Demystifying STEM Education

What STEM is and why it matters

with **David Ogunshola**

What comes to mind when you hear the word STEM?

There's a lot of misconception around STEM

Let's start with the problem

Our world today has a massive thinking deficit.

It's a global problem, but it's worse in Africa.

Symptoms

- **Massive Unemployment**
- **Workplace and Economic Unproductivity**
- **Massive Poverty**
- **Educational Vices such as Exam Malpractice**
- **A lot of employed people don't work in their areas of study**

How did Africa end up as a continent full of educated people who create little or nothing?

Because we run schools and educational systems that promote memorization above thinking, and which value and reward passing of exams with good grades above the student's creativity.

David Ogunshola
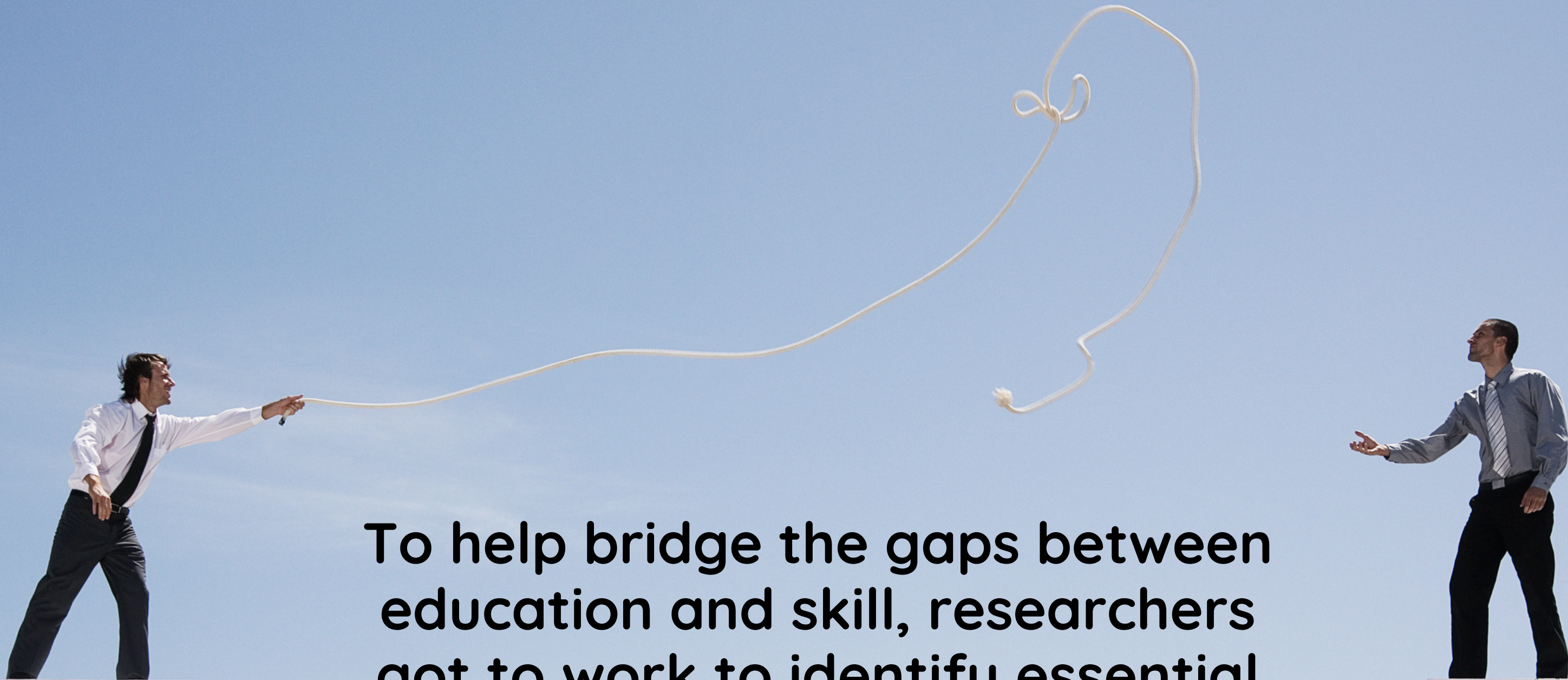
To help bridge the gaps between education and skill, researchers got to work to identify essential skills required to thrive in the world today.

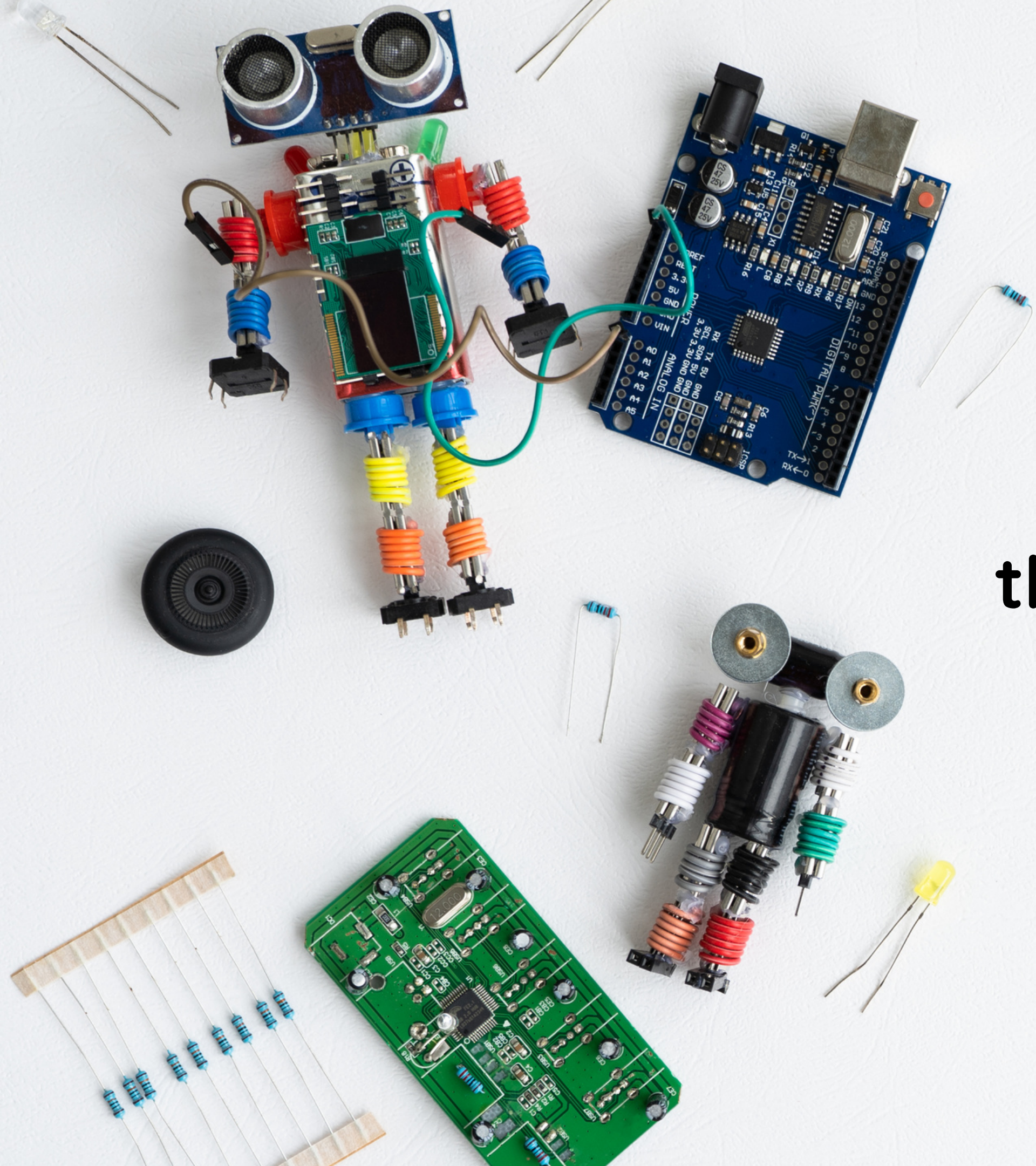...but these skills don't exist as subjects in schools.

Our schools are still heavily subject-focused.

It was the realization of
these facts that made STEM
become a big deal

Education

Science
Technology
Engineering
Mathematics

STEM education goes beyond the 4 subjects

It a paradigm of education that focuses on developing the skill set that governs the way we think and behave. Merging science, technology, engineering, and mathematics, STEM education helps us to solve the challenges the world faces today.

STEM education gives people skills that make them more employable and ready to meet the current labor demand.

Each STEM component brings a valuable contribution to a well-rounded education.

Science

Science gives learners an in-depth understanding of the world around us. It helps them to become better at research and critical thinking.

Technology

Technology prepares young people to work in an environment full of high-tech innovations.
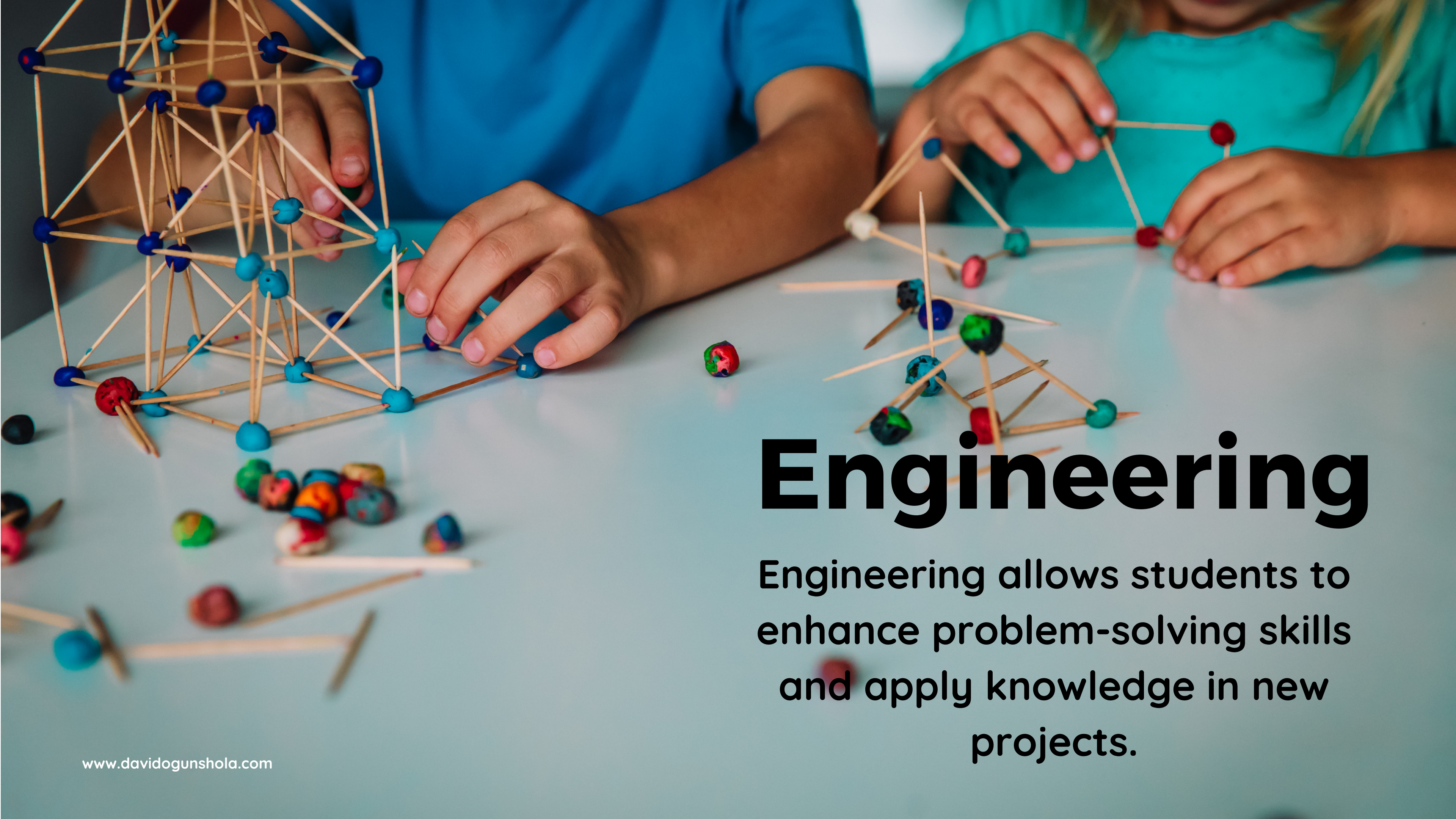
Engineering

Engineering allows students to enhance problem-solving skills and apply knowledge in new projects.

Maths

Mathematics enables people to analyze information, eliminate errors, and make conscious decisions when designing solutions.

Implementing STEM in School

Inquiry-Based Learning

Project-Based Learning (PBL)

Problem-Based Learning

Inquiry-Based Learning

Inquiry-based learning is a learning process that engages students by making real-world connections through exploration and high-level questioning.

The goal of the entire process is not to find the right answers, but to help students develop the right framework for thinking

Ask questions

Investigate

Reflect & evaluate

THE INQUIRY PROCESS

Process & analyse

Share findings

Project-Based Learning

An instructional approach designed to give students the opportunity to develop knowledge and skills through engaging projects set around challenges and problems they may face in the real world

In PBL, students are driven to learn because they have seen the need to learn and they have an immediate application for the knowledge.
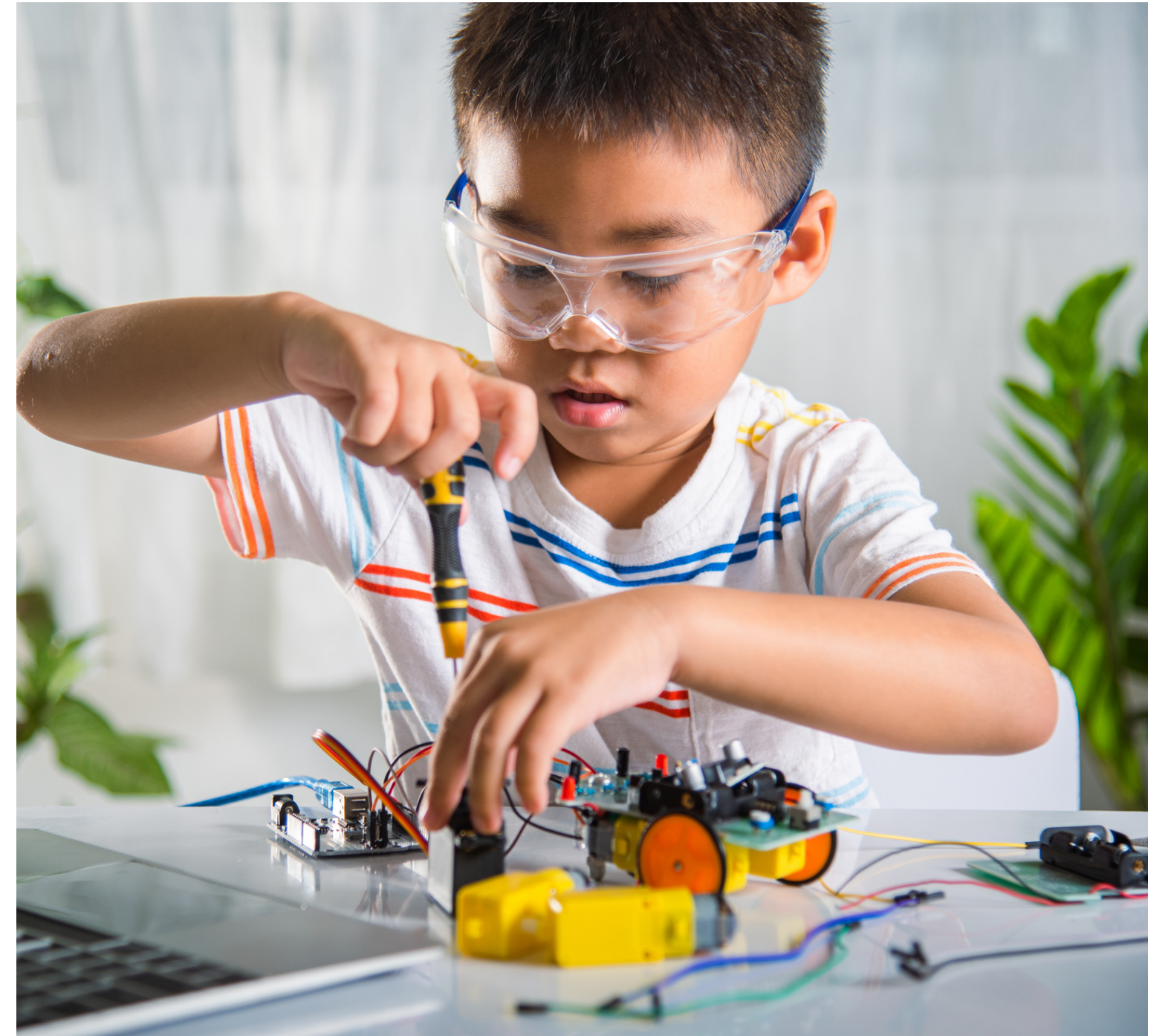
5 PHASES OF PBL

1

PROJECT PLANNING

Teacher identifies what knowledge and skills they want students to learn and think about.

BLOOM'S: UNDERSTAND & REMEMBER

- Identify Learning Targets to be 'pulled' out as Need to Know questions
- Map cognitive path & thinking journey
- Design & plan DQ & student product(s)
- Plan instruction, scaffolding, & assessments

Students not yet active in project

2

PROJECT LAUNCH

Entry Event/Hook and introduction of the Driving Question and authentic audience.

BLOOM'S: CREATE

- DQ: How can we 'create' so that...?
- Clarify product, purpose, & audience
- Develop Need to Knows

Students become active in project

3

PROJECT IMPLEMENTATION

BLOOM'S: ANALYZE

multiple milestones → **TEACH & ASSESS** ← **scaffolded supports**

BLOOM'S: APPLY → **BLOOM'S: UNDERSTAND & REMEMBER** ← **BLOOM'S: EVALUATE**

- Students acquire, understand, & apply new knowledge & concepts identified as Need to Knows
- Teacher uses inquiry exercises, collaborative learning, & direct instruction where appropriate
- Teacher & students critique & assess content, process & product, relearn, revise, & improve

4

PROJECT CONCLUSION

Presentation of product(s) and summative assessments

BLOOM'S: CREATE

- Students share product with authentic audience
- Teacher assesses product & process of group
- Teacher assesses knowledge & understanding of individuals
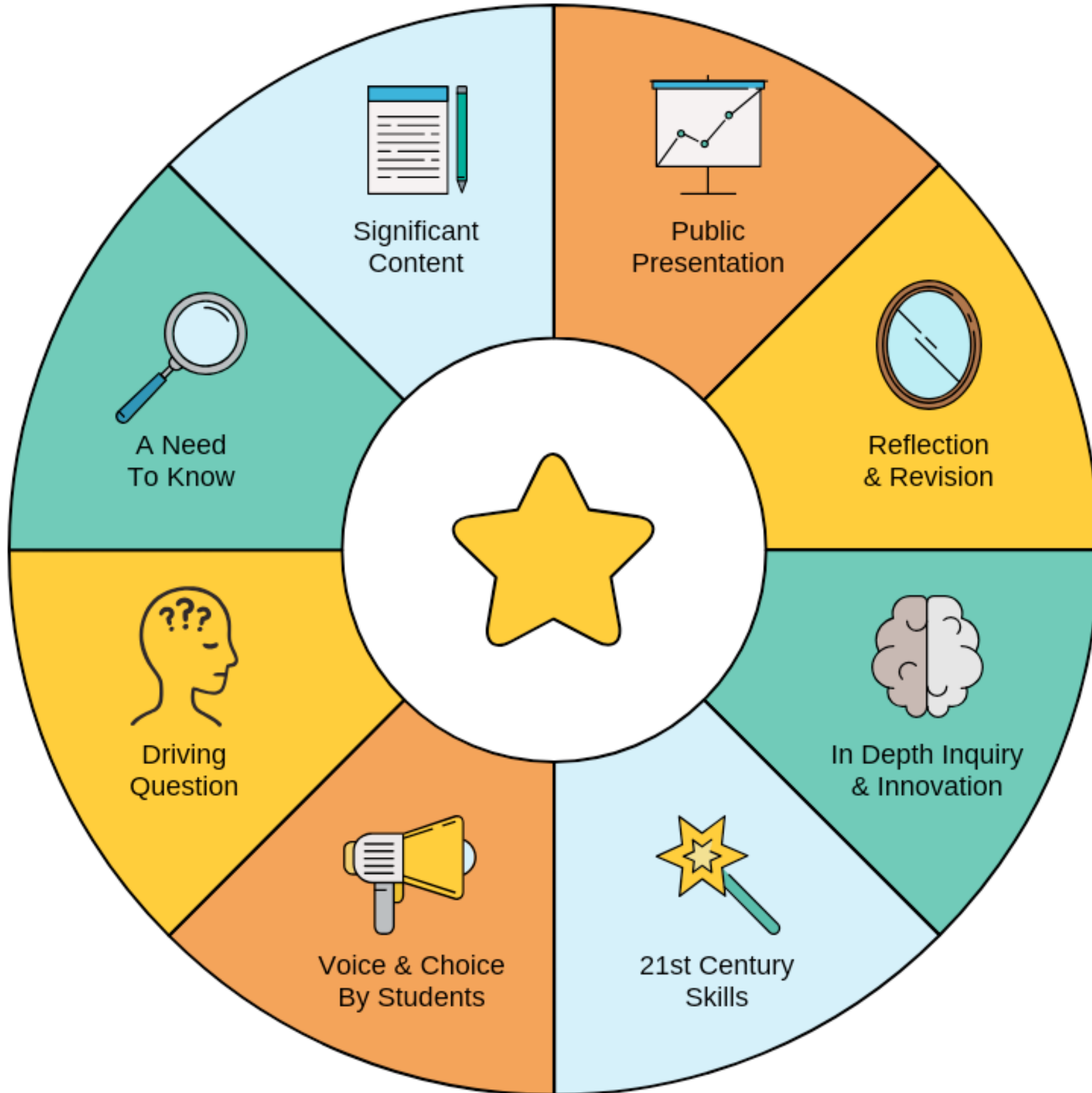
5

PROJECT DEBRIEF

Formal and informal reflections on planning, products, and process

BLOOM'S: EVALUATE

- Students reflect on their products & process
- Teacher reflects on project design & implementation
- Adjustments & revisions
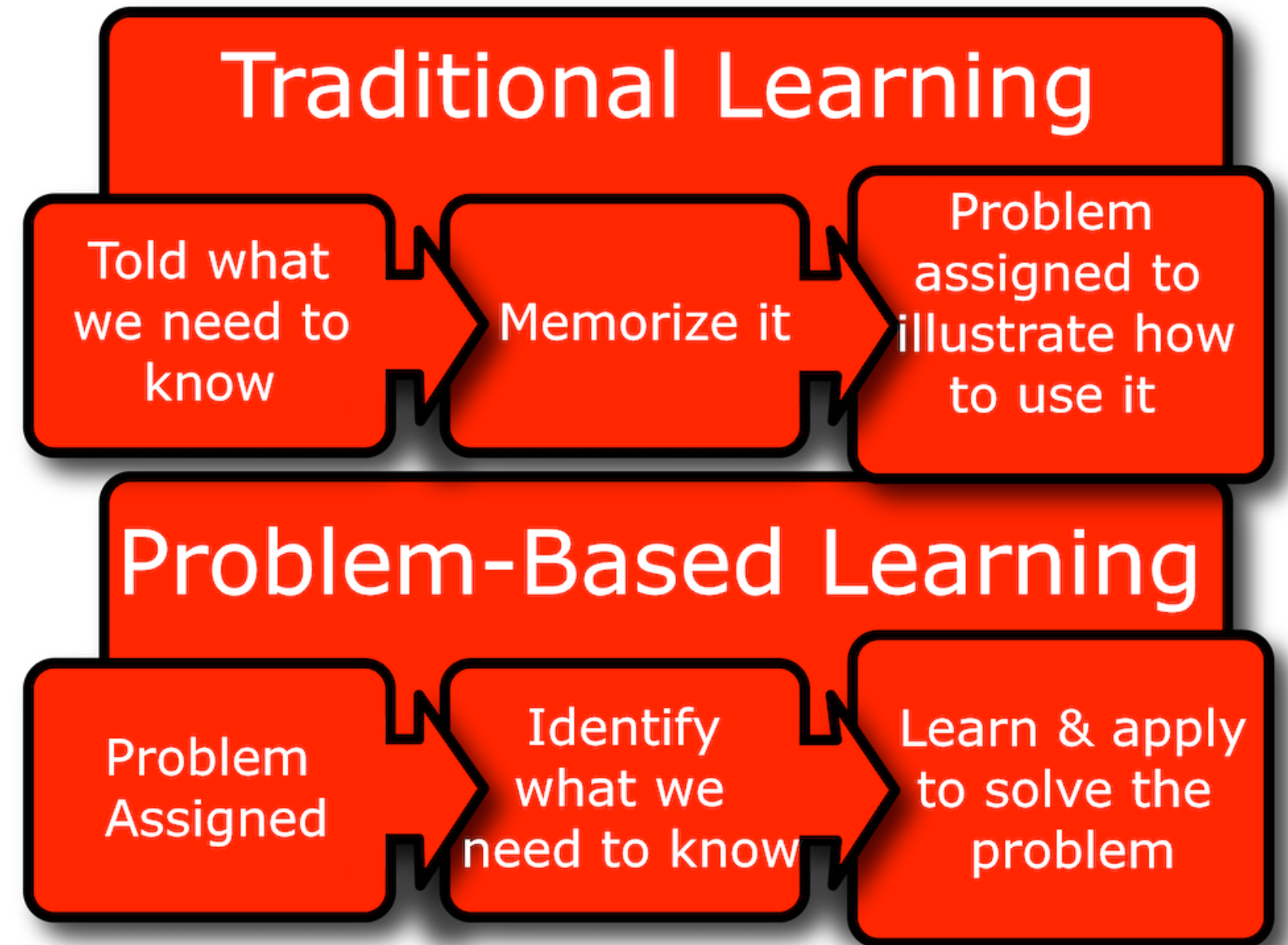- What worked, what didn't? Why?

teachthought

What happens on the background in PBL

Problem-Based Learning

Problem-based learning is a student-centered approach in which students learn about a subject by working in groups to solve an open-ended problem.

Traditional Learning

Told what we need to know → Memorize it → Problem assigned to illustrate how to use it

Problem-Based Learning

Problem Assigned → Identify what we need to know → Learn & apply to solve the problem

Problem-Based vs Project-Based Learning

In Project-based Learning, students produce an artefact to demonstrate their mastery of content, in Problem-Based Learning, students present a solution to a clearly defined authentic problem.

Implementing STEM at home

Parents can invite their children to engage in household activities that involve STEM concepts, such as helping in the kitchen. Allowing them to measure and chop ingredients is an effective way to help children observe the practical application of mathematics.

David Ogunshola

Founder, EarlyFounders Labs
Co-Founder, Brainy Hive Schools
Founder, Daveshoope Webmasters
Author, Early Coding for Kids

www.davidogunshola.com