OpenSTEM Africa

INVOLVING ALL

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Ministry of Education

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For information on OpenSTEM Africa see: www.open.ac.uk/ido

OPITO for their generous support, which has made OpenSTEM Africa and the development of the Virtual Laboratory and these materials possible.

Contents

OpenSTEM Africa: Ghana

The overarching aim of OpenSTEM Africa, Ghana, is to make a contribution to Government of Ghana/Ministry of Education policy to the effective teaching of practical science.

Effected by:

1. **Virtual Lab:** onscreen interactive science instruments using real data and with examples of science lessons, to improve the experiential teaching and learning of science in Senior High Schools, helping develop girls' and boys' practical science study skills, and building on the iCampusgh/iBox model developed by CENDLOS.

Underpinned by:

2. **Continuous Professional Development (CPD) for science teachers:** which develops confidence, skills and strategies to enable improved teaching and learning in the sciences, with a particular focus on ICT-based practical sciences, and which supports them in meeting the aspirations of the SHS elective science curriculum (Physics, Chemistry and Biology).

Embedded in Senior High Schools through:

3. **Curriculum Leadership Programme:** for Heads of Department/Heads of Subject, which enables them to effectively implement short- and long-term strategies to improve teaching and learning in the sciences, with a particular focus on ICT based practical science in their school.
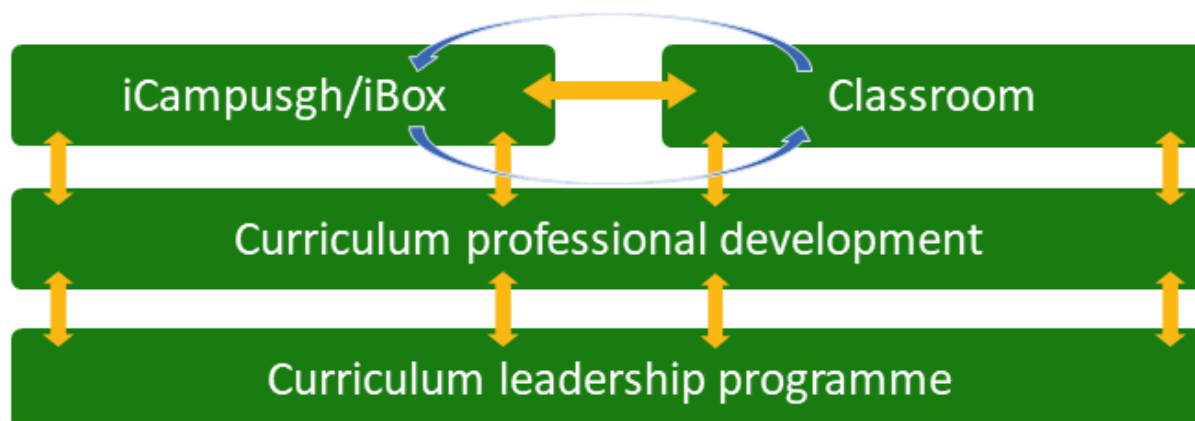
The school-based professional development and leadership programmes will help more teachers use ICT-based science resources more and more effectively, with more learners. The support for school leaders' facilitates the development of a sustainable community of practice in science within the school, led by the Head of Department/Subject Lead and with the support of the Headmaster/Headmistress, in line with National Teaching Council Guidelines.

CPD programme for SHS science teachers

This CPD programme for SHS science teachers is designed by experienced Senior High School science teachers working with Heads of Science and SHS curriculum and Science Resource Centre developers, representing a wide range of Senior High Schools in Ghana. They are working with representatives from the Ministry of Education, from CENDLOS, from the University of Ghana and from The Open University (UK) on OpenSTEM Africa (Ghana).

Improving teaching and learning in the sciences at SHS level is part of the Government of Ghana's *Education Strategic Plan (2018–30)* to enable increasing numbers of SHS students to specialise in the sciences at tertiary level and then move into STEM careers. Government of Ghana policy points to the importance of in-service training for teachers for acquiring new skills and keeping abreast of new developments. The National Teacher Standards for Ghana (MoE/NTC) set out the importance of teachers continuing to learn as they teach and the importance of the school as the location of that learning. Ghanaian research suggests that continuous professional development (CPD) taking place within the school is more motivating, more coherent, more sustainable and likely to be more effective in the long term This is the "growth approach in which teachers are given the opportunity to try new opinions, gain new perspectives, and extend their professional capabilities in order to understand and find solutions to problems in their individual schools" (Asare et al., 2012).

SHS science teachers, particularly those specialising in the elective sciences are already experts in their field. This programme is to enable them to work directly with their Head of Science, or Heads of Physics/Biology/Chemistry alongside their departmental colleagues to further develop the expertise of the whole department in teaching SHS sciences, with a particular focus on ICT-based teaching and learning and to help build a community of practice among science teachers in the school.

Involving all

Introduction

The diversity in culture and in society is reflected in second cycle classrooms in Ghana. Students have different languages, interests and abilities, and they come from different social and economic backgrounds.

> **Reflection point**
>
> Think about the range of languages spoken by you and your students. Think about the variety in their backgrounds, the differences in their upbringing, the distances for some of them from home to school. Think about what this can add to the richness of their learning of the sciences in Senior High School.

Rather than ignoring these differences they should be celebrated, as they can become a vehicle for learning more about each other and the world beyond. A key aspiration of the Education Strategic Plan is:

"Towards supporting all children and youth to progress through the different levels of education in a timely manner; towards a more equity-oriented sector that is defined by free education from KG to SHS; and towards a more responsive and diversified tertiary sector."

(MoE 2018, p.15)

As you know Ghana has an inclusive education policy which supports young people with disabilities in mainstream education. The inclusive education approach is to create an education system that is responsive to learner diversity and to ensure that all learners have the best possible opportunities to learn (MoE 2013/15, pp.5). Senior High Schools and SHS teachers have a very important role in this respect.

As the policy says with regard to Senior High Schools:

- Second cycle schools shall progressively adapt their environments, according to the universal design principle, to make them accessible to all including those with special educational needs.
- All second cycle schools shall make their content of curriculum or programmes of study inclusive and functional for a wide range of student diversity.

As a teacher, you have the ability to influence every student's experience of education in a positive or negative way. Every learner is different, and these differences can help us learn more about each other and the world around us. How you act in the classroom will affect how equally your learners learn. You can take steps to make sure that all learners are involved in learning.

In the sciences, a particular challenge is that students learn and work at different rates. Yet you have a syllabus to follow, and they have school-based and public examinations to take. This unit will help you to develop teaching approaches that will enable you to support all students.

> ☁ **Reflection point**
>
> Think about your own experience of being at school or university. Did you find the work easy or hard? Which teachers or lecturers helped you and made you feel included? What was it that they did that helped you to learn?

By the end of this unit you will:

- have discussed and practised ways of modelling inclusive behaviour in your classroom
- considered teaching approaches that will help you to support all students
- devised ways of supporting students who work at different rates
- have made links between the ideas in this unit and some of the other OpenSTEM Africa CPD units, particularly *Formative assessment*, *Effective questioning* and *Collaborative learning*
- continued to develop your skills in using ICT in teaching and learning, via the final section of this unit.

The CPD units can be found at: https://www.open.edu/openlearncreate/Teacher_units

Three key principles for involving all

- **Identification:** Effective teachers are observant, perceptive and sensitive; they notice changes in their students. If you are observant, you will notice when a student does something well, when they need help and how they relate to others. You may also perceive changes in your students, which might reflect changes in their home circumstances or other issues. Involving all requires that you notice your students on a daily basis, paying particular attention to students who may feel marginalised or are finding the work difficult.
- **Differentiation:** You as a teacher always need to be aware of the range and diversity of children in your classroom, and to be able to meet the learning needs of a wide range of students. All students have their own strengths and weaknesses and all second cycle students have a right to equitable treatment.
- **Adaptation:** If something is not working in your classroom for specific learners, groups or individuals, be prepared to change your plans or stop an activity. Being flexible will enable you to make changes so that you involve all learners more effectively. For example, shorten an activity if it is not going as intended, give students extra time if an activity is going well, or add a new activity if students need more support in understanding a concept.

(MoE, 2013/2015)

Classroom example 1

Mr Ackom was teaching Chemistry to SHS 2. He noticed that Kobena had lost motivation recently. His work was very rushed and he was often late for school. Mr Ackom asked his colleagues if they had noticed anything and Abla told him that Kobena wanted to join the family business – they ran a garage and he wanted to be a mechanic.

Kobena could not see the point of staying at school, even though his parents wanted him to. The next topic was electro-chemical cells. Mr Ackom asked Kobena if he could bring in an old car battery and explain to the class what the various components were. He was very pleased to do so and confidently and clearly took it apart in front of the class, explaining the purpose of the lead plates and showing them how it all connected together.

Developing inclusive attitudes and behaviours

This section describes some approaches that you can use to support all aspects of your work as a teacher, and approaches that you can use in Science lessons.

Being inclusive

Model good behaviour: Be an example to your learners by treating them all well, regardless of ethnic group, religion or gender. Talk to them all respectfully and honour their background, taking account of their opinions when appropriate. Taking responsibility for the classroom is expected in SHS and it is important that everyone in the class is given that kind of responsibility.

Challenge stereotypes: Find and use resources that show girls in non-stereotypical roles and invite female role models to visit the school (e.g. Integrated Science SHS1 Section 1 Unit 1, references a soil scientist, a medical doctor and a geologist – all of whom could be women). Try to be aware of your own gender stereotyping; you may know that girls play sport and that boys are caring, but often this is expressed differently, mainly because there are stereotypical ways of talking in society.

Create a safe and welcoming learning environment: All learners need to feel safe and welcome at school. Think about how the school and classroom might appear and feel to different learners. Think about where they should be asked to sit and make sure that any learners with visual or hearing impairments, or physical disabilities, sit where they can access the lesson. Check that those who are shy or easily distracted are where you can easily include them.

High expectations: All learners can learn and progress if supported appropriately. If some learners are finding it difficult to understand the work you are doing in class, your role as the teacher is to work out how best to help them learn. If you have high expectations of everyone in your class, your learners are more likely to assume that they will learn if they keep trying. High expectations should also apply to behaviour. Make sure the expectations are clear and that learners treat to each other with respect.

There are special challenges for female students studying science subjects. The Government of Ghana includes in its policy objectives to:

"Facilitate sector gender policies to transform gender norms, stereotypes, socialization issues and unequal power relations; focusing especially on educational systems, media, the labour market, and leadership leading to sharing of responsibilities and confronting negative masculine and feminine behaviour…[to] transform gender stereotypes in the school system and support girls to study science related subjects such as IT, mathematics and engineering among others."

(MoGSP, 2015)

National Teachers' Standards for Ghana

The Teacher:

- takes account of and respects learners' cultural, linguistic socioeconomic and educational backgrounds in their planning and teaching.

Examples of the Standards in action

The Teacher:

- investigates and takes notes of each learner's background, acknowledging where they may have gaps in their education, extra domestic work (especially for females), be vulnerable to early drop out and act on this to overcome disadvantage; they know why some learners may have irregular attendance and seek to improve this; they code-switch as appropriate to ensure all can understand lesson content; seat learners carefully to support one another; talk with respect about all learners; draw sensitively on learners' backgrounds in their teaching.

(National Teachers' Standards, 2017)

🖼️ Classroom example 2

Example about a safe and welcoming learning environment, gender stereotyping and high expectations.

Safe learning environment

Miss Kakra was teaching an adaptation of tilapia to its habitat. To make the lesson practical, interesting and real, she brought a tilapia that was freshly caught from its habitat. She split the class into groups and demonstrated to them in turn. She asked them to observe the darker dorsal part and the ventral pale colour of the fish that allows it to camouflage in its environment.

When planning the groups, she remembered that Ebo had previously had a strong reaction to the smell of fresh fish – it made him feel sick. Before the lesson she explained to him what they would be doing and asked him what would be best for him. For example, might it he be OK if the demonstration was outside in the fresh air rather than in a classroom? She also found some photographs of tilapia fish which she downloaded on to her phone and offered him the chance to look at them instead.

Did you notice…

- in this way she did not draw attention to his difficulty, gave him the chance to benefit and involved him in the decision about how best to include him in the lesson.

High expectations

Mrs Sarfo was teaching her students about the mass spectrometer. She decided to use a strategy called 'pair-think-pair-share'. She drew a diagram on the board and used the diagram to explain the steps. When she had finished talking, she wrote the steps on the chalkboard, but put them in the wrong order.

She numbered the steps and divided the class into pairs ensuring that each of the students with a visual or hearing disability were paired with a student who could support them.

- Step 1 was that the pair explained to each other the task (Pair).
- Step 2 working on their own, each student in the pair had to work out the correct order by jotting the numbers on a piece of paper.
- Then Step 3 they compared their answers with their partner in the pair (Think).

If they did not agree, they had to explain their reasoning and agree the correct order (Pair). Then they had to share with another pair and discuss the problem until they all agreed (Share). Once everyone had agreed the correct order, students copied the sequence into their notebooks.

Did you notice…

in this way she used pair work as an opportunity for high achieving students to support those who would find the work more difficult, while maintaining high expectations for everyone in the class.

> ### 🧠 Activity 1: Inclusive behaviours
>
> Working with your HoD and your department, brainstorm the ways in which you all make your classrooms inclusive and implement universal learning.
>
> - Under the guidance of your HoD and drawing on the discussion within the department, compile a list of new activities and actions that you as an individual could adopt in your role as a teacher and adult-role model to be even more inclusive.
> - Think about the classes you will be teaching next week and identify three specific actions that you will take in your classroom.

Being inclusive in Science

Have different types of activities: Students learn in different ways. Some learners like to write, while others prefer to draw diagrams or pictures. Remember that there are numerous examples across the syllabuses where students are asked to draw and to annotate diagrams. Some students like to work alone, others in groups or pairs. Some learners are good listeners and some learn best when they get the opportunity to talk about their ideas. You cannot suit all the learners all the time, but you can build variety into your teaching and offer learners some choices.

Relate the learning to everyday life: For some learners, what you are asking them to learn appears to have little to do with their everyday lives. There are examples across the syllabuses – for example, in Biology there are references to a farm or a garden in the school; in the Chemistry syllabus there are references to Ghanaian industry and mining, and Ghanaian practices such as salt extraction. Try and relate the learning to something that is relevant to them and draw on examples from their own experience. See all the examples in the OpenSTEM Africa unit *Linking science to everyday life*.

The CPD units can be found at: https://www.open.edu/openlearncreate/Teacher_units

Use of language: Think carefully about the language you use. Use positive language and praise. If *you* make unkind comments to a learner, then the others in the class may think it is appropriate to be unkind to others. Also, be aware that technical language can be a barrier to learning. Find ways of explaining and practising new vocabulary, so that you do not inadvertently exclude some students. Also take care not to reinforce gender stereotypes in language – for example when talking about scientists, use 'she' and 'they' as well as 'he'.

> ## Activity 2: Inclusive behaviours in Science
>
> Working with your HoD/HoS and a group of teachers from you own elective science, consider the topic which you will teaching next (an example each from the three elective sciences).
>
> 1. Discuss how aspects of this topic might relate to the students' everyday lives. Can you identify a 'hook' – something that might draw them in and help them appreciate the relevance of this topic?
>
> 2. Draw up a list of technical words associated with that topic. Devise a game or make a classroom display which you could use to test understanding of these technical terms. For example, you could make sets of cards (use old food packets if card is not easily available) which have the key terms and their definitions and then ask students to work in groups to match them up. You could create a set of cards with the terms on one side and the definitions on the other, which students could use to test each other.
>
> 3. Devise three different types of activity that you could use in teaching this topic.
>
> - Is there a question they could discuss in groups?
> - Could the topic be divided up into sub-topics which different groups could research and present?
> - Could students draw and annotate a diagram in groups?
> - Could you organise a practical experiment or use the OpenSTEM Africa Virtual Laboratory?
> - Is there a video or simulation you could use?

Developing inclusive teaching approaches

These approaches will help you to involve all students in the class, to monitor their learning and to plan how to support students with different needs and different levels of attainment.

Questioning

If you invite students to put their hands up, the same people tend to answer. There are other ways to involve more students in thinking about the answers and responding to questions:

- direct questions to specific people in all parts of the room
- give students 'thinking time' and invite them to chat briefly in pairs before you ask for a response
- use pair or groupwork to build confidence, by providing a set of questions to be discussed.

Another of the CPD units in this series focuses on *Effective questioning*, considering the different types of questions that you might ask, different ways of responding to students' answers and the importance of planning effective questions in advance.

Assessment

Develop a range of techniques for formative assessment that will help you to know each student well. You need to be creative to uncover hidden talents and shortfalls.

Formative assessment will give you accurate information rather than assumptions that can easily be drawn from generalised views about certain students and their abilities. You will then be in a good position to respond to their individual needs.

Another of the CPD units in this series considers *Formative assessment* in more detail and focuses on some different ways of undertaking formative assessment.

Groupwork and pair work

As you know, groupwork is referenced in the SHS syllabuses and group exercises are part of School Based Assessment, including group reports and group presentations, so this is something which you are tasked with and encouraged to organise. Pair work is an extension of this idea – a group of two – and there can be particular situations in learning where it is especially helpful for students to work in pairs.

Many students are more willing to talk about their ideas in a small group than in front of the whole class. Group work is popular amongst teachers, but is difficult to do well. Pair work is less common, but is a really good way to practise organising collaborative learning. Well-designed group work and pair work can provide a 'safe space' in which students can test their ideas. For example, if you have introduced a new idea which students need to practise – such as calculations based on the laws of motion – getting students to work in pairs to solve them and then to correct the work of another pair, can provide a powerful learning experience.

Group and pair work are also ways of creating opportunities for students to support each other. High achievers can teach and support those that find the work more difficult and in the process of doing so will deepen their own understanding. Groups can be set different tasks, which is another way of tailoring the work to individual needs. For example, as each group to research a source of renewable energy and then get them to present to the class.

Another of the CPD units in this series considers ways of promoting *Collaborative learning* in the science classroom.

The CPD units can be found at: https://www.open.edu/openlearncreate/Teacher_units

Differentiating work for students of different attainment levels

Students sometimes work and think at very different rates. Some students will learn more effectively by reading a book, some by carrying out a practical activity and some by listening to and absorbing spoken instructions. Some will understand the work very easily, some will take more time. Some will work very quickly through any task you set some will work slowly. It is impossible for you as a teacher to take all the differences into account all the time, but there are things that you can do to support individuals within a class.

If you have a class of 50 or more students, this might sound like a daunting task. There are two important aspects to being able to effectively cater for everyone in your class:

- **Know your students:** You get to know your students better by giving them as many opportunities as possible to work in groups and listen to their conversations. For example, in Biology SHS2 Section 3 Unit 5, students are asked after a field trip to

discuss the natural resources they observed prior to making group presentations on the topic. You also get to know your students by marking their written work, by asking questions of individuals in class and by encouraging them to ask you questions if they don't understand or just want to know more. Always look to add to your knowledge about who understands easily, who finds science difficult, who likes to talk, who likes to write, who likes to draw and who likes doing experiments, and you will be in an increasingly better position to help individuals.

- **Know your subject:** It is unrealistic to expect everyone to remember and understand everything that you do. Breaking down each topic into simple steps will help to make sure that everyone understands the most important ideas. Knowing how to challenge students who have grasped the basic ideas is also important. Frequently checking understanding in innovative and friendly ways is also helpful.

Activity 3: Identifying key concepts

For you and for some of your students, the quantity of material that you need to cover, and that they need to learn can be daunting.

It will be easier to cater for different levels of attainment if you are clear in your own mind about the fundamental concepts needed to pass the exams and the extra materials that those aiming for the top grades will master, then you will be able to present the ideas more clearly.

For example in Chemical Bonding (SHS 1, Section 3):

All students need to be able to describe the different types of interatomic and intermolecular chemical bonds and give some examples, but the details of hybridisation (Unit 3) are demanding. Do the students need to understand all the details of hybridisation?

Working with your HoD, for the next topic you are due to teach, identify:

- what students need to know and understand to pass
- what a mid-grade students needs to know and understand
- what a top-grade student needs to know and understand.

Check your lesson preparation against this and ensure that the fundamental concepts are well presented and that you have strategies for challenging students to reach the top grades.

In your teaching you will be setting tasks to do in the lesson and for homework. You can cater for the range of attainment levels within your group in two main ways:

Differentiating and adapting by outcome

This involves setting some questions that get progressively more difficult. Everyone gets as far as they can. Alternatively, you can set open-ended tasks in which students demonstrate what they can do. This also enables you to give them a choice about how they present their work, which can be very motivating. You may find that the degree of support that you need to

provide to individuals, pairs or small groups within the class varies significantly.

Differentiating and adapting by task

For this, you set different students, or groups of students, different tasks. For example, in a practical session some pupils could have instructions provided for them in written form and some could have them in diagram form and some could have a combination of both.

You could provide a set of questions that cover the basic ideas that you judge that everyone needs to understand and a set that are more challenging. The students who you expect to get a top grade could be given the more challenging ones.

Classroom example 3

Patterns in Group 1 (SHS 1, Section 2, Periodicity)

When she finished her training, Mrs Panyin found a job in a SHS near to the University of Education Winneba (UEW). When she was teaching her students about the periodic table, she borrowed a laptop from the university. She went to an internet café and downloaded video clips of the reactions of lithium, sodium, potassium, rubidium and caesium with water. She showed her students the clips of lithium and sodium and asked them to predict how the other metals would react.

She divided the students into groups according to their attainment levels. She encouraged the students to work together to describe what they thought they would see in as much detail as possible, to explain the reactions and write equations. She worked with the group who she knew would find these ideas demanding, provided extra explanations and supported them in writing the equations. Later, she showed the class the reactions of potassium, rubidium and caesium so they could see if they had predicted correctly.

The group of students who usually struggled with chemistry had done very well and produced accurate descriptions of the reactions. They confidently explained their predictions to the rest of the class. Later on, when they were revising the equations for the exams, even though they found them difficult, this group remembered the lesson and were very motivated to try and understand the equations.

Activity 4: Planning for differentiation

Having worked through this CPD unit, plan a lesson in which you differentiate the work to allow for different attainment levels or different ways of working.

Teach your lesson and if possible, arrange for your Head of Department/Head of Subject or a colleague to observe the lesson.

- Ask them to focus their observation on particular students and how they respond to the lesson.
- With your observer, or with a colleague, reflect on how the lesson went and the extent to which you were able to involve all your students.

Using ICT to transform learning

In this section, you will explore some strategies for using ICT to involve everyone.

Activity 5: Using ICT to involve all students

When you are using a science application from the OpenSTEM Africa Virtual Laboratory (see below for general guidance), you could divide your students into pairs in order to work through an experiment using the application, so that they could discuss questions about the experiment in their pair.

Think carefully about how to divide your students and plan in advance. For example, you could pair students of different attainment levels so that high achievers can provide peer support to others those who may be struggling. This will also help their understanding.

Alternatively, you could pair high achievers together, and also prepare a few higher-order, open-ended questions that will challenge them to extend their understanding. You could concentrate your efforts on supporting those that need more help.

You may want to divide you class in male pairs and female pairs for this activity, if you feel that girls in your class are sometimes marginalised when they are in mixed gender pairs or groups. In this way, working on an experiment in the OpenSTEM Africa Virtual Laboratory will help you to meet the needs of all your students.

National Teachers' Standards for Ghana

Examples of the Standards in action

All teachers have good technological pedagogical knowledge, knowing how to incorporate ICT into their practice to support learning.

(National Teachers' Standards, 2017)

Lesson planning using ICT

Activities 6, 7 and 8 will help you to think about the effective use of technology and how to make it transformational. Information and communication technology (ICT) provides a great opportunity to make lessons and learning more interactive, and at the same time help students engage in 21st century skills that are relevant for their studies and future professional lives. Selecting and integrating a range of ICT in your lesson requires careful consideration and thought.

Activity 6: Using ICT to transform learning

Think of a science topic that you will be teaching next week.

Imagine that you and your students could have access to any technology that you wished.

- How could you use the technology to support how you would normally teach this topic?
- How could you use technology to achieve the same learning but in different ways?
- How could you use technology to provide learning opportunities that would otherwise not be available?

As a subject or departmental group and under the guidance and support of your Head of Department, collect all your ideas for the points above on to a flip-chart and keep it as a resource to support future planning or to inform the individual coaching sessions you will be having with your HoD.

OpenSTEM Africa Virtual Lab Applications

Practical science

The practical science applications in the OpenSTEM Africa Virtual Laboratory such as the fine beam tube and the mass spring system being introduced are designed to help you to teach your students practical science in the absence of other reliable equipment.

With each instrument there is an example lesson plan, demonstrating how it might be used to support science learning.

The instruments could be used to:

- introduce a topic
- deliver the main content of a lesson
- consolidate key concepts and ideas
- teach practical skills
- help students solve problems you have posed
- encourage critical thinking
- relate science to everyday life.

Working with your Head of Department, take a look at the fine beam tube or the mass spring system and the lesson plans. Consider:

- what practical skills the students will learn
- how the engagement is being used
- alternative ways in which the engagement could be used.

As more apps in the Virtual Lab become available, work with your Head of Department and colleagues to develop more example lesson plans.

Activity 7: Planning to use the Science apps

Work with your HoD to plan activities across the whole department for using the Science apps. For example, you might work with a colleague to choose one of the apps to investigate, work through the exemplar lesson and discuss how it would work best in your school with your students.

OpenSTEM Africa Virtual Lab
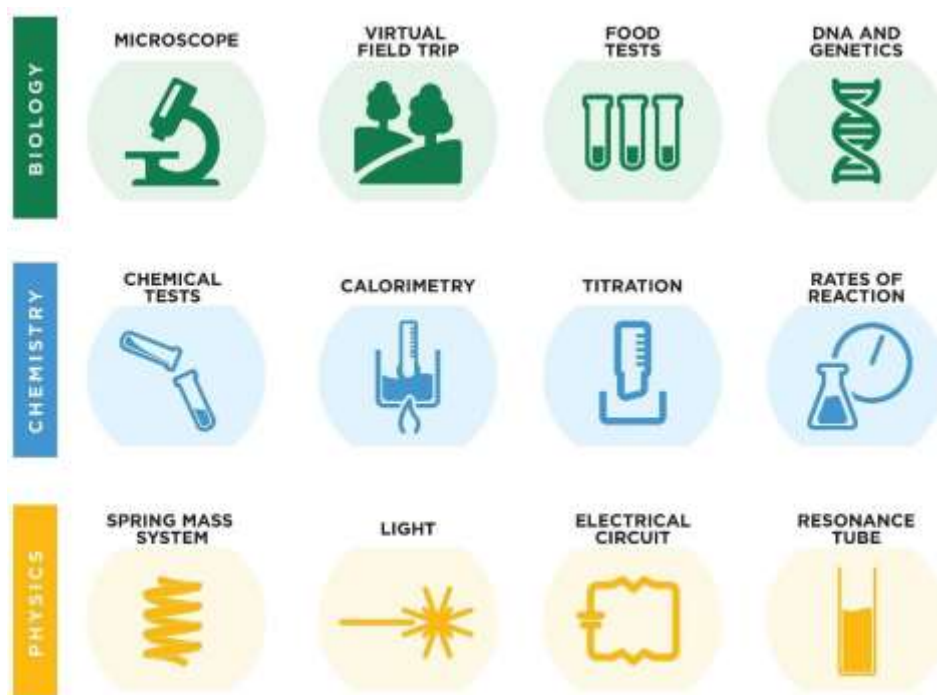
The OpenSTEM Science apps in the Virtual Lab have been developed collaboratively by CENDLOS, GES and a group of SHS teachers in Ghana and The Open University (UK). They cover a range of experiments highlighted in the SHS elective science syllabuses. Students can interact with the experiment individually at home if the internet is available, or at school if sufficient computers are available. They might benefit more from the experience if they work in twos or threes, so they can discuss the issues and work together to solve problems.

With each Science app there is at least one possible exemplar lesson. These are intended to highlight the possibilities for teaching a lesson rather than anything prescriptive. It is expected that at first you might follow the example as suggested, but you could move towards developing your own plans as you become more familiar with the apps. They have all been designed to be relevant at various points in the syllabus, or over a few weeks of work, so that there is extended opportunity for students to interact with the materials.

Lesson planning using iCampusgh and the iBox

Activity 8 will help you to think about the effective use of technology and how to make it transformational.

Activity 8: Examples of using the iCampusghand the iBox

Teachers in Ghana are using the iBox and iCampusgh, which have been developed by CENDLOS, in a number of ways:

1. **Catch up** – students who have missed lessons are able to access the material at home or in the ICT lab and go through what they have missed.

2. Using the **video** lesson interactively – the teacher plays the video lesson to the class but stops the video periodically to ask questions or to set up a short discussion between the students about one of the issues raised.

3. **Flipping** – students work though the lesson on iCampusgh at home in advance of the classroom lesson. The teacher then organises a series of activities in groups or pairs designed to probe students' understanding. Through careful questioning, peer-support groups can be established and the teacher can focus on those who need the most help.

4. **Note-taking** – the teacher displays the notes and students work in pairs or groups to convert the notes into alternative formats such as poster, a mind- map or a concept map. While they work the teacher walks around asking questions and checking individuals' understanding.

5. **Teacher absence** – the teacher knows that they will be absent on a particular day so arranges for the class to access the lab and work through a designated lesson.

Classify each of the above as:

1. supporting learning as usual

2. extending learning

3. transforming learning.

Reflection point

At the start of the unit, three general principles for inclusive teaching were highlighted:

identification, differentiation and adaptation.

Reflect on your own teaching over the last few weeks and identify instances when you have demonstrated these principles in your teaching. Think about any opportunities you may have missed and how you can plan for these in the future.

Summary

This unit has encouraged you to think about your behaviours, your attitudes and your teaching. You will not be able to involve all your students in every lesson, but overtime it is possible to make all students feel included, through a variety of approaches including the ones in this unit, and the CPD units *Formative assessment*, *Effective questioning* and *Collaborative learning*.

The CPD units can be found at: https://www.open.edu/openlearncreate/Teacher_units

The inclusive behaviours described in the first part of this unit, apply to all teachers and are reflected in the way the school in organised. Continue to work with your Head of Department all colleagues to review inclusivity in your department and school to see how it can be improved.

The ideas in this unit will help you to fulfill the principles of the The Universal Design for Learning (UDL), set out in the Ministry of Education's *Inclusive Education Policy* (MoE 2015).

These principles are:

- multiple means of representation, to give learners various ways of acquiring information and knowledge
- multiple means of expression, to provide learners alternatives for demonstration of what they know
- multiple means of engagement, to tap into learners' interests, offer appropriate challenges, and increase motivation.

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