



DESIGNING AND IMPLEMENTING CPD PROGRAMMES



Acknowledgements



Ministry of Education

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



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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:

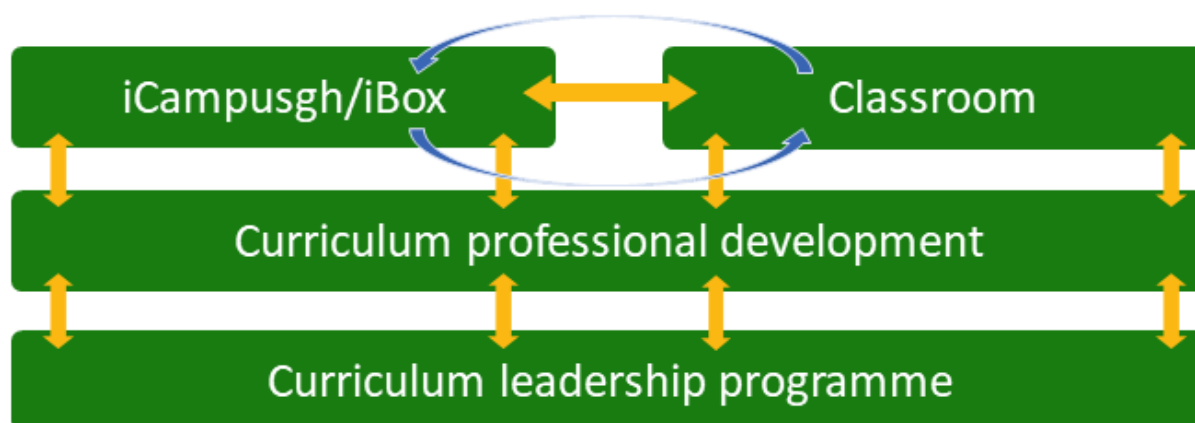
1. **Virtual Lab:** onscreen interactive science instruments using real data and with examples of science lessons, to improve the experiential teaching and learning of science in Senior High Schools, helping develop girls' and boys' practical science study skills, and building on the iCampusgh/iBox model 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/Head of Subject and with the support of the Headmaster/Headmistress, in line with National Teaching Council Guidelines.

Curriculum leadership programme

This curriculum leadership programme is designed by experienced Senior High School 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 GES, from the University of Ghana and from Open University (UK) on OpenSTEM Africa (Ghana).

Improving teaching and learning in the sciences at SHS level is part of the Government of Ghana *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).

The role of Head of Department is key to enabling this kind of teacher development to thrive. Heads of Science, or Heads of Physics/Biology/Chemistry already take responsibility for the professional practice of the teachers in the department. This programme is to enable these leaders to organise individual and group support to those teachers, to share their own expertise in the sciences, to lead on the development of skills among their teachers) with a particular focus on ICT-based teaching and learning) and to lead on building a community of practice among science teachers in the school.

Your role as a Head of Department in transforming STEM education

As a Head of Department, you are a middle leader and your role is a combination of leadership, management, administration and teaching. Your leadership role requires you to focus on your own expertise and that of your colleagues, with a commitment to continuing professional development (CPD) for all. You must pay attention to everyone’s professional and personal growth, with respect to teaching and learning.

In your classroom

As a subject expert, you are expected to model exemplary practice in your own teaching and learning. In the classroom, you are continuously developing your capacity to make lessons exciting, engaging and ultimately make science interesting for your students. The range of materials created to support the OpenSTEM Africa programme will provide key resources for you and your staff.

In your school

As Head of Department, you have the management responsibility of observing others teach and providing critical and constructive feedback on aspects of their work. This is a great opportunity to influence practice by drawing your colleagues' attention to good practices in STEM teaching and learning. This may be through formally organised professional development sessions for a group of teachers, or through one-to-one interactions with colleagues.

The aim of the OpenSTEM Africa CPD programme is to support the development of a “community of practice”. As you will know, the National Teachers' Standards for Ghana place community of practice as within the domain of teachers' professional values and attitudes' and give the following definition:

“A group of teachers who share a concern or passion for the teaching profession and learn how to do it better as they interact regularly.”

(NTC 2017, pp. 51)

The community needs to be a safe space in which science teachers feel supported and enthusiastic about developing their practice, in order to improve learning. In a “community of practice”, learning is seen as a joint enterprise of negotiation and reflection, taking place through mutual engagement in practice, with all participants being valued equally (Wenger, 1998). The conditions required for a 'community of practice' are:

- engagement in action (which will come through the activities in the CPD units),
- shared knowledge (which will come through discussion, and reflection on practice),
- interpersonal relations based on mutual respect and support.

Your leadership role is to create the conditions for a community of practice to develop. You will be a facilitator and supporter, rather than inspector and monitor. This programme is designed to develop your skills in this area, with other units including *Coaching your Science teachers*, *Being an effective Head of Department* and *Embedding the use of ICT across your department* (https://www.open.edu/openlearncreate/HoD_units).

Beyond the school

As a “critically reflective practitioner” (NTC 2017 pp. 16) it is important to recognise your science department as more than an administrative unit within a school. Your department should be conceived as community that involve practitioners who can have great influence on teaching and learning in the school and beyond. So, connecting with STEM educators beyond your school boundaries, and with employers and advocacy groups, is a great way to extend opportunities for you staff and students. This could involve school visits to STEM employers, inviting guest teachers from other schools, inviting STEM role models from business and public life into school to talk to students, STEM career days, science fair or STEM project exhibitions etc. Your role here is to make learning and teaching of STEM-based subjects very relevant and practical for your students.

Designing and implementing CPD programmes in your school

Introduction

Teachers are an important asset to any nation, therefore attention to their development should be a fundamental aspect of nation building. In Ghana, 90% of teachers in SHS are considered as trained teachers; however, reports suggest that ‘this does not seem to be translating into good-quality learning outcomes’ (Education Strategic Plan 2018–2030, pp. 32). Therefore, effective continuing professional development for teachers remains a core part of securing effective and outstanding schools.

This unit is to assist middle leaders (HoDs/Subject Heads) to design and implement professional development programmes effectively in their schools. You as an HoD/Subject head are the first supervisor of the curriculum, and require knowledge skills and values to monitor the full implementation of government policies and standards. In this unit, there are guidelines to do a need analysis and to design a learning and teaching package for science teachers/educators. It also provides suggestions on how you can monitor and evaluate your CPD programmes

By the end of this unit, you will be able to:

- design programmes to support teacher professional development in your school
- design a learning and teaching package for science teachers
- evaluate CPD programmes and take necessary action to enhance programme
- link, where appropriate, to the OpenSTEM Africa CPD units.

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

During your work on this unit, you are encouraged to make notes – just for your own use so that you collect together your thoughts and plans in one place. You could do this in a notebook or on a computer or laptop. You may be working through this unit alone or as a group; either way it is good to discuss your learning with peers to help foreground some of the ideas you will be introduced to. This can be done in an organised way or on a more informal basis, but it is good to model the practice of collaborative learning as it forms part of the OpenSTEM Africa learning strategy.

What is professional development?

Continuous professional development (CPD) at the workplace can be described as learning that aims to help someone improve their practice and professional capabilities, therefore, would typically, encompass a range of concepts and ideas that focus on experiential learning and behaviour change (Eraut, 2007). In the school context a professional development programme is likely to involve many activities designed to sustain and embed practice, including, but not limited to: individual and collaborative teacher activity; reflection processes, expert input, whole- school leadership, and well-designed formative assessment and evaluation (Avalos, 2011).

Evidence suggests, for example, that a one-day course as a stand-alone activity without a specific focus is unlikely to have a lasting impact on student outcomes. That same course, however, could be used to much greater effect as part of a sustained, coherent programme which includes structured, collaborative in-school activities for teachers to refine ideas and embed approaches. Teachers' professional development cannot exist in isolation; it requires a prevalent culture of scholarship with a shared commitment for teachers to support one another to develop so that students benefit from the highest quality teaching. The thousands of professional decisions that must be made every day need to be informed by the best evidence, knowledge and professional wisdom (Hargreaves and Fullan, 2012).



Activity 1: Organising meetings

Senior High School teaching is exciting but also challenging and very busy. The increase in student numbers means that there are some large classes to prepare for and government priorities mean that all teachers need to keep up to date with new initiatives. Regular collaboration and teamwork among teachers, and an enthusiasm for hands-on, regular professional learning is important but we also need to address the practicalities of organising school-based CPD.

Consider the most effective ways of bringing your teachers together to agree plans for CPD.

- Why might it sometimes be better to hold a full meeting, including all teachers in the department, and when might it sometimes be preferable to hold a smaller and more specialised group meeting?
- When are the best times in the day/week to hold meetings? At break/lunch times or before/after school? How long can your meetings last? Are there times when it might be possible to provide food?
- Where are the best places to hold a meeting? When might you want to use a laboratory, the ICT lab, or a particular spot in the school grounds?

A reminder that the National Teacher Standard for Ghana specifies competencies which are continually developed through a teacher's professional life providing 'the framework for future professional and career development for all teachers' (NTC, 2017).

National Teachers' Standards for Ghana

The Standards are divided into three main domains, each with its own sub-divisions:

Professional Values and Attitudes

- Professional Development
- Community of Practice

Professional Knowledge

- Knowledge of Educational Frameworks and Curriculum
- Knowledge of Learners

Professional Practice

- Managing the Learning Environment
- Teaching and Learning
- Assessment

These three domains and aspects encompass what teachers should value, know and do, and intersect with one another ... as illustrated in the Venn diagram where the synthesis of the three domains represents a competence or competences.



Reflection point

Consider

- national priorities for teacher continuous professional development (CPD)
- the needs of your own school at this moment in time
- interests and enthusiasms raised by the teachers in your department.

What kinds of professional development would help the teachers in your department?

Are there ways of addressing national priorities while also meeting some of the most specific needs of your own school and the most urgent needs of your own department?

Comments

	Domain 1 Professional values and attitudes	Domain 2 Professional knowledge	Domain 3 Professional practice
National teacher standards	Community of practice		
Needs of my school	Build my school's capacity to develop early career teachers and create a learning community that is professional and open to sharing our learning and challenges		
What can I do about it?	E.g. Develop a mentoring and coaching system <ul style="list-style-type: none"> • Build a culture of communal learning • Develop/create opportunities to share good practice- formally and informally • Set up a structured CPD programmed that draws on collective knowledge 		

Why a school-based approach to teacher professional development?

Teachers and educators are always learning, so there is no single way of organising continuous professional development. However, school-based professional development is increasingly being adopted as a more effective way of supporting teachers. This is because the learning and development is situated close to their work setting and therefore, they are able to immediately apply their learning to their practice (Eraut, 2011).

Whilst your role as head of department and subject leader offers great opportunity to champion CPD in your school, you know that the full support of your headmistress/headmaster will help to ensure the success of any CPD you want to introduce.

To ensure you have buy-in from all stakeholders, your school-based approach should:

- be underpinned by robust evidence and expertise
- include collaboration and expert challenge
- have a clear focus on improving and evaluating student outcomes
- be sustained over time.

The following table provides suggestions.

Draw on robust evidence and expertise	Built on collaboration and expert challenge	Focuses on improving and evaluating student outcomes	Embedded in school development plan to ensure sustainability
<p>It is important to be explicit about the evidence underpinning practices and how and why practices are intended to work.</p> <p>Data on lesson observations can be used effectively here.</p>	<p>Work with guidance of the headmistress/headmaster in the school so that there are multiple opportunities for teachers to practise.</p>	<p>Are clear about the expected impact of their offer on teachers and students.</p>	<p>Be explicit about the commitment required by teachers and the whole school leadership team to make sustained changes in practice.</p> <p>Incorporating your professional development approach(es) into the school development plan is always a good idea.</p>
<p>Always provide opportunities to draw out and constructively challenge</p>	<p>Support structured collaboration and discussion about the impact on students' learning.</p>	<p>Request information about their teachers' prior knowledge, experience and goals and use this</p>	<p>Support teachers and heads of subject (where they are in place) to sustain and embed change</p>

<p>teachers' existing beliefs.</p> <p>This can be achieved through coaching conversations and is very important if you are going to help move their practice(s) forward.</p>		<p>in the design of their activities to secure progression.</p>	<p>and link short activities into a sustained programme.</p>
<p>Actively seek robust and independent evaluations of your programmes to demonstrate impact on intended outcomes.</p>	<p>Use external perspective where appropriate (e.g. the GES Science Resource Centre, teacher educators from universities, university colleges of education, etc.) to challenge current orthodoxies, raise expectations and introduce evidence-informed practices.</p>	<p>Provide tools that help teachers' change their own practice and evaluate its impact.</p>	<p>Try to ensure that the supporting components (e.g. time, place) do not detract from the achievement of professional development objectives.</p>

Adapted from Coldwell et al., 2017.

As middle leaders and heads of department, you have role to play in the design and implementation of programmes that will support and enhance teaching and learning practices in your school.



Reflection point

Review professional development activities that have taken place in your science department, and more widely in your school, in the last 2–3 years. Drawing on the four broad areas discussed earlier to what extent were the activities

- Underpinned by evidence?
- Built on collaboration and expert challenge?
- Focused on improving and evaluating student outcomes?
- Embedded in school development plans to ensure sustainability?

Carrying out a training and development needs analysis/CPD audit

The first stage of designing a CPD programme is to conduct a training and development needs analysis or CPD audit. Carrying out a learning audit means systematically identifying and evaluating the specific needs of teachers and learners. This audit (also called a needs analysis) will differentiate between the current situation with respect to teaching and learning, and the desired outcomes. It determines the evidence about the current situation (including good practices) and shows the aspects that would benefit from improvements. It should also clearly define the needs by collecting evidence of what is needed. There may be several needs from the analysis. However, a priority list will determine the order in which to address them.

The following activity provides some suggestions that could help in gathering the necessary evidence in your audit.



Activity 2: Carrying out a training and development needs analysis/CPD audit

Ask yourself the following questions:

What is the current situation in my department with respect to teaching of individual lessons, learners' performance, organisation of practical lessons – are they the best practices? are teachers and learners achieving the objectives of the curriculum? (e.g. of integrated science, of the elective sciences)

- Where is the outstanding practice(s) in my department? What is the evidence to support this?
- Which lessons are not working particularly well? What teaching approaches are used by these teachers? Where did I get evidence to support this?
- How can I prioritize the professional development needs which have been identified?

For example, you could:

- workshop the above questions at a departmental staff meeting
- give a simple questionnaire to learners and teachers
- interview learners/teachers (you may want to focus on teachers if your school does not already have such a system to receive feedback from students)
- use lesson observations to look at question techniques, lesson introduction, class control, extent of engagement of learners, gender perspectives
- (e.g. equal engagement of female and male students, equal attention? sharing of equipment during practical sessions?)
- assess schemes of work and lesson notes
- look at attendance records of teachers and learners
- review internal and external exam results
- look at students' notebooks, exercise books, sketch pads etc.

Designing a learning and development package for science teachers/educators

Professional development that aims to change teachers' practice is most effective when it includes collaborative activities with a focus on the intended student outcomes. In particular, effective professional development:

- builds-in peer support for problem solving
- includes focused discussion about practice and supporting groups of students with similar needs
- challenges existing practice, by raising expectations and bringing in new perspectives
- includes support from someone in a coaching and/or mentoring role (you!) to provide modelling and challenge.

Although the CPD package may include one-off/discrete sessions, the learning gains from these one-off events should contribute to the overall learning package over a sustained period. You will recall earlier that we identified four key issues that could underpin your CPD plan/package:

- be underpinned by robust evidence and expertise;
- include collaboration and expert challenge;
- have a clear focus on improving and evaluating student outcomes;
- be sustained over time.

Here are some practical steps to consider in drawing your CPD plan together:

PREPARATION/PLANNING	
Establish a purpose	Create a sense of purpose, urgency and enthusiasm about sharing good practice as well as tackling those real problems which have prevented progress in the past. Ask what and who may support progress in your department, what and who may be preventing progress, and who can really help in unblocking it.
Organise the practicalities	Address from the outset the ordinary challenges of getting your teachers together as a department. This might typically involve finding the right time when they are all available, and finding the right space in which to meet and work together. The solution might include using break times or working lunches, meeting in laboratories or classrooms, meeting with smaller subject groups (e.g. Physics or Chemistry), and in the longer term building into the timetable additional or longer subject and departmental meetings.

Logistics available or needed	<p>Use this information to set up a group of facilitators/resource people. These may be the Head of ICT, Heads of Subject in your department, experts in particular teaching practices in your school etc. This group will include the key people involved in designing and delivering a range of practical session as well as helping you to continue supporting colleagues throughout the year.</p> <p>NB: Support from your Headmaster/Headmistress is always key to success. Their support should include planning and budgeting if support from other departments and/or funding is needed.</p>
What approach will you use for the training (coaching, seminars, co-design, activity-based, online, face-to-face, etc.)?	<p>With your department, decide on an approach that is fit for purpose and agree the number of sessions that all involved could commit to.</p>
Date, venue, time and duration	<p>The CPD plan needs to be clear before you begin. Every new programme/ initiative needs a start date and a finite time-span, (3 months, half a school year, the whole school year?) regardless of whether it is being introduced incrementally or simultaneously across the different subject areas.</p> <p>The schedule must be challenging enough to convey urgency, but attainable enough to be motivating.</p> <p>Draw up detailed implementation plans with each subject area (Physics, Chemistry, Biology, etc.) having a clear set of activities.</p> <p>Remember that your following CPD plan needs to build on this one – learn from its successes (and failures!) so that all plans and programmes cumulatively build that sense of community of practice.</p>
Programme outline	<p>It always important to set out a clear programme outline so participants know exactly what to expect.</p> <p>For example you may choose to draw on the material from the OpenSTEM Africa teacher CPD unit on Using ICT to support learning.</p>

	<p>In this case the clear learning outcomes would include:</p> <ul style="list-style-type: none"> • understanding that integrating ICT into learning and teaching is a pedagogical issue rather than a technological one • understanding the sort of pedagogy required to be able to successfully integrate ICT into your classroom teaching • have thought about how ICT can enhance and transform teaching • collect a number of practical examples which you can develop and adapt for your own teaching. <p>However, you must also allow some flexibility and opportunity to integrate new outcomes based on how your participants are responding and progressing throughout the professional development session(s).</p> <p>See below for more specific guidance on using the OpenSTEM Africa CPD units.</p>
Programme	
Setting up the venue	<p>If the session is going to be face to face always ensure you have checked the location (classroom? lab? office?) prior to the start of any session in the programme in order ensure the room is set-up appropriately and all equipment you need is in working order and ready. If the session involves breakout sessions, it is important to ensure the rooms for breakout sessions have also been set up appropriately.</p> <p>If the session is going to be an online session, you should login into the online room/portal in advance to ensure access and permissions have been set up as expected and that you're your teachers have the right access and permission to take part.</p>
Safety of participants	<p>If your session is 'beyond the school' and for example involves participants other than teachers coming into your school, or you are leading a session outside your own school, then you may need to</p>

	<p>explicitly ensure that everyone understands appropriate health and safety measures. This includes safeguarding measures, e.g. if it is in another school when students are present. You may yourself have attended sessions where at the start, the facilitator takes you through a brief set of health and safety instructions, points out all the fire exits and assembly point. This is a very important requirement and you are advised to do same for this kind of face to face session.</p> <p>If the session is online, you should point out issues about internet etiquette and confidentiality and safety of participants views/voice. It is also important that all voices are given equal online time, including women's, and younger people.</p>
EVALUATION	
<p>Diagnostic questioning techniques to elicit response from participants</p>	<p>Critically reflect and evaluate the progress of the programme against the goals established in your original plan.</p> <p>Be honest in your assessment of progress. If there is a real divergence between the planned goals and reality, take corrective action quickly. Be open about areas that didn't work and involve colleagues in setting new targets or devising new measures.</p>

You may also consider working through the NTC priorities for promotion (See NTC, 2017 pp. 36–43).

Designing and implementing CPD using the OpenSTEM Africa materials

The OpenSTEM Africa CPD units for teachers are designed to be used as part of a coherent CPD programme, or as standalone units for specific ideas which are consistent with your needs analysis. They are all created to be led by you as Head of Department/Head of Subject, working with your teachers.

A full list of the CPD units with hyperlinks to each unit (if you are accessing them online) is available here: <https://www.open.edu/openlearncreate/mod/page/view.php?id=185616>

Each of the units can be used in a variety of ways and provides material for several weeks of CPD, depending on the departmental need, and how often you can meet to plan, review, refine and evaluate new practices. They each have a clear, stated purpose and a set of learning outcomes which make clear what teachers can expect to learn.

Each of the CPD units includes:

- teaching examples taken from Ghanaian SHS classrooms
- curriculum-focused activities for the teacher to carry out with the class
- reflections for the teacher.

Here is an example of an activity with a focus on pair/groupwork for a teacher to try out with their class, with a follow up activity which would be a collaborative exercise led by you as HoD/HoS. Groupwork is a practice included in the NTC Teaching Standards.



Activity 3: Teaching and learning

Here is an example of a Teaching and Learning Activity from Biology SHS3 Section 1 Unit 1 that could be used in the classroom.

- If possible, in your locality, send students outside to collect examples of a monocotyledonous and a dicotyledonous plant
- Organise your class into pairs. Ensure each pair has a monocotyledonous and a dicotyledonous plant.

Ask each pair to examine the structure and function of their plants. If you have access to microscopes, or if you and your students can use the OpenSTEM Africa virtual microscope, have your students examine the sections of the plants.

Draw the structure of the plant and label the parts of the plant. Brainstorm the function of the roots, stems and leaves.

- How is the plant pollinated?
- Do insects visit the plant?
- Does the pollen hang on stamens outside the flower?
- Is it in a windy place?
- What are the main differences between a monocotyledonous and a dicotyledonous plant?

When each pair or group is ready, select two pairs to explain their answers to the class.



Activity 4: Pair work activity

Working with your Head of Department/Head of Subject and if possible alongside a colleague a colleague, discuss the example above by considering the following questions:

- Where could you direct your students to find more/different examples of monocotyledonous and dicotyledonous plants in your local area?
- How would you choose to put your class in pairs for this sort of activity and why?
- Are there any questions or instructions you would change or include?
- What would students learn as a result of taking part in this activity?
- How could you as a teacher use formative assessment during this activity to support learning?

More generally with the OpenSTEM Africa CPD units, there are opportunities to invite fellow HoDs or expert teachers within your own department to facilitate relevant types of discussion. For example, access to the virtual microscope mentioned in the first activity above could be demonstrated by the Head of ICT in your school, or there might be a teacher in your department who is particularly skilled in the use of technology who would welcome the opportunity to share their expertise.

Evaluating and refining your school-based teacher development programme

It is always helpful to critically reflect on your teacher development programme especially if it is one spanning months or even a complete school year. Think about criteria for reflection.

These might include how you could reflect on:

- The success of individual CPD sessions for the department/group of teachers.
- The specific and different ways in which this CPD is developing each individual teacher involved.
- The gender perspective: have women and men been equally able to participate? Are there specific issues for women which need to be addressed?
- The progress of the CPD programme – e.g. by month or term of semester.
- The ways in which this CPD programme is connecting to and building on previous CPD in your department or in the school.
- The ways in which this CPD programme connects to other CPD in your school which is running at the same time.
- The ways in which this CPD programme is fitting into current national priorities.

Critically reflect on each CPD session to identify the aspects that went well and others that didn't work particularly well. As a HoD this will help you refine the programme and ultimately help shape subsequent programmes so that everyone gets the best out of your CPD sessions.

Use your critical reflections on the ways in which this CPD is helping to develop an individual teacher to link to your coaching of individual teachers in your department

Ask your participants each session and/or at key milestones in the programme to critically evaluate the CPD.

One way of doing this is through informal oral feedback at the end of a session; another asking all participants to complete a short piece of written feedback that solicits information such as:

- Have your expectations been met?
- Which aspects of the CPD are working well?
- Which aspects of the CPD are not working so well?
- What can we do to improve on it?

The format of the evaluation form should be made as simple as possible and if necessary anonymised so participants are able to give constructive feedback without feeling their views/feedback would be seen as negative.

As explained on page 14, be honest in your assessment of the feedback elicited. If there is critical feedback that shows a divergence between what you planned to achieve and the reality of the response from your department, take the necessary steps to improve/correct them. Be open about areas that didn't work and involve colleagues in setting new targets or devising new measures. See appendix C for an example of a feedback form.

Summary

This unit has provided some insights and guidance to middle leaders (HoDs/Heads of Subject) on how to design, implement and evaluate CPD programme(s) effectively in their schools. The unit provides guidelines on how to conduct a need analysis and design learning and teaching package for science teachers/ educators. It provides suggestions on how you can monitor and evaluate your CPD programmes. The exemplars provided in the appendices should be seen as examples and not an illustration of what should be done in your school. You are expected to adapt them to suit your context.

A full list of the Head of Department units can be found at:

https://www.open.edu/openlearncreate/HoD_units

A full list of the CPD units can be found at:

https://www.open.edu/openlearncreate/Teacher_units

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NTC (2017) National Teachers' Standards for Ghana Guidelines MoE/NTC.

Appendix A: Training and development needs analysis exemplar

This template is to help you assess the current situation in your department with respect to lesson delivery, students' performance, organization of practical lessons – are they the best practices? are teachers and learners achieving the objectives of the curriculum? (e.g. of integrated science, of the elective sciences).

	Domains of professional development specified in National Teaching Standards		
	Professional Values and Attitudes	Professional Knowledge	Professional Practice
	<ul style="list-style-type: none"> Professional development Community of Practice 	<ul style="list-style-type: none"> Knowledge of educational frameworks and curriculum Knowledge of learners 	<ul style="list-style-type: none"> Managing the learning environment Teaching and learning Assessment
What "needs" will be addressed by the CPD package? What knowledge, skills, and abilities are being considered?			
Where is the outstanding practice(s) in my department? What is the evidence to support this?			
Which lessons are not working particularly well? What teaching approaches are used by these teachers? Where did I get evidence to support this?			
Who needs to be trained?			
Who can serve as subject matter experts?			

Acknowledgements

Grateful acknowledgement is made to the following sources.

logo_Ghana-MoE: Ghana Ministry of Education

logo_CENDLOS: CENDLOS

logo_OPITO: OPITO

venn-diagram_professional-know-values-practice (p6): National Teachers' Standards for Ghana: Guidelines. Published by the Ministry of Education (Ghana). Licensed under a Creative Commons Attribution-ShareAlike 4.0 International, <http://creativecommons.org/licenses/by-sa/4.0/>. Available online at www.tel.org/hub.html Updated version, November 2017.

icon_teaching-male: Microsoft

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