

LEVEL 6 ASSESSMENT SPECIFICATION

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Programme:	PGCE Secondary Biology with Science		
Module:	Principles of Teaching, Learning and Pedagogy in the Secondary Sector		
Module code:	ECSP6001	Contribution to Overall Module Assessment (%):	50%
Lecturer:	Alison S Evans	Internal Verifier:	
Assignment Title:	Part B, (i) and (ii)	Word count (or equivalent):	(i) = 1,500 (ii) = 2,000
Submission deadline:	26 November 2018	Return date of provisional marks & written feedback:	17 December 2018
Submission method:	All written assessments, where practical and possible, must be submitted via Turnitin unless otherwise instructed by the Lecturer. (Please DO NOT put this assessment specification into Turnitin or it will match many similarities with other students' submissions.) Alternative submission method (if applicable): Late submission of the assessment will result in a late penalty mark. Penalties for late submission: Up to one week late, maximum mark of 40%. Over one week late, 0%. Only the Extenuating Circumstances Panel may approve a change to submission dates.		
Academic honesty / referencing:	Academic honesty is required. In the main body of your submission you must give credit to authors on whose research and ideas your work is based. Append to your submission a reference list that indicates the books, articles, etc. that you have used, cited or quoted in order to complete this assessment.		

A scheme of work is defined as “A plan setting out how the programme of study, syllabus, or curriculum will be translated into teaching and learning activities, including the sequencing of content, the amount of time spent on each topic, and how the specified learning objectives will be assessed” (Wallace, 2015). In order to be successful, a scheme of work should cover the requirements set out in the science national curriculum for Wales (Welsh Assembly Government, 2008), in a logical way, as well as meeting the requirements set out in the literacy, numeracy, and digital competency frameworks.

The scheme of work presented covers part of the “Interdependence of Organisms” section of science in the national curriculum (Welsh Assembly Government, 2008), so this topic is generally one of the first topics covered by year seven pupils, and is often their first experience in a science classroom. The four lessons give pupils opportunities to study the basic structure and function of some cells, tissues, organs and organ systems and how they support vital life processes, as required by the national curriculum (Welsh Assembly Government, 2008). In the sequence of the four lessons, the first lesson is designed to assess the prior knowledge of the pupils. This will vary among the cohort, depending on their primary school experience. Research suggests that this may be because primary school teachers typically lack the science content knowledge, which would enable them to confidently teach science effectively (Appleton, 2003). This lesson also introduces the concept of how organisms are made up of systems of component parts, key to many aspects of the unit (Welsh Assembly Government, 2008). The second lesson acts as an introduction to cell structure and function, providing historical context and exemplifying structure with diagrams and demonstrations. The third lesson reinforces the concept of cell structure by presenting it in a practical way where pupils develop their skills by preparing their own microscope slides of specimens. The fourth lesson builds on the previous lessons content to teach about specialised cells.

The teaching session was part of the fourth lesson in the scheme of work. In planning the teaching session, a variety of activities were selected in order to reinforce the concepts presented. This was to increase the variety of ways information is experienced, which Nuhall (2007) suggests increases the chance of it being remembered.

The starter activity was designed to quickly engage the learners in the lesson. It involved a matching exercise where pupils matched pictures of different shoes with statements indicating structure and function. This was then related to how cells are specialised to their function, with the analogy of shoes being a way to provide visualisation of the concept, which has been shown to help pupils understand abstract concepts (Duit, 1991). Knowledge has been found to be transferable to later learning when students are able to construct their own knowledge, which is improved and developed when teachers build analogical bridge between known and unknown topics (Treagust et al. 1998). An effective way of providing analogies in learning has been to match a topic to an appropriate concept, that pupils would

be familiar with (Treagust et al. 1998). By selecting an analogy involving shoes, which all learners would be familiar with, the intent was to generate an intrinsic interest in the learning activity.

The main activity of the session involved pupils learning about the structure and function of several specialised plant and animal cells, using the “think/pair/share” format. In pairs, pupils had a picture of a cell, and initially for two minutes were asked to think about the structure of the cell, and, using previously acquired knowledge about cell structure, suggest ways the cell structure is suited to its function, and what this function might be. Following this, pupils were then asked to discuss in their pairs for a further two minutes in order to share their findings. Each pair was then asked to present what they found to the class, with any additional information the pupils may have missed shown.

This format of activity was intended to allow pupils to demonstrate several of the requirements of the science national curriculum for ks3. In particular it allowed pupils to initiate and share ideas as well as allowing the pupils to manage their own learning and further develop learning and thinking strategies, and also allows time for thinking, peer discussion and reflection (Welsh Assembly Government, 2008).

The final activity was intended as a plenary, in order to gauge the understanding of the pupils. The task was a quiz activity in the style of “countdown” with pupils being split into two teams and then asked questions about the topic, with each correct answer removing a tile covering part of a picture of a particular cell. Pupils were then given an opportunity to guess the function of the cell, and the ways this cell is suited to its function. As pupils were able to confer and discuss their answers during the quiz activity, it was possible to use challenging questions, designed to stretch all pupils, including particularly difficult questions about cells not mentioned in the lesson. This was to allow pupils to take concepts they have learned and apply their scientific knowledge in a new context, progressively introducing new learning, which Coe et al. (2014) identifies as practice which has an impact on student outcomes, by increasing the quality of instruction.

A key part of the national curriculum at KS3 involves the literacy framework. This scheme of work provides several opportunities to develop pupil’s oral, reading, and writing skills, as required by the literacy framework. This scheme of work involves using specialist words relating to the structure and function of organisms, as well as words with similar, but distinct meanings, and also words with different meanings in scientific and everyday contexts, such as cell and tissue (Welsh Assembly Government, 2014). Specific tasks which allow the year seven learners to demonstrate aspects of the national literacy framework were included in lesson four when pupils present to the class their conclusions about their cell’s structure and function. They show they are able to present topics and ideas clearly, using formal language and varying what they say and how they say it to interest listeners and also respond thoughtfully to others’ ideas and questions while also asking pertinent questions (Welsh Assembly Government, 2014). The tasks that encourage independent learning such as the research required for pupils to make their own models of cells, promotes the strand “Reading

across the curriculum” allowing pupils to be able to collate and summarise information from various sources and pull out key facts (Welsh Assembly Government, 2014).

The practical part of the scheme of work where pupils prepare onion cell slides, and then draw a labelled diagram, and calculation of the cell size using known magnification, allows the learners to transfer their mathematical skills across the curriculum, including the statement “estimate and visualise size when measuring and use the correct units” of the numeracy framework (Welsh Assembly Government, 2014).

Several different methods of assessment were chosen for this scheme of work across a variety of activities in order for the learners to engage with the subject matter in as many ways as possible, with the logic behind this being based on the findings of Nuthall (2005) which identified that three complete sets of information are required learn and remember a topic. Use of various questioning techniques was intended to act as a way to achieve assessment as learning (Clarke 2008), with pupils given the chance to discuss their thoughts among their peers first before being questioned by the teacher, and feedback is used in order to fill any gaps. The range of questions selected was designed to cover the topic discussed using a range of difficulties, with the feedback intended to allow the learner to reflect on their answers, as well as referring back to the learning outcomes and success criteria given at the start of the lesson, as suggested by Clarke (2008) as an effective form of formative assessment.

There are several additional aspects of the scheme of work which would allow all learners to access the content. The use of enlarged images on flashcards and microprojection apparatus was intended to support learning for pupils with visual impairment. Additional support may also be required by pupils with poor manual dexterity, to prepare materials for microscopic examination, and when using drawing aids to record their observations. Presentations given during the teaching session had a black background with white text in order to make them more easily visible for those with visual difficulties (Hall & Hanna, 2004). Prompts on board in the specialised cell were used in some activities to act as scaffolding as a way to help those learners who required it to help form arguments. During the quiz activity these prompts were removed as Alison & Tharby (2015) suggests that scaffolding is most effective when it is used to support pupils and enable them to learn, but then withdrawn when it is no longer needed.

In order to evaluate the effectiveness and quality of the planning and delivery of the microteaching session, several key aspects needed to be considered, including how the session addresses key areas of knowledge and skills required by the national curriculum, as well as how effectively the session allowed the pupils to learn. Also important is how effective the delivery and planning allowed the teaching to be. Through deconstructing these main areas, it was possible to identify the areas of effective teaching, as well as the areas that require further development. Although there are many different frameworks which schools use to determine effective teaching, a Sutton Trust report on the research into effective teaching identified effective teaching as that which leads to improved student achievement using outcomes that matter to their future success (Coe et al. 2014), which I identify as a key measure when assessing the suitability of the use of this teaching session and scheme of work in future teaching. Throughout the planning and delivery of the microteaching episode, consideration was paid to the requirements presented in “Science in the National Curriculum” (Welsh Assembly Government, 2008). In particular, the activities used within the teaching were designed to address the following statements indicated in the national curriculum; “Teaching should encourage learners to manage their own learning and further develop learning and thinking strategies”, “They should enable learners to initiate, explore and share ideas, and they should allow time for thinking, peer discussion and reflection” (Welsh Assembly Government, 2008)..

The planning and delivery of the teaching episode kept learners involved as they were able to engage in the activities without having to repeat instructions. This was aided by having important instructions for the activities displayed on the PowerPoint presentation used for the lesson. The importance of instructions being clear and accessible for pupils has been reinforced by my experience in PTE 1 where having instructions displayed clearly prevents them having to repeat or clarify. By keeping the learners on task, all learners were able to complete the “think/pair/share activity” successfully, within the time allocated for it as well as being able to demonstrate that they could exhibit the learning objectives by successfully answering questions during the plenary activity.

There are several aspects of the teaching episode I would alter in order to improve the learning of the pupils in the lesson. Some of the content presented was beyond the level presented in the year seven national curriculum. This was designed as a way to challenge the more able pupils, however if I were to repeat the activity, care would need to be taken that this was not too challenging for pupils who may struggle. Some learners appeared struggled to apply the concepts presented to a new context, as they were unable to answer an extension question at the end of the plenary activity, which was based on answering a question on a cell not covered in the lesson.

It may be beneficial to differentiate the activities more so that all learners were sufficiently challenged to reach higher levels of achievement, for example providing a more difficult example of a cell for the groups with the most able pupils to describe the structure and function of. The plenary activity had questions of varying difficulty, which I made accessible for all pupils, by having them work in teams, and able to discuss answers. Nuthall (2005) suggests that more able students both start with more background knowledge, but also asked

more questions which may also help their less able peers learn more effectively through peer teaching within these groups.

Activities during the session were varied and interactive, which resulted in pupils being unable to avoid interacting with the information presented. In particular the learners reacted well to the use of the “catchphrase game” resource in the plenary activity. This aided in learning because, as well as being a fun activity, it presented the content in another form, increasing the chance of it being remembered, as suggested by Nuthall (2007) as a way to enhance learning.

Resources were used throughout the session to support teaching, including the handouts during the starter and “think/pair /share” activity. This presented the information related to the task in a visual way and helped the learners engage with the task, although the quality of one of the pictures used in the “think/pair/share” activity caused confusion for one group as to what type of cell they had, and so, if I were to repeat this lesson, I would make sure to use higher quality images to make the task clearer. Further use of resources included use of the PowerPoint slides to reinforce the answers to the second activity, which allowed learners to fill gaps in knowledge following independent learning.

Health and safety is of particular concern in science teaching, due to the unique environment and dangers of a school science laboratory. Although the session involved no practical activities, the teaching was still in a laboratory so all usual laboratory rules were followed, including making sure all bags and coats were cleared away under the desks.

Although there is a large amount of guidance available in the creation of learning goals and objectives (Bloom, 1956, Marzano, 2009), there is a gap in research in to the best way for increasing learners’ interaction with learning objectives as a part of their learning (Faulconer, 2017). Due to this, I made the learning objectives a key aspect of the session. The learning objectives, along with the key ideas to be explored during the session, were introduced during the starter activity, as well as reinforced following the plenary activity. This kept objectives clear and displayed, which allowed learners to identify what they needed to achieve. This could help pupils learning as research suggests that pupils can only determine success when they have a sufficiently clear picture of what the targets they are expected to achieve are (Black and William, 1998). Learners appeared to engage with the learning objectives and key ideas presented, which was shown by them successfully producing accurate content in the second task as well as successfully answering questions during the plenary activity.

The importance of classroom management, including teachers’ ability to make efficient use of time, and to coordinate classroom activities to maximise learning which can take place was identified by Coe et al. (2014) as having an impact on student outcomes. Due to this, the organisation of a classroom was a consideration in the planning and delivery of my microteaching session. Having all pupils on one side of the central bench facing the board, I was able to engage all pupils during explanations. It did however restrict my ability to circulate around the entire classroom to check on the content produced. From my experience in PTE1, I have found this enables checking that all pupils are remaining on task as well as

checking for understanding, or any potential gaps in learning. The organisation of the classroom did allow me to address questions posed by learners as I could see all groups and identify any misbehaviour. Feedback demonstrated that the lesson was organised and flowed well between activities, with the content in the lesson being delivered in steps with each activity building upon the last in order to reinforce learning.

The “think/pair/share activity” involved independent and peer learning, which enabled the learners to develop their communication skills by discussing the ideas within their groups and presenting the ideas that they had come up with. This activity contributed to the requirements set out by the national curriculum by addressing the requirement that pupils initiate, explore and share ideas, as well as be given time for thinking, peer discussion, and reflection (Welsh Assembly Government 2008). During the group discussion I was able to check that the learners were on task, as well as asking them developing questions about the ideas they had thought of, which was identified in tutor feedback as effective questioning.

Questioning was used throughout; closed questions to start, in order to introduce concepts, and also as a form of assessing understanding of the topics covered. The use of effective questioning, when used as a form formative assessment, to adapt the teaching to meet learners needs, has been suggested as a way of extending participation from the whole class, and a successful strategy to deepen pupils leaning (Clarke, 2008)

Time management is a fundamental part of classroom management, and ensuring enough time is allocated to activities ensures that pupils have adequate time to engage and complete activities, maximizing the learning that can take place (Coe et al. 2014). An improvement would be to be clearer with timings of the activity by having the amount of time allocated on the board, as this would potentially give clear indication as to when it would need to be completed. It has also been suggested that if learners are clear what their targets are and what their learning is to achieve, they will be more able to link the task they are doing with their learning objectives (Black and William, 1998). The importance of clear instructions has been reinforced by my experience in PTE1, where pupils often need instructions repeated and sometimes clarified, which having them clearly displayed minimizes. I have continued to mitigate this by having the instructions for a task, and the timings for tasks clearly displayed, which enables pupils to focus on the task.

During the delivery of my lesson not enough time was allocated to the second activity so this restricted the time available to check all groups had effectively completed the task and didn't need further clarifications. This also meant that the amount of questions which could be asked in the plenary was reduced, further reducing the opportunities to check understanding of the whole class. If I were to use this lesson again, I would ensure more time was allocated with the activities used more suited to a full hour lesson rather than the twenty minutes allocated for the session. More time would potentially allow deeper thinking with pupils given the opportunity to look up information, and not rely on recalling what they had previously learned. Another aspect which would benefit from development in order to make the session more effective would be the further development of questioning techniques to involve the whole class. This may mean all pupils are thinking about the answer, not just

those volunteering, and may be helpful to check understanding, as well as affecting behaviour by keeping all pupils engaged.

As the session presented was building upon what had been learned in previous lessons, including a recap would be an improvement which would make sure that learners understood before progressing. Starting a lesson with a short review was found to improve student outcomes by Roshenshine (2012), and also a specific practice which had strong evidence of impact on student outcomes by (Coe et al. 2014).

A way this scheme of work would be able to develop the cross curricular responsibility of Digital Competency would be to compliment the activity where pupils make models of their cells, including potentially completely digital representations or using a range of programs to present information regarding their cells structure and function, including animations, or videos.

In Conclusion, both the planning and delivery of the microteaching session were based in sound learning principles and accurate pedagogical content knowledge, which followed a logical flow between activities and kept the learners engaged throughout. Feedback presented from tutor and peers, as well as my own reflection on the session, and further teaching experience during PTE1 has however identified key areas of improvement on this session and highlighted the particular areas of development which need to be implemented in order to achieve QTS standard. These main areas are; developing questioning techniques to involve the whole class, time management to make sure all tasks set are achievable within the time allocated, and also ensuring material presented is appropriate to the requirements of the national curriculum for the age group as well as for the individual level and ability of the learners within the class. The changes, and areas of improvement I have identified, I feel would have a positive impact on learning, thinking, and behaviour of learners. In addition to improving my own thinking as a teacher in order to achieve QTS status, due to them being represented in the common components that research suggests teachers should consider (Coe et al. 2014).

Word Count: 3564 (i. 1501, ii. 2063)

References

- Allison, S. & Tharby, A. (2015) Making every lesson count: Six principles to support great teaching and learning. Crown House Publishing Ltd: Carmarthen.
- Appleton, K., (2003) How do beginning primary school teachers cope with science? Toward an understanding of science teaching practice. *Research in science education*, 33(1), 1-25.
- Black, P., & Wiliam, D. (1998) Inside the black box: Raising standards through classroom assessment. London: GL Assessment.
- Bloom, B. S. (1956) Taxonomy of educational objectives, handbook 1: The cognitive domain. New York, NY: David McKay.
- Clarke, S. (2008) Active Learning Through Formative Assessment. London: Hodder Education.
- Coe, R., Aloisi, C. , Higgins, S. & Major, L.E. (2014) What Makes Great Teaching? Review of the Underpinning Research, The Sutton Trust, London.
- Duit, R. (1991) On the role of analogies and metaphors in learning science, *Science Education*, 75, 649–672.
- Faulconer, E., K. (2017) Increasing Student Interactions with Learning Objectives. *Journal of College Science Teaching*, 46(5), 32-38.
- Hall, R.H & Hanna P. (2004) The impact of web page text-background colour combinations on readability, retention, aesthetics and behavioural intention, *Behaviour & Information Technology*, 23:3, 183-195.
- Marzano, R. (20010) Designing and teaching learning goals and objectives: Classroom strategies that work. Bloomington, IN: Marzano Resesarch Laboratory.
- Nuthall, G. (2005) The cultural myths and realities of classroom teaching and learning: a personal journey, *Teachers' College Record*, 107(5): 895–934.
- Nuthall, G. (2007) The hidden lives of learners. Wellington: New Zealand Council for Educational Research Press.
- Rosenshine, B. (2012) Principles of Instruction: Research-Based Strategies That All Teachers Should Know. *American educator*, 36(1), 12.
- Treagust, D. F., Harrison, A. G. & Venville, G. (1998) Teaching science effectively with analogies: An approach for pre-service and in-service teacher education, *Journal of Science Teacher Education*, 9, 85–101.
- Wallace, S. (2015) A dictionary of education. Second ed. Oxford: Oxford University Press.
- Welsh Assembly Government, Department for Children, Education, Lifelong Learning and Skills. (2008) Science in the National Curriculum for Wales. Curriculum Division. Cardiff.
- Welsh Assembly Government. (2014) National Literacy and Numeracy Framework. Available at <http://learning.gov.wales/docs/learningwales/publications/170601-numeracy.pdf>.

ACTION PLAN - Objectives and programme for PTE1

Name Michael Britton

Subject: Secondary Biology with Science

Date 23/11/18

OBJECTIVES (relate to QTS Standards where appropriate).	ACTIONS TO BE TAKEN	SUCCESS CRITERIA	TARGET DATE
Develop questioning techniques in order to involve whole class – Addressing QTS standards : S3.2.1 – S3.2.4	Read up to date articles and literature on advancements in assessment and questioning techniques Observe effective assessment practice from experienced teachers Get to know pupils and learn their names so questioning can be directed and engage pupils directly	All pupils in class are engaged during question Learners use questioning sessions to reflect on, evaluate and improve their own performance Progress of all pupils in class is evident following questioning sessions	29/11/18 – mentor meeting
Ensure material is appropriate for level of class as indicated by the national curriculum as well as the ability and ambitions of the class – addressing QTS standards - S3.2.3	Consult national curriculum documents as well as resources and schemes of work produced by my placement school when producing lesson plans Check previous progress of pupils in classes as well as topics previously covered in order I am responsible to be able to plan appropriate and differentiated activities.	Pupils are able to complete activities and successfully achieve learning objectives identified in lessons Both more able and less able pupils feel challenged and pay attention during lesson Pupils demonstrate the requirements of	29/11/18 – Mentor Meeting

Assessment against national requirements. S3.3.2(c) Key Stage 3 S3.1.2 Planning lessons S3.3.1 High expectations.	Include activities with a high, yet appropriate level of difficulty, but also have scaffolding available for those who need it	both skills and knowledge in the national curriculum during assessments	29/11/18
Ensure sufficient time is allocated for activities in order to allow pupils to think more deeply about topics.	Observe practice from experienced teachers to identify how much time is allocated for particular tasks	Pupils are able to complete tasks provided in the time allocated	
	Include flexibility in lesson plans if activities take longer than expected as well as having additional extension activities available for pupils who finish tasks early. Evaluate and adjust lesson plans following a lesson to identify whether time allocated to tasks was appropriate	Pupils exhibit the progress expected and display good performance in end of unit assessments. All planned activities can be completed during lessons	

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