLASS ACTIVITY

Habitats and Communities

- What impacts do humans have on habitats?

- Study the characteristics of different habitats to compare and contrast them, or they can investigate the ways animals and plants depend on each other in a specific habitat. For example, how does deforestation affect habitats in Gabon affects wild life in Gabon.

- Furthermore, what effect does home building and residential development have on habitats?

Not only can students explore the impact of human activities on habitats, but they can also go deeper to investigate the ways plants and animals adapt to these changes.

They could also explore the impact of hunting, climate change, or invasive species. Give students space and materials to investigate their natural curiosity about the topic and see where it takes them.

CLASS ACTIVITY

Cross-Curricular Links:

- **Science:** Students are to conduct a scientific inquiry about creating an ideal honeybee habitat, construct labeled, to-scale dioramas of two contrasting habitats

- **History:** Students construct maps showing how habitats have changed over time and the causes for the changes, interview members of the community to hear their perspective on how their local community has changed, and highlight their voices in a mini-documentary

CLASS ACTIVITY

Decomposition Demonstrations

Most learners understand that when you leave food out on the counter for a few days, it will begin to get brown, slimy, and yucky. However, most learners don't know what really causes this to happen. This inquiry-based learning activity will give them an opportunity to explore how the decomposition of organic matter is affected by factors such as temperature, humidity, storage, time, and type of food.

For this activity, teach your learners the science behind decomposition and how organic matter gets broken down into simpler chemicals and molecules. Then discuss the factors listed above and how they can affect the rate of decomposition. To allow learners to explore this for themselves, provide them with a variety of fruits and vegetables.

CASE STUDIES

Ocean Disruption

According to the International Union for Conservation of Nature, at least 14 million tons of plastic end up in the ocean every year. Plastic makes up 80 percent of all marine debris, which entangles animals and is ingested by marine species. Marine plastic pollution is a global threat, and according to projections, by 2025 the ocean will contain one ton of plastic for every three tons of fish. By 2050, there may be more plastic in the ocean than fish.

- **How can we preserve and protect the world's oceans?**

Eliminating Homelessness

It is estimated that 150 million people are homeless worldwide. How can this issue be addressed, ensuring everyone live in a safe and healthy environment?

- **How can we address the problem of homelessness in our community?**

CASE STUDIES

Food Scarcity

In an article published by Columbia University's Earth Institute, the effects of COVID on the earth's food supply is discussed. It points out that "The underlying cause of the pandemic has been attributed to agricultural activities encroaching into natural habitats. Now the pandemic is encroaching on agricultural production."

Inquiry Questions About Food Scarcity:

- **How has COVID-19 affected agriculture around the world?**
- **What is a food desert and how can we make access to food more equitable?**
- **In what ways can we help promote food production in our communities?**

CASE STUDIES

Art in the Community

- **How can Art be used in community representation?**

Students brainstormed adjectives that matched the place they lived in and chose the top three that best described what life was like in their community. Next, they chose places to photograph, sketch, paint, or draw that best represented their communities. They needed to consider the time of day, space, textures, and colors. The final product was up to them, but they needed to include at least ten artworks that represented life in their community.

Questions About Community Art:

- **What is the function of art in our lives?**
- **How have artistic expressions evolved?**
- **How has art historically been used to cultivate change?**

Community Gardening

In this inquiry-based learning example, students investigate the connections between resources and health. Students explore concepts like urban farms, food sovereignty, and food scarcity.

- **What impact can growing our food have on the community?**

CASE STUDIES

Cross-Curricular Links:

Math: Students measure and calculate the perimeter and area of planting beds, use cubes to measure the heights of pre-existing flowers and plants, calculate the cost savings of growing their own food vs. buying food at a local grocery store

Science: Students conduct a scientific inquiry into the conditions favourable for growing healthy flowers, or into the best soil for optimal vegetable growth

Engineering an Ideal Car

- **How can we redesign cars or buses to make travelling more comfortable for passengers, while being cost-effective for transport companies?**

Questions About Airplane Design:

- **How can passenger comfort be maximized while maintaining a reasonable ticket price?**
- **In what ways can we design cars to be more eco-friendly?**
- **How could we use recyclable materials to build cars?**

CASE STUDIES

Designing an Equitable School

- **How can we design a school that is more inclusive and/or equitable?**

Consider physical inclusion. For example, are there any places at their school that could be more accessible? Do ramps, railings, or other supports need to be built in a particular area? Does the layout of certain rooms need to be rearranged to accommodate students with disabilities?

Boat Float

Provide learners with basic information regarding the physics of floatation and buoyancy. Have them explore how boats the size of luxury cruise liners and container ships can stay afloat even with the extra weight. Then have them use their knowledge to create a boat that can remain afloat in a plastic tub of water.

They should experiment with different types of materials and designs while following the scientific concepts they've learned. Once learners have found a way to keep their boat afloat, have them add items such as paperclips or thumbtacks to see if the weight causes their boat to sink. They can also simulate storms and ocean waves by causing disruptions to the water in the tank. Do their ships still stay afloat?

Curiosity is probably one of the most important characteristics that people have who go into science, and engineering is about solving problems and creativity.

Ellen Ochoa

CHAPTER EIGHT

TINKERING: REVERSED ENGINEERING

Tinkering, often referred to as reverse engineering is a hands-on and exploratory approach that encourages students to dissect, manipulate, and reconstruct objects and systems to gain a deeper understanding of how they work.

This methodology embodies the spirit of curiosity and experimentation, inviting learners to become active problem-solvers by dismantling and analyzing the components of technology, machinery, or artistic creations.

Tinkering fosters a profound connection between theory and practice, allowing students to bridge the gap between abstract concepts and tangible realities. In the process, it cultivates critical thinking, creativity, and resilience to failure, emphasizing that mistakes are opportunities for learning.

Tinkering is a cornerstone of STEAM education, where it ignites a passion for innovation and empowers students to become the architects of their own discoveries.

TINKERING

INVOLVES

Trying different actions like pressing buttons or moving objects to observe outcomes.

Combining instructions or actions to explore new possibilities.

Encouraging imagination and exploration without device limitations.

TINKERING PROMOTES COMPUTATIONAL THINKING BY DEVELOPING CRITICAL THINKING, COLLABORATION, CREATIVITY, AND COMMUNICATION SKILLS, OFTEN IN PAIRS OR GROUPS.

Incorporating tinkering into STEAM education offers affordability, especially if recyclable materials or donated broken gadgets are used.

Analyzing and deconstructing household gadgets and toys is an effective way to teach STEAM practices and content.

TINKERING ACTIVITIES FOR STUDENTS

- Analyze broken gadgets, considering materials, function, and components.
- Gain exposure to mechanical, electrical, and materials science engineering concepts.
- Learn entrepreneurial skills through this process.
- Sort, organize, label gadget components, and create schematics.
- Create displays of components on poster board or cardboard.
- Extend learning by attempting to fix broken gadgets or creating new devices or art from components.

CLASS ACTIVITY

Deconstruction of Toys and Gadgets: Try to understand to understand the function of each part and how to fixed it.

Construction: Try building something new out of the various gadgets parts available.

Construct a Cardboard Chair from used Cardboards.

Chain Reaction : Exploring the Cause and effects processes using every day items.

Circuits and Paper : Using simple methods to create a light bulb card.

Curiosity is probably one of the most important characteristics that people have who go into science, and engineering is about solving problems and creativity.

Ellen Ochoa

CHAPTER NINE

SMART PHONE: AN EDUCATIONAL TOOL

A smartphone is a mobile device that functions like a computer, featuring a touchscreen interface, internet access, and an operating system capable of running apps. It is not limited to communication and social media but can perform various tasks akin to a computer, such as document editing, spreadsheet work, and video conferencing.

Smartphones are versatile tools with capabilities comparable to laptops. They can be employed for research, lesson planning, content creation, and more. Understanding your phone's functionalities and potential is crucial.

Phones are not just communication devices; they can be harnessed for educational purposes. This training focuses on utilizing smartphones as STEAM resources. It explores how simple tools on phones can enhance STEAM learning in classrooms.

Our Smartphone affords us an opportunity to leverage technology in both teaching and learning, we will learning about some of the platforms:

EDUCATIONAL APPS

Educational apps are digital tools that offers a dynamic and interactive approach to education. These apps go beyond traditional learning methods by incorporating multimedia elements such as videos, animations, quizzes, and interactive simulations.

Apps makes learning and teaching more enjoyable. As technology continues to evolve so does the way we learn and teach.
There are alot of advantages in using educational apps so also there are disadvantages.

If teachers rely too heavily on apps, they may not be able to adapt their lessons to the needs of individual students. Therefore, it is important to use apps as a supplement to traditional teaching methods, not as a replacement. We can use apps in a way that enhances our teaching and helps our students learn better.

Educational Apps

Duolingo

Kahoot

Flip

Ulesson

Khan Academy

Canva

Question.Al

Socratic by Google

Microsoft Math Solver

Wolfram Alpha Resources for Educators

Game changer

Class Dojo

Feedly

Educational Websites

Educational websites are great resources for educators. You can access materials and templates. Below are some resourceful sites

Because Learning

PHET Simulation

How Stuff works

Oxford Owl

BrainPop

TINKERLAB

STEM Teaching tools

EDUTOPIA

Teaching Channels

HOW STEM WORKS

Lesson Planet

Discovery Education

Science buddies

The Science Laboratory

Educational Websites

CHATGPT

National Geography Kids

BILL NYE

NASA STEM

Open Classrooms

Quizlet

AL Content Detector

Read Along by Google

Spelling & Phonics:

PhotoFunia

Voice Maker

Grammarly

zamzar

Educational Blogs

MindShift

MindShift explores the future of learning in all its dimensions covering cultural and technology trends, groundbreaking research, and innovations in education.

Teach Thought

An idea and brand dedicated to innovation in K-12 education. TeachThought Blog is dedicated to thought leadership and the development of learning models and frameworks to create transparency for new possibilities in teaching and learning for modern circumstances.

WeAreTeachers

WeAreTeachers is an online community for educators committed to one of the toughest, most rewarding jobs out there. Our Mission is to promote innovation in education through collaboration and connection to the most effective classroom resources.

FreeTech4Teachers

Free Technology for Teachers provides teachers with ideas for using free technology resources in their classrooms.

TeachersPayTeachers

Teachers Pay Teachers is the world's first open marketplace for educators to buy, sell, and share original resources. Its mission is to empower educators to share original educational materials and make teaching an even more rewarding experience.

Define learning

ONLINE COMMUNITIES

There are active online communities for teachers across the world. Through these communities, you get to connect and learn from other teachers from different parts of the world. Let explore some communities you can connect with:

Teachers Connect

TeachersConnect is a bustling online community where all teachers collaborate to make a deep impact — regardless of experience or location.

Turito

You can offer your services from the comfort of your home and still earn a passive income.

Educators Forever

At Educator Forever, they empower teachers to find alternative careers beyond the classroom.

Teachers Task Force

Teacher Task Force (TTF), is a unique global independent alliance working solely on teachers and teacher issues. It is dedicated to raising awareness, expanding knowledge and supporting countries

LinkedIn Education Group

LinkedIn has education-related groups where educators can network, share ideas, and discuss educational topics.

Twitter Education Group

Twitter hosts regular education-related chats in both languages, where educators can participate and engage in discussions.

CLASS ACTIVITY

- Identify AI that can make you more efficient and effective with your students.
- Do you have ideas, that has worked in your classroom and open to sharing your expertise with the world? You can you start your blog, podcast, or YouTube channel today!
- Create a lesson plan/ Note using YouTube as a resource. Use YouTube to gain new ideas and approaches in teaching specific STEAM concepts.
- Create a VR HeadSet for Virtual Tours and Scientific Simulations for your students.
- Connect with Other career professional globally leveraging online platforms

E-LEARNING PLATFORMS

Edx

Alison

MIT Open course ware

Coursera

Udemy

LinkedIn Learnings

FutureLearn

Udacity

Moodle

Acumen Academy

Digital Harbor Foundation

GOOGLE EDUCATION

GOOGLE EDUCATION

The Google for Education initiative is a comprehensive program that provides educators with a suite of powerful tools and resources to enhance their teaching practices and improve student learning outcomes.

Google Classroom the flagship platform of the initiative, offers a digital learning environment that streamlines assignments, communication, and collaboration between teachers and students. Educators can create and distribute assignments, provide timely feedback, and monitor student progress, all within a centralized and user-friendly platform.

Google Workspace for Education (formerly known as G Suite for Education) empowers educators with a set of productivity and collaboration tools, including Gmail, Google Docs, Sheets, Slides, and Drive.

E-BOOKS AND DIGITAL LIBRARIES

World Readers

Junky Books

SOCIAL MEDIA LEARNING PLATFORMS

WHATSAPP

TELEGRAM

FACEBOOK

LINKEDIN

GROW WITH GOOGLE

STREAM YARD

Google for Education Teacher Center provides self-paced online courses, certification programs, and workshops that focus on integrating technology effectively into teaching practices.

Google Forms: Allows educators to create surveys, quizzes, and assessments for students. Responses are automatically collected and can be used for feedback, assessments, and data analysis.

Google Sites: Enables educators to create simple websites for class projects, portfolios, or sharing resources with students.

Google Earth: Provides access to interactive maps, satellite imagery, and geographic data. It can be used to explore the world and integrate geographical concepts into lessons.

Google Expeditions: Offers virtual reality (VR) experiences for classrooms, allowing students to take virtual field trips to various locations worldwide.

Google Arts & Culture: Provides access to high-resolution images of artworks and historical artifacts from museums worldwide. It offers educational resources for art and culture studies.

Google Jamboard: An interactive digital whiteboard that allows collaboration and brainstorming in real-time, either in-person or remotely.

Google Meet: A video conferencing tool that supports online meetings, webinars, and virtual classrooms. It allows educators to host live sessions and interact with students in real-time.

YouTube for Education: Provides access to educational content on YouTube, including educational channels, documentaries, and tutorials.

OPEN DISCUSSION

- HOW WILL YOU LEVERAGE TECHNOLOGY IN TEACHING AND PROMOTING STEAM EDUCATION
- SHARE NEW IDEAS AND ACTIONS IN EFFECTIVE USE OF YOUR SMART PHONE IN THE CLASSROOM
- WHAT ARE THE NEW TECHNOLOGICAL TOOLS YOU WILL START EXPLORING?
- WHY IS IT IMPORTANT NOW?
- HOW WILL YOU DO IT ?
- WHAT IMPACT WILL IT HAVE IN YOUR CLASS?

Creativity is seeing what everyone else has seen, and thinking what no one else has thought."

ALBERT EINSTEIN

CHAPTER TEN

BEYOND CODING : CREATIVE AND INNOVATIVE TEACHING

This section marks the final part of our training manual, where we encourage you to tap into your inner creativity to craft engaging STEAM activities for your students. These activities should utilize easily accessible and affordable materials, deeply rooted in your community's context.

Take a moment to consider what resources your community offers and how they can be transformed into valuable learning opportunities for your students.

Look around and identify ways in which STEAM principles can be applied to address pressing community challenges.

Ensure that your content is tailored to your community's experiences and realities, fostering relatability and deeper comprehension of concepts.

For educators in remote and underserved communities like mine, delving into high-tech projects can be costly and resource-intensive. In such contexts, I have embraced the principles of place-based education to educate my students using STEAM concepts.

For instance, I encourage my students to apply their knowledge of Chemistry to tackle local water purification challenges, thus creating access to clean water.

We've also explored using sand logs to mitigate soil erosion along roads, illustrating how classroom knowledge can directly impact the community.

One particularly exciting project I embarked upon involves bridging the digital literacy gap prevalent in rural areas. Many rural students are familiar with computers in theory but lack hands-on experience.

As a team, we devised a project to bridge this gap by offering practical computer education, emphasizing a human-centered approach.

By imparting computer skills that align with real-life applications, we empower students to leverage their newfound knowledge for community development.

Through these initiatives, we aim to instill a shift in student perspectives – moving beyond theoretical understanding to the ability to translate classroom knowledge into tangible impacts on their communities.

The human body serves as a universally relatable model that grants us a clear understanding of its functioning. This foundational understanding served as the cornerstone of our training program. We successfully facilitated student comprehension by drawing parallels between different computer components and corresponding human body parts. Here are some of our concepts:

The CPU is likened to the human brain, functioning similarly to process information.

Much like the heart, the motherboard acts as the computer's central hub. The monitor is comparable to our eyes, enabling visual perception.

The keyboard, similar to ears, facilitates communication through typing. Speakers, analogous to a mouth, emit sound.

The mouse functions as the legs, enabling navigation within the computer.

Software can be likened to cells, aiding effective computer functioning.

Hardware stands as our physical body – tangible and observable.

This straightforward experiment remarkably enhanced classroom engagement, leading to a remarkable 50% improvement in learning outcomes. The success of this approach lies in our commitment to breaking boundaries and creating tangible, relatable content for our students.

> As teachers we must explore our inner creativity in creating content that helps improve learning outcomes in our classes leveraging very relatable models. This helps simplify learning, making it more real, reasonable and possibly Fun for your students.
>
> Elisha Dorcas

Traditional games commonly enjoyed by children can also serve as effective strategies for teaching STEAM concepts. Embracing creativity and innovation in STEAM education, it's essential to explore diverse methods within your reach to provide a dynamic and engaging learning experience for students.

You can use anything and everything to teach or explain a concept, it is our responsibility to simplify learning

Elisha Dorcas

CLASS ACTIVITY

Let's create innovative content for our classroom:
Using the Lesson plan template provided, Create a content that explore Non-Tech approach to teach a STEAM concept.

REFERENCES

Splash Learn

Exploratorium

Edtechbook

Kubo Education

Diana Wehrellgrabowski Blog

Creating a culture of inquiry

Education Corner

Place-Based learning

Connected Science learning

STEM Activities

REFERENCES

Dtl Steam Box book

STEAMH DO IT YOURSELF

Guide to implementing place based education

Quick start guide to place based professional learning

STEM TEACHING TOOL: Place based Science education

Glass on Place Based STEM education

PEB Manual

MISTEM Network: STEM Place Learning and Justice