Essex, J. (Accepted/In press). Supporting a beginning teacher to implement extension and enrichment. In S. Salehjee (Ed.), *Mentoring Science Teachers in the Secondary School: A Practical Guide* Abingdon: Routledge Taylor & Francis Group.

Chapter 18 Supporting a beginning teacher to implement extension and enrichment

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Introduction

When beginning teachers commence teaching in a classroom in initial teacher education (ITE), they commonly find it a challenge simply to plan basic lessons. They are likely to give pupils access to all learning outcomes but are unlikely to respond to individual pupils or to offer rich learning experiences (see Chapter 6 on lesson planning). Instead, beginning teachers are likely to focus on teaching essential content and establishing classroom routines. The next phase of practice involves planning and teaching lessons which are differentiated to meet the needs of the full range of pupils, learning which is stimulating and achieves diverse outcomes, underpinned by confident classroom management (see Chapter 7, pp.xx). This transition gives a beginning teacher rewarding new insights into their ability to support high quality learning and enables them to witness the full capabilities of their pupils.

How a mentor might support this post-basic professional growth further is considered in this chapter. A set of practical mentoring strategies to support a beginning teacher to use differentiated forms of extension practices and to enrich their planning practices are presented in the context of two case studies. The process of helping a beginning teacher to implement enrichment practices is discussed, in detail, against current models of mentoring (Maynard & Furlong, 1995, Clutterbuck (2004) and Katz (1995); outlined in some detail in Chapter 1).

Objectives

At the end of this chapter you should be able to:

1. Support a beginning teacher to understand the link between differentiation and extension, and how these approaches can meet pupils' learning needs;
2. Support a beginning teacher to understand the term enrichment and consider how to incorporate planning for enrichment activities;
3. Use a five-step framework to guide a beginning teacher to select some suitable strategies to implement enrichment in their practices. The five-steps are: eliciting

reflection; targeted planning; modelling good practice; external expertise support; review; and plan for the future.

1. Differentiation and extension

The notion of differentiation to teach different pupils in a range of ways to meet their different learning needs is almost universally accepted by teachers. A scrutiny of teacher's standards for meeting this notion in the UK's four nations (England, Northern Ireland, Scotland and Wales) specifies the relevant governments' requirement. Previously in this book, teacher standards have been discussed. In this chapter, teacher standards are discussed explicitly in relation to learning for all the pupils, for example, the Teachers' Standards for England (Department for Education (DfE), 2016d) explicitly require teachers to adapt teaching to respond to the strengths and needs of all pupils' and specify differentiation as a mechanism for achieving this. By the same token, the Northern Irish Teacher Competences (General Teaching Council of Northern Ireland (GTCSNI), 2018b), specify the need for challenge, and a related quality and pace (of learning) for all pupils. The Professional Standards in Scotland (General Teaching Council of Scotland (GTCS), 2012) call, in two different pre-registration teachers' standards, for teachers to meet the needs of all learners. Similarly, the Professional Standards for school practitioners in Wales (Welsh Government, 2017) state that teachers should 'exhibit high expectations and commitment to the achievement of each learner' (p.25).

One element of differentiation is scaffolding for those pupils who may have difficulty in learning, which ensures access to the curriculum. For other pupils, extension activities offer enhanced access to the curriculum implementation of differentiation. Discussing differentiation in this way can be controversial because a beginning teacher working in a specific context might then set low expectations which can cap progression for some pupils, whilst they commonly reserve extension work for the gifted and talented (GandT), or most able, pupils. Therefore, before you move on to the next section, Task 18.1 asks you to reflect on the context in which a beginning teacher you are mentoring is operating differentiation to include learning for all the pupils.

Task 18.1 Mentor's reflection: Looking at the context of differentiation

Answer the following questions:

1. What expectations of different teaching for different pupils are set out in the assessment framework you use in mentoring the beginning teacher?

2. How did a beginning teacher you have worked with respond to the expectation of differentiation? and How did you support their teaching and learning practices?

The notion of extension, or stretch and challenge, as a way of providing differentiation is far from uncontroversial practice, being widely driven by notions of ability as a fixed attribute of pupils. Therefore, you should continuously guide a beginning teacher to not just give 'more able' pupils more to do, whilst giving their 'less able' peers less to do. This mentoring guidance could begin with co-planning learning outcomes for a proposed lesson/series of lessons, as it would offer an opportunity for you and the beginning teacher to think about the purposes of extension and differentiation to promote science learning for all the pupils. In doing so, you can encourage the beginning teacher to consider both specific and immediate, but also extensive and transferable outcomes so that the purpose is elevated beyond simple content acquisition. Now read case study 18.1, which presents a beginning teacher Zarah, who is prompted to make her learning outcomes effective by considering ways to set rich learning environments for all the pupils.

Case study 18.1 Zarah: Reach for the stars

Zarah is a beginning teacher specialising in chemistry. She is coming to the end of her post-graduate teacher education year having undertaken her second school placement with you. Her subject knowledge is excellent, and her classroom management is secure, but you feel that what she teaches is often devoid of context, so pupils sometimes complain that it is dull or seems irrelevant. She is still working on making her lessons suitably stimulating for the full range of pupils and is seeking her mentor's support. She is about to start teaching Year 8 (age 12 and13) pupils a topic on the 'solar system' and has written the following learning outcomes:

- Be able to list the planets in the solar system in order;

- Be able to describe differences in the surface temperature, size, gravity and composition of the planets;
- Be able to explain why life only exists on earth.

Zarah's mentor wants her to re-write her learning outcomes by introducing differentiated yet extended aspects of learning.

Before I present some mentoring suggestions that Zarah's mentor used to support her, complete Task 18.2. Task 18.2 asks you to indicate ways you, as Zarah's mentor, would use to support her in differentiating and extending the learning outcomes for her Year 8 pupils.

Task 18.2 Mentoring strategies for Zarah

Consider the following questions:

1. Based on what you have been told about the beginning teachers, Zarah (case study 18.1), plus any relevant mentoring experience you may have, what types of support do you anticipate you would need to give Zarah?
2. How could your support facilitate Zarah to implement differentiated yet extended aspects of learning in her planning of the topic 'solar system', catering learning for all pupils?

Zarah was asked by her mentor to encompass differentiated forms of extension, which show progression through the use of higher order thinking skills (HOTS). The mentor considered supporting Zarah by using Bloom's taxonomy framework as a way to employ differentiated use of HOTS in planning the learning outcomes and associated activities for pupils. [You could share Shabatura's (2018) online resource with a beginning teacher you are mentoring. This suggests using Bloom's taxonomy to write learning outcomes and plan activities. Shabatura's (2018) presents differentiated 'action verbs' that align with each of the progressive (HOTS) levels of Bloom's Taxonomy (see further resources section), to help the teachers write differentiated learning outcomes].

The three learning outcomes presented in the case study 18.1 used action verbs – list, describe and explain – though differentiated but pitching at the lower thinking levels of 'remembering' (list) and 'understanding' (describe and explain), and lack higher levels thinking skills of 'applying' (such as model, calculate, predict, apply, solve), 'analysing' (such as classify, break down, categorise, criticise, simplify), 'evaluating' (such as choose, support,

relate, determine, judge) and 'creating' (such as design, create, derive, modify, develop). Therefore, Zarah's mentor took the following steps:

1. First, the mentor suggested a broad question as the title of the lesson, which is not conclusively agreed upon by everyone so that different answers could be accommodated with validity, for example, could there be life on other planets in our solar system? This extended question accommodated the 'evaluation' level of higher thinking order in planning the learning outcomes
2. The mentor then suggested to Zarah that she look again at the learning outcomes (in case study 18.1) in light of using the 'action verbs' from the Bloom's taxonomy framework aiming at the higher thinking levels of 'apply', 'analyse', 'evaluate' and 'create'
3. Next, Zarah's mentor reviewed the re-written learning outcomes, which included the extension element of HOTS:
    - 'Classify' patterns in the surface temperature, size, gravity and composition of the planets
    - 'Predict' planet measurements using given data
    - 'State', with 'reasons', an answer to the question, could there be life on other planets in our solar system?
4. The mentor then encouraged Zarah to plan pupils' activities which provide more time to pupils for exploratory talk about the subject matter by making use of other forms of pupils' accounts to assess their learning. Such as differentiation by:
    - Including 'analyse' – a higher thinking level, by asking pupils to 'classify' the characteristics of the planets by recording the characteristics on an incomplete table with the missing answers supplied separately
    - Providing additional support for pupils who might struggle, for example, to whom a completed copy of the table could be available
    - Incorporating higher thinking level of 'evaluate', to capture pupils' evaluation of the data without a lot of writing, such as drawing a sketch of each planet in a box on the table and give each one a suitable user name, for example Mercury might be the hot one

In addition to these steps, a mentor can incorporate further discussions with a beginning teacher about differentiated forms of extension practices by sharing ways the mentor (and other science

teachers - if any) manage class learning when setting challenging and open-ended tasks. The beginning teacher could then undertake two/three lesson observations of the mentor and/or other experienced science teacher and focus observations on ways in which pupils are facilitated to achieve more than the core learning recommended in the science curriculum, without setting low standards for pupils who are not expected to achieve any more than the core learning. The next step, for the beginning teacher, after observing the experienced teacher's lessons, might be to report back their observations to the mentor at the next weekly mentor meeting. Then, a beginning teacher could be guided by the mentor, to try out some extension focused strategies that they have observed in the observed classes.

2. Enrichment

Enrichment refers to the incorporation of material beyond the core curriculum, which is essential for teaching the lesson content. It equates to what is termed inter-disciplinarity, but specifically from the perspective of the target discipline, in this case science. You need to build a beginning teacher's awareness that enrichment activities, unlike extension activities, are drawn from another discipline(s), usually bringing a cultural dimension to bear on the content. You could provide some examples to a beginning teacher, such as: connecting a particular topic/concept of science to a story of the history of science; a trip to a relevant visitor attraction, a comparison of appropriate technologies relying on a scientific principle taken from different parts of the world; or using poetry to explore a science concept. You could provide some examples of enrichment activities, from your teaching or practices you have observed, for example making links between the science content and a relevant societal or cultural context (Chapter 15, ppxx).

Before supporting a beginning teacher to plan lessons to embed enrichment activities, you could ask them to read Godec, King and Archer's (2017) article and then discuss their understanding of planning for enrichment with you. You can elaborate this discussion by engaging the beginning teacher with the benefits and limitations of including culturally-driven enrichment activities in their classrooms as a way to engage all pupils. After the beginning teacher has discussed the potential benefits of including enrichment activities, Task 18.3 encourages you to discuss with the beginning teacher whether they would categorise a field trip activity as an enrichment activity (or not), and why. This task will not only help a beginning teacher you are mentoring, to be able to start thinking about planning some enrichment activities for all the pupils, but will also be helpful for you to target support, by carefully

listening to the beginning teacher's motivations or hesitations to implement enrichment-oriented activities in their teaching.

Task 18.3 Supporting a beginning teacher to start thinking about planning enrichment activities

1. Ask a beginning teacher to list the names of at least two field trips that they would like to organise for their pupils. Discuss how these field trips could cater to the learning for all pupils.
2. Then discuss the following questions with the beginning teacher:
   - To what extent do these proposed field trips constitute an extension of the demands of the science curriculum, and to what extent is it enrichment, through the introduction of other disciplines that relate to the topic?
   - How would you introduce the relevant scientific content and how would you introduce other daily life knowledge to pupils (if appropriate)?

The discussions from Task 18.3 support you in employing a range of mentoring practices to involve a beginning teacher in diverse approaches to teaching science. The five-steps of the framework (eliciting reflection; targeted planning; modelling good practice; external expertise support; review; and plan for the future) could broaden a beginning teacher's ability and in turn enrich learning – see below. The framework focuses on a mentor supporting a beginning teacher, Chen, to reflect on the notion that 'doing more' is much less helpful than the notion of 'doing differently' to provide enrichment. Before presenting the framework, read Chen's case study (case study 18.2), which present a beginning teacher who is planning to incorporate enrichment activities in his practice and is asking for mentor's support in planning a field trip to a 'waste recycling' plant. And complete Task 18.4, which asks you to indicate mentoring strategies for a beginning teacher, Chen.

Case study 18.2 Chen: Field trip

Chen has undertaken a school-based teacher education route in your school and is now undertaking his induction year. He studied environmental science as an undergraduate and has been actively involved in the Ecology Club, which runs weekly in the school. He now wants to take the participating pupils, who range in age from 11 to 14-years-old, with two sixth form helpers, on a field trip to a 'waste recycling' facility in the region. He has mentioned the possibility to the pupils who were very enthusiastic and he now feels under pressure to meet their expectations. However, the demands of this apparently simple task are

beginning to dawn on him. He asks you for advice, including whether it is worth running the trip in the first place.

Task 18.4 Mentor's strategies for Chen
Consider the following questions:

1. Based on what you have been told about the beginning teacher, Chen (case study 18.2), plus any relevant mentoring experience you may have, what types of support do you anticipate you would need to give Chen?
2. How could your support facilitate their implementation of enrichment practices, with the aim of catering for all pupils?

3. Framework for supporting the ability of a beginning teacher to enrich pupils' learning

The five-steps set out below, i.e.: eliciting reflection; targeted planning; modelling good practice; external expertise support; review; and plan for the future provide a suggested framework for you to use to support a beginning teacher to develop their ability to enrich pupils learning. The stages correspond closely to different elements described in the three models, namely Maynard and Furlong, 1995, Clutterbuck's (2004) and Katz (1995), of mentoring as set out in Chapter 1, and the five-steps are illustrated by reference to the case study of Chen:

Step 1 Mentoring to elicit reflection

Eliciting reflection by a beginning teacher is one of the important, if not the most important, things that a mentor does (Maynard & Furlong, 1995). This is as true when working towards the introduction of enrichment, as with any other aspect of practice. Therefore, as a mentor, you need to support a beginning teacher to reflect on prior and existing experiences and beliefs which bear upon their undertaking. Failure to do so will prevent the beginning teacher from identifying some inappropriate insights. For example, Chen a recent graduate in environmental studies needs to reflect more deeply on differences between how a field trip activity for under-graduate students would differ from a field trip activity for school-aged pupils. Chen needs to be helped by the mentor to recognise that the context in which he saw the enrichment activity undertaken (such as in his graduate life) is significantly different from the one in which he is

working. It may seem unnecessary, or even time-wasting, for you to explore which aspects of teaching a beginning teacher finds challenging, why they find them so, and what relevant prior experience they may have. However, this shared understanding of a beginning teacher's perception enables you to offer truly personalised guidance for them. This process fulfils the Chartered Institute of Personnel and Development (CIPD, 2012) criterion for mentoring, which states that some personal matters should be discussed productively. The process also corresponds to the counselling element described in Clutterbuck's (2004) model. This may seem off-putting – and you may feel unqualified for such a role; if so, you may find it easier to think of it as simply an exploratory opening conversation. For example, you could support the beginning teacher to start by looking to how science can be applied in real world contexts, for instance you can probe them by asking questions, such as:

- Are there local employers whose businesses use some aspect of the science content?
- Is the content related to a recent news item?
- What planning strategies might be suited to an activity where a broad range of responses are acceptable, such as strategies to increase re-cycling rates?

Next, once the beginning teacher has provisionally decided to undertake a field trip to a specific venue, it will be helpful to ask them to list the reasons that they were initially enthusiastic about the trip, what obstacles they now perceive and what support would help them to negotiate these obstacles. This supported analysis would help a beginning teacher, like Chen, to evaluate the merits of proceeding, or not, with the trip.

Step 2 Mentoring to support Chen's learning outcomes

Chen's 'headline' learning outcome is to evaluate the risks and benefits of the trip. If the balance lies in favour of proceeding with the trip, the next step will be to run a successful trip to the 'waste recycling plant'. Therefore, Chen's learning outcome embodies several constituent criteria:

- To have researched and evaluated opportunities to learn about waste management at a relevant venue;
- To have researched the procedures for running a trip out of school, including the associated administrative processes;
- To have determined appropriate learning from the trip, incorporating wider learning benefits than purely scientific ones, such as technology, engineering and citizenship.

To this end, the three criteria mentioned above have been set out in the chronological order in which learning outcomes would be expected to be achieved. The first learning outcome will require a beginning teacher, like Chen, to undertake independent research on 'waste recycling' venues, where his findings and evaluations could be monitored by the mentor. You will notice that these learning outcomes are unlikely to be completed rapidly so the beginning teacher will need a mentor's support to construct a medium-term agenda that can be monitored over several weeks until the trip has been conducted. However, individual components of the activity, and the corresponding learning outcomes, can be assessed by the beginning teacher and the mentor at different review points, for example fortnightly until three weeks before the date of the trip and, thereafter weekly until the post-trip evaluation is completed.

In accomplishing the second learning outcome, a mentor's task is to signpost Chen to colleagues who may be able to help them in the research part, such as colleagues teaching Geography, local environmental education groups and people with relevant specialist knowledge in the local educational council. With the procedural elements of the trip, administrative staff in school will be able to guide Chen as to the current procedures for running an off-site visit, including Health and Safety requirements, to make transport arrangements et cetera.

Undertaking the third learning outcome can start once the venue has been decided. At this point, Chen will need guidance from the mentor on arranging a pre-visit. It is possible that the focus of the visit is likely to be on enrichment, possibly focusing on how social and economic factors affect waste handling practice. Since these areas may be unfamiliar to Chen, given their science background, a mentor's 'sponsorship' in meeting other colleagues will be important. Chen can usefully be introduced to colleagues in suitable curriculum areas to discuss how the trip could fit with other aspects of the school curriculum and to draw on their subject expertise. In addition, Chen will also need guidance from the mentor on how a field trip to 'waste recycling' venue could enhance the development of transferable skills among pupils (such as making observations, testing hypothesis, exploring phenomenon et cetera).

Step 3. Using modelling of good practice to provide support and challenge

Working collaboratively with a more experienced colleague and getting the chance to observe how they undertake a targeted activity, such as enrichment, can be invaluable support for a beginning teacher's development. The scope of this modelled observation of experienced teachers is commonly focused on teaching but can cover a host of related activities, including

lesson planning, assessment and evaluation of lessons. All of these observations would be relevant to a beginning teacher seeking to broaden their understanding of how to implement enrichment in their practices.

For Chen, it would be helpful for him to talk to other teachers who have arranged opportunities for learning outside the classroom successfully, in order to understand both why and how they undertook the activities. Next, Chen could shadow an experienced teacher who is conducting a trip in the near future. This would enable him to see at first-hand the 'mechanics' of organising a trip and to learn 'how to' run one. In supporting this activity, Chen's mentor might help him by identifying a colleague, irrespective of their subject. For example, a colleague from the English department could be asked about the practicalities of leading a non-residential trip, because they regularly arrange theatre trips. Then the mentor needs to facilitate an arrangement to shadow the colleague who is organising the next trip, to find out the practicalities of the process. The mentor might want to make the planning of the trip a running agenda item for forthcoming weekly mentor meetings, thus ensuring that it does not get forgotten as the term gets busier. Once Chen has gathered further information from colleagues and others with relevant expertise such as education officers at potential venues, the mentor could prompt him to re-consider the pluses, minuses and interesting things about the trip, so that he can start to reach his own decision as to whether it is a worthwhile undertaking this enrichment activity further.

One of the supportive things that a mentor can very usefully do, during weekly mentoring meetings, is to encourage a beginning teacher to try out small enrichment activities, at first, in their lessons as early as possible during their ITE programme. If a mentor helps the beginning teacher to see that larger enrichment activities are composed of small steps of the sort that they have already been doing, it should give them confidence to attempt more ambitious activities. This gradualised approach is in keeping with Maynard and Furlong's (1995) competency model of mentoring, which sees a holistic 'performance' as being comprised of a set of smaller competences. The atomisation of a task is likely to help the mentor and beginning teacher to monitor progress in planning enrichment activities. It also provides scaffolded development; during which the mentor can lessen the support they provide to facilitate the transition to implementing enrichment activities. This can, therefore, contribute to a mentor's endeavours to support a beginning teacher to 'manage their career and improve skills' (CIPD, 2012, p. 1).

Step 4. Draw on external expertise to develop relevant knowledge-based enrichment activities

At every stage of a (beginning) teacher's career, they benefit from engagement with appropriate sources of external support to broaden and enrich their knowledge of the curriculum and approaches to planning and teaching it. External organisations can offer valuable guidance and specialist expertise that complement the help provided by the mentor. Collectively, such guidance contributes to the overall mentoring process as shown by Clutterbuck (2004) (see Chapter 1). What is notable about this stage of the framework is that it has a dual purpose under Clutterbuck's model, offering an important opportunity for networking. The networking may take the form of direct personal contact or engagement with external organisations. For example, during any pre-visit, a mentor can encourage a beginning teacher to draw on the expertise of staff at the venue. Professional bodies, such as the Council for Learning Outside the Classroom, Consortium of Local Education Authorities for the Provision of Science Services (CLEAPSS) and Scottish School Education Research Centre (SSERC), can be an invaluable source of guidance and ideas.

For Chen, there is likely to be suitable guidance on leading a field trip already published. However, Chen is unlikely to find an 'off the shelf' solution to his specific proposal. In this instance, he may need to be signposted to suitable outside agencies (see further resources) and then help him to apply the guidelines to the specific trip that is being planned. Likewise, Chen, should be directed to liaise with staff at the site of a proposed visit, as they will have extensive knowledge of the site. Chen could be asked, as part of his preparation, to evaluate, for example, four resources and identify the relevance of the advice given about the proposed trip. Based on this, he should be able to estimate both the plausibility of running such a trip and its desirability. A beginning teacher may, like Chen, however, need further guidance with selecting the best external materials to help them to achieve their aims. Since the scrutiny of resources prior to the development of enrichment tasks further increases the time taken for planning, they may need support with this from the mentor, including the adjustment of other demands being placed upon them. Task 18.5 encourages you to reflect on sources of support available to a beginning teacher you are working with.

Task 18.5 Signposting the beginning teacher to sources of support

Having read step 4 of the framework, drawing on external expertise, answer the following questions:

1. What resources and expertise, formal or informal, are available that could be helpful for a beginning teacher you are mentoring when planning for an enrichment activity? You might find it useful to look at the website of the external bodies 'Association for Science Education' (ASE), 'CLEAPSS' and 'STEM Learning' mentioned in the further resources section.
2. How would you support the beginning teacher to broaden their networking with external organisations?
3. How is, or could, the beginning teacher be helped to make best use of these resources?
4. Discuss any specific needs the beginning teacher has identified with the senior teacher/senior leadership team member who oversees staff development.

Step 5. Review and plan for the future

A beginning teacher should be engaged in reviewing their achievements and setting future targets, in processes akin to Katz's (1995) 'consolidation' and 'renewal' stages (see Chapter 1, ppxx). Where specific aspirations have been identified for the beginning teacher, as they have been for Chen, and feedback is available from multiple sources (teachers, technicians, directly from pupils, indirect evidence from pupils), the format can be akin to that of a solutions-focused coaching approach (Allen & Sims, 2018). In solutions-focused coaching, successive peer supported evaluation, target setting, and implementation of teaching strategies forms the basis for future plans. At this stage of the planning, execution and review cycle, the reflective model of mentoring (Maynard & Furlong, 1995) should dominate over the 'apprenticeship' or 'competency' models (see Chapter 1). The focus on specified outcomes at this stage of the framework corresponds to Clutterbuck's (2004) component of coaching; this is not, however, a discrepancy of the models, but a salient reminder that mentoring is a complex and multi-faceted process.

I return to Chen to present what impact the mentoring process might have had:

- Chen demonstrated that he had reached the consolidation phase of his development (Katz, 1995) by being able to justify his decision about the value of the trip. Having

evaluated it, he still thought it should proceed. A successful outcome would be to have devised a detailed and plausible plan, which is accepted by the senior leadership team.

- At this stage of his career, where he is on the brink of the renewal phase (Katz, 1995), this activity will help Chen's progress to reflect on the applicability of both planning and running a trip for other classes he teaches.

Having considered the five-step framework, you are now aware of some mentoring strategies by which a beginning gteachr can develop enrichment activities. You have been reminded of your important role in signposting a beginning teacher to suitable sources of support, both to achieve their immediate goals, but also in developing their sense of themselves as a collaborative member of the education community. You have considered the benefits of introducing enrichment to the beginning teacher's impact upon learning and have identified some obstacles to their implementation. Task 18.6 asks you to reflect on the five-steps of the framework for supporting the ability of a beginning teacher to enrich pupils' learning.

Task 18.6 Reflection and review of the five-steps of the framework

Review the five-steps of the framework set out in this chapter and reflect upon:

1. How many of the mentoring strategies mentioned in this chapter have you already used?
2. How comfortable do you feel about implementing each of these steps with a beginning teacher you are currently mentoring? What would help you to feel more able to use any strategies that you are currently not using?
3. Do you think that some of the steps are more essential than others? If so, which ones, and why?
4. What will be the next practical step(s) you take to promote the use of enrichment with the beginning teacher with whom you work?

Summary and key points

In this chapter, consideration has been given to the importance and practical implications of developing the ability of a beginning teacher to introduce differentiation with extension and enrichment into their teaching. The key points made are as follows:

- Developing the ability to incorporate differentiated forms of extension and enrichment practices during lessons, which is key for a beginning teacher's professional development
- One of your roles as a mentor is to judge the point at which a beginning teacher is ready to introduce extension and enrichment dimensions into their lessons
- A framework of five-steps through which you could support the development of enrichment into a beginning teacher's work
- Signpost a beginning teacher to appropriate additional support and helping them to form relevant professional relationships.

Further resources

ASE (Association for Science Education) (2018) *Best Practice Guidance*, ASE, viewed 16 March 2020, from:
https://www.ase.org.uk/bestpractice
This website provides best practice guidance for a series of key aspects of the teaching and learning of science. One of the key aspects is outdoor learning which you can share with a beginning teacher. The outdoor learning file provides short and easily accessible guidelines for teachers along with some useful further support weblinks.

CLEAPSS (Consortium of Local Education Authorities for the Provision of Science Services) (2019) *Student Safety Sheets: Fieldwork including any science work outside the laboratory*, CLEAPSS, viewed 16 March 2020, from:
http://science.cleapss.org.uk/Resource/SSS075-Fieldwork.pdf
This one-page pupil safety sheet can be used by a beginning teacher by asking the pupils to read it before the field trip and keep it with them during the trip.

DfE (Department for Education) (2018a) *Health and Safety on Educational Visits,* DfE, viewed 16 March 2020, from:
https://www.gov.uk/government/publications/health-and-safety-on-educational-visits
This website provides guidance to help schools understand their roles and responsibilities when undertaking school visits. It would be a good resource for a beginning teacher to read before planning any field trips for pupils.

HSE (The Health and Safety Executive) (2011) *School Trips and Outdoor Learning Activities: Tackling the Health and Safety Myths*, HSE, viewed 16 March 2020, from: http://www.hse.gov.uk/services/education/school-trips.pdf

This short document encourages teachers to recognise the benefits of out of school learning. It outlines some health and safety procedures that the school, staff, parents and pupils should be following.

Institute of Education (IoE) (2020) ***ASPIRES 2:*** *Longitudinal research project studying young people's science and career aspirations*. IoE, viewed 2 April 2020, from: https://www.ucl.ac.uk/ioe/departments-and-centres/departments/education-practice-and-society/aspires-2

Through the site you can download the PDF, 'The Science Capital Teaching Approach', which gives numerous practical suggestions for enrichment strategies which may enhance the uptake of science by pupils, especially by under-represented groups. You may find the suggestions useful to share with a beginning teacher who is considering how to enrich science lessons.

Light, D. (2017) Stretch and challenge in your classroom, *SecEd*, viewed 9 June 2019, from: http://www.sec-ed.co.uk/best-practice/stretch-and-challenge-in-your-classroom/

This account of stretch and challenge (extension) is not science-specific but is valuable because it describes approaches that will help extend all pupils, not just the few most highly attaining in the class. The top ten list provides a helpful summary and all could be put into practice without difficulty. You might wish to jointly select one or more of the strategies for a beginning teacher you are mentoring to implement and you to jointly evaluate afterwards.

Shabatura, J. (2018) *Using Bloom's Taxonomy to Write Effective Learning Objectives*, TIPS, viewed 15 April 2020, from: https://tips.uark.edu/using-blooms-taxonomy/

This online resource provides a verb table including some key 'action verbs' and example learning outcomes for each of the six levels of learning identified in Bloom's taxonomy. The author uses the term 'learning objectives' instead of learning outcomes, but this means the same. These verbs and example learning (outcomes) objectives could support a beginning teacher to write learning outcomes which presents differentiation using HOTS approach. One of the examples given by Shabatura is:

> At the end of this lesson, students will be able to explain the difference between H_2O and OH-." This would be an *understanding* level objective [learning outcome]. However, if you wanted the students to be able to "…explain the shift in the chemical structure of water throughout its various phases." This would be an *analyzing* level verb.

STEM Learning (2020) *Enrichment*, STEM Learning, viewed 19 March 2020, from: https://www.stem.org.uk/enrichment

This area of the STEM learning website brings together a wealth of resources from a range of external agencies, which could be used to enrich the science curriculum. It also enables you to request specialist support from STEM ambassadors whose contributions would enrich the science curriculum by showing 'real-life' applications. (Note that you need to be registered as a user, but there is no charge for registration.)