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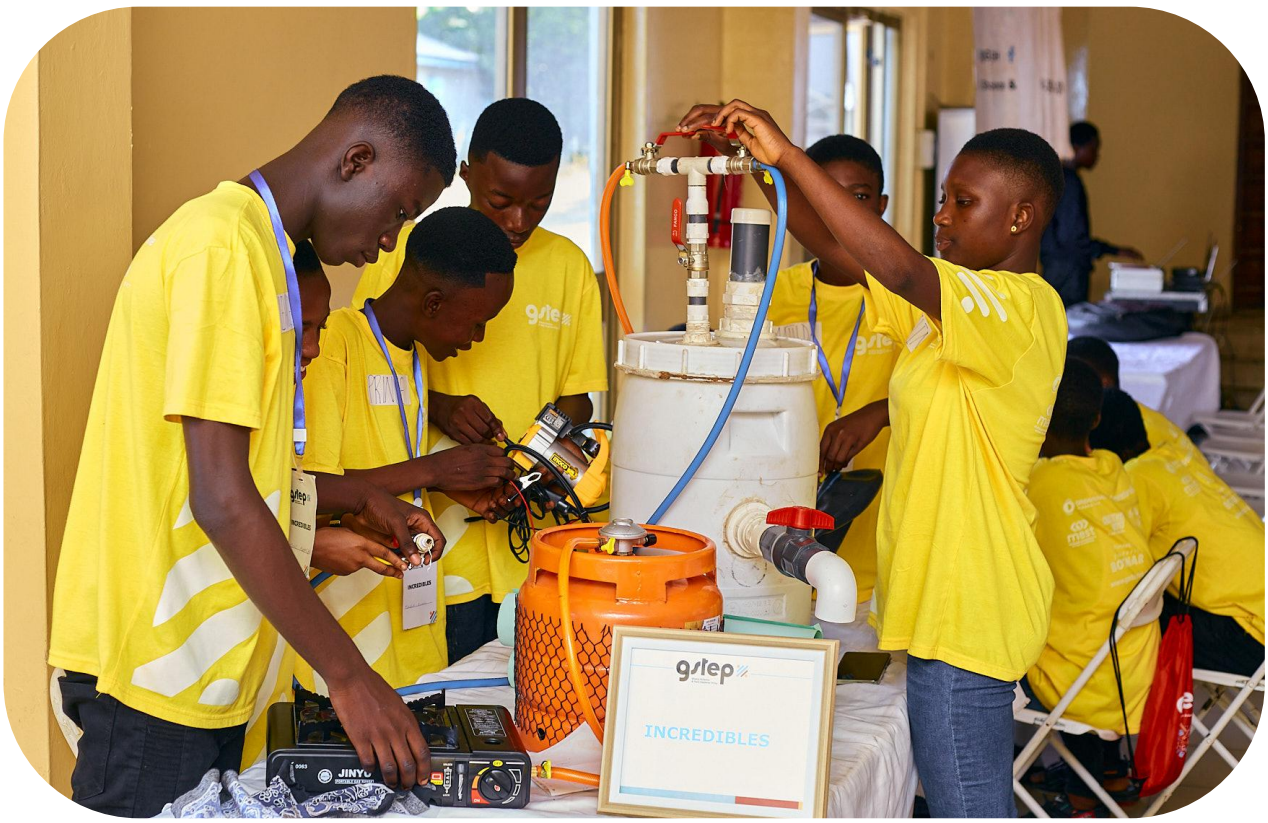

Lesson 5:
Risk Factors

(Environmental, Health and Safety Considerations)

and Teamwork

Introduction

How to use the lesson plans

These lesson plans are for the use of teachers (or an adult representative), to help guide the students through the GSTEP Challenge. Lesson plans 1-6 should be competed in order.

Each lesson plan includes:

- A list of materials needed
- The learning objectives
- A lesson summary with teacher notes
- A worksheet for students to fill in (optional)

All lesson plans and supporting materials can be downloaded for free from the GSTEP Challenge website: www.gstep.org.gh.

The lesson is outlined over the next few pages. However, this is just an example schedule. You can choose the activities and lesson plans to meet the needs of your group and your timetable. You can also adapt the time spent on activities to make them shorter or longer.

Students will need paper and pens / pencils and should be guided by your instructions. Alternatively, there is a worksheet that can be printed out for students to fill in, if this is easier and you have access to a printer (no problem if not!).

Overview

Learning objectives:

- To learn about risk factors and ethics;
- To reflect on effective teamwork; and
- To prepare for their class presentations.

Time:

- 50-60 minutes

Materials needed:

- Large sheets of paper (preferably A3 and / or A2 paper, plus A4 paper)
- Pens / coloured pens / pencils / coloured pencils
- Lesson worksheet (optional)

Lesson plan 5: Risk factors and teamwork

Introducing today's lesson (5 min)

Start with a brief recap of the the previous session.

Notes for teachers:
In the previous lesson, students learnt about developing business and turning ideas into reality. Ask them if they remember the order of the 8 different categories discussed.

Answer:

1. *Discovering a problem & definition*
2. *Idea generation*
3. *Design & development*
4. *Market research and design iteration*
5. *Prototype development*
6. *Business case development*
7. *Marketing and communications*
8. *Analysis of product or solution*

Next, introduce the aims of this session.

Notes for teachers:
The aim of this session are:

- To discuss the risk factors (environmental, health and safety considerations) of their inventions;
- To reflect on how the groups have worked together as a team; and
- To prepare for their class presentations.

Activity 1 (5 min): Understanding ethics

Ask the class what they think the word 'ethics' means.

Notes for teachers:
After you've heard their answers, explain that ethics are defined as a set of moral principles which inform how people (an individual or a group) behave.
In other words, ethics are a set of rules that help determine the way we should act. This includes how we treat other people and also the environment. Ethics also translates to risk factors. For the purpose of this challenge, we will consider the environment, health and safety as our key focus for identifying risks associated with our inventions or solutions

Now, ask the class what sort of ethical issues they could face or risk factors to consider when developing products or solutions, using Science and Technology.

Notes for teachers:
If the class gets stuck, a few prompt questions include:

- How might the environment be affected?
- How might people be affected?

Please explain to the class that, even if their product or solution is solving an important problem, it could have some unintended negative consequences.

Some examples of this include:

- **Environmental pollution:** Products and solutions using Science and Technology often require a lot of materials and energy to create. As the Earth's resources and materials are finite, this can have a negative impact on the environment.
- **Privacy:** Technological products often require the collection of personal data. This personal data could get into the wrong hands and be used for negative purposes, such as identification fraud.
- **Automation:** Science and Technology tends to make the lives of people easier. However, this could mean that Science and Technology essentially outcompetes humans, and replaces their jobs. This could have a negative impact on some people's livelihoods.

Activity 2 (10 min): Applying ethics

In their groups, ask students to come up with the risk factors associated with their inventions.

Notes for teachers:
As 'ethics' or 'risk factors' is likely to be a new concept, the groups may need some further support and examples. We encourage students to share as many risk factors as they can think of.

Next, as a group, the students should identify how to reduce the risks factors (i.e. environmental, health and safety considerations) associated with their inventions.

Notes for teachers:
Again, as this is likely to be a new concept, the groups may need a few hints and tips.

Some examples include:

- Protecting personal data by using trusted companies and following legal guidelines.
- Using renewable energy sources to create their products and solutions, in order to reduce environmental pollution.

Activity 3 (10 min): Working as a team

Ask each group to consider how they have worked together as a team to come up with their ideas, by answering the following questions.

- How did you share responsibilities?
- How did you communicate with each other?
- Is there anything you could have done to work even more effectively?

Notes for teachers:
In the GSTEP Challenge, we want to make sure all voices are heard within conversations around STEM, including females.

From your observations over the past few lessons:

- Did everyone have the opportunity to participate?
- Were everyone's ideas encouraged and supported?

Please encourage them to think critically about how they worked together and share any guidance about how this could make this even better in future sessions.

Activity 4 (20 min): Summarising your ideas

Ask each group to collate their answers to the following questions, in preparation for a short presentation (up to 3 min) in the next session.

1. What is your problem statement?
2. Which GSTEP Challenge theme does this relate to?
3. Describe how your product or solution will tackle this problem.
4. What makes your product or solution different from existing inventions?
5. What are the next 3 steps you are going to take to turn your idea into a reality?
6. How will you advertise or market your product?
7. How did you work together as a team?
8. Are there any risks factors to consider in implementing your idea? How will you manage these?

Notes for teachers:

- Students should already have thought about all of these points in the previous lessons. This is a chance for them to collate all of their thoughts and ideas and share these with their classmates.
- We also encourage them to show the class the picture that they developed in Lesson 3, to help visualise their invention.
- It is important that all members of the group have the opportunity to speak during the presentations. Please encourage this. The groups might like to divide out the 8 questions between them, to make this preparation easier and quicker.
- Students are welcome to have some prompt notes in their presentations, if this helps them.
- Some students will feel nervous about the idea of presenting. Please reassure them that there will be no judgement and that this is an opportunity for them to share their great work with their classmates. Please make clear that this is not a test!
- This information will help the students to fill out their application forms, which they will start in Lesson 6.

Student worksheet 5: Risk factors and teamwork

Activity 1 (5 min): Understanding ethics

What does the word 'ethics' mean?

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Note: A couple of prompt questions, which might help you to answer this question:

- How might the environment be affected?
- How might people be affected?

What sort of ethical issues could you face or risk factors to consider when developing products and solutions, using Science and Technology?

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Student worksheet 5: Risk factors and teamwork

Activity 2 (10 min): Applying ethics

As a group, please identify some of the risk factors associated with your invention.

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How do you plan to reduce the risk factors associated with your inventions?

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Student worksheet 5: Risk factors and teamwork

Activity 3 (10 min): Working as a team

As a group, please reflect on how you have worked together as a team to come up with their ideas, by answering the following questions.

How did you share responsibilities?

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How did you communicate with each other?

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Is there anything you could have done to work together even more effectively?

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Student worksheet 5: Risk factors and teamwork

Activity 4 (20 min): Summarising your ideas (I)

Working in your groups, please answer the following questions, in preparation for a short presentation (up to 3 min) in the next session.

1. What is your problem statement?

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2. Which GSTEP Challenge theme does this relate to?

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3. Describe how your product or solution will tackle this problem.

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4. What makes your product or solution different from existing inventions?

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Student worksheet 5: Risk factors and teamwork

Activity 4 (20 min): Summarising your ideas (II)

Please answer the following questions, in preparation for a short presentation (up to 3 min) in the next session.

5. What are the next 3 steps you are going to take to turn your idea into a reality?

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6. How will your advertise or market your product?

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7. How did you work together as a team?

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8. Are there any risk factors you should consider in implementing your idea? How will you manage these?

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Student worksheet 5: Risk factors and teamwork

Activity 4 (20 min): Summarising your ideas (III)

Note:

- This is a chance for you to bring together all of your ideas and hard work from the last few weeks and share all of your excellent work with your classmates.
- We also encourage you to show the class the picture that they developed in Lesson 3, to help visualise your invention.
- It is important that all members of the group have the opportunity to speak during the presentations. You might like to divide out the 8 questions between your groups to make this exercise easier and quicker.
- You are welcome to have some prompt notes in your presentations, if this helps.
- But most importantly, enjoy this! This is not a test and, rather, an opportunity to celebrate all of your brilliant work.


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