

Overview

Monday, December 9, 2019 9:32 AM

Student Name: Janelle S. Whitman

Student Number: 1806604

Pathway: Secondary PGCE in Chemistry

Assignment Title: A Portfolio Which Illustrates a Critical Reflection of Progress Made on the Planning and Implementation of Three Pedagogical Principles

Link to this OneDrive Assignment: https://uowtsd-my.sharepoint.com/:o:/g/personal/1806604_student_uwtsd_ac_uk/Erftgv_3XPpMky5f2LR73h8BsUIrYoTQKx8ILLEZ6K7A6A?e=pe9ovr

Assessment for Learning

Monday, December 9, 2019

9:33 AM

1. What are the forces acting on a stationary table?

- A Balanced
- B Unbalanced
- C No forces

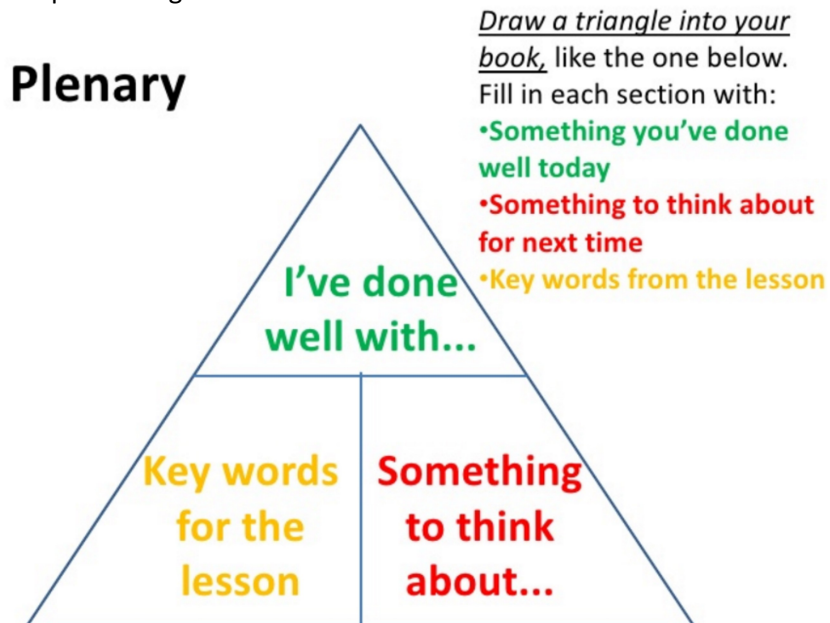


This picture represents a question from a Low Stakes Quiz that was used with a top set year seven class during their Forces unit. These low stakes quizzes are normally between five and ten questions long and are a blend of multiple choice and true or false questions. At the beginning of their lessons all students expected to number in their books and write the answer to each multiple choice question. Then as a class they go over the answers and give themselves a mark to see how much was known. These low stakes quizzes are used as a method to review material not only from the previous lesson, but from previous units as well. Each lesson starts with this type of review. Reviewing material at the beginning of each lesson helps students recall previous information they may have otherwise forgotten and gives students extra time to review. This is especially pertinent to students who may not have the ability to study effectively at home. There are of course some faults with this method. One fault is that a multiple choice review gives students opportunities to guess answers. There are few ways around this but one or two short answer questions may be effective in getting around this problem. Another problem is that it is self-assessed to save time. It is possible that students could just give themselves all good marks and not have answered a single question, but when these quizzes are given, it is attempted to call students at random to give their answers. This keeps students engaged because they never know if they will be chosen. Students are also never given the ability to back out of answering a question. It is always worked through with the student chosen to answer it.

Evaluation of Pupil Learning	
Evidence of Learning (including attitude to learning over time))	Students were able to answer questions throughout the lesson. Especially those that were snowballed off other students' responses. Students seemed confident answering directed questions. While circulating students were clear in their task on the graphs and could answer the questions posed about the graphs in their books. Students were able to make logical inferences from the graphs about smoking and answer questions about smoking from the data sheets with little guidance.
Next Steps for Progress	Ensure that all students are working on the task at hand, several students at one table needed multiple prompts, perhaps encourage less group work or move these students. More directed questioning to students who seem weaker with the biology topic.

Reflective Analysis of Teaching and Strategies For Development – including justification/rationale for pedagogical choices	
Evidence of my Effective Practice	Students respond very well to my directed questioning and are willing to work with me. Students are becoming less shy in answering my questions on the topic and are even willing to offer up questions of their own, they are seeing that I have subject knowledge. Students now know they cannot back out of a question and rarely answer with "I don't know." Now answers are at least attempted and worked through with prompts if need be. Students do not seem as fearful of getting answers wrong.
Areas for my Development	Work on timings for longer activities. Sometimes the group work ends up with students talking too much, not all things need to be done in a group.
Personal Targets for Progress	More examples need to be given during directioning, instead of having the students go off and do the graphs entirely on their own, maybe do the first one with them instead. This could lead to more understanding of the task and therefore quicker completion.

This image is from the reflection section of a lesson plan with a top set year nine class. Reflections are done by discussing with the class teacher after the lesson with what strengths and weaknesses were seen in the lesson. This lesson had particular success with the questioning done throughout it and methods of questioning.



This plenary activity was given to students to fill out after a lesson to be collected at the door as the students left. The students were seen being very engaged while doing this activity and upon reading the tickets the students showed they were confident with the lesson, but still had some questions they wanted answered further.

Cross Curricular Responsibilities

Monday, December 9, 2019

9:34 AM

Analysis

1. How is the extension affected by doubling the force on the spring?
2. What is the name of the force causing the spring to stretch?
3. What would the extension be if you hung a 250g mass on the spring?
4. Use the formula:

$$\text{force (N)} = \text{mass (kg)} \times 9.8$$

to calculate the force on the spring when the 500g weight was hung on it.

Hint: 1kg = 1000g

Students are often given analysis questions after performing practical. It is often asked of the to do some mathematical calculations on what they just did. This strengthens understanding of not only the scientific concept being taught by the practical but also mathematical skills they have learned outside of science.

Research Task - Leaflet

- Your task:
 - You own a chemical company – congratulations!! What are you going to call it?
 - Your company produces several different chemicals. You need to produce a sales leaflet for your chemicals (You will be using the laptops, you are making these on PowerPoint).
 - You need to tell your potential customers all about your chemicals such as **what properties** they have and **what your customer could use them for and why.**

Though seemingly a simple task this research project involving digital competence was found to be quite difficult by the bottom set year eight class it was presented to. These students struggled to perform internet searches and set up a PowerPoint, so the lesson quickly went from being about elements to being about how to search for information online and how to present that information. Understanding where students are with a certain skill is essential for correctly implementing cross curricular responsibilities.

Deficiency disease: Osteoporosis

What is it? Osteoporosis is a condition that affects the bones, causing them to become thin and weak. It happens more commonly in old age when the body becomes less able to replace worn out bone. Special cells within the bones, called living bone cells, are no longer able to effectively break down old bone and renew it with healthy, dense (thick) new bone.

As you get older, you also lose a certain amount of bone, causing the bones to become thinner. The bones become fragile and more likely to break (fracture), particularly the bones of the spine, wrist, and hips. Healthy bones are very dense, and the spaces within bones are small. In bone affected by osteoporosis, the spaces are larger, making the bones weaker and less elastic. Bones are repaired and reinforced by a range of proteins and minerals, which are absorbed from the bloodstream. They include calcium, phosphorus, proteins and amino acids. Changes in hormone levels e.g. the female hormone oestrogen offers some protection against osteoporosis. After the menopause, oestrogen levels fall, often causing the bones to thin quickly. That is why it is more common in women.

Symptoms: Osteoporosis is a condition that develops slowly over several years. The symptoms are not obvious in the early stages of the condition and can take months, or years, to appear. The early warning signs of osteoporosis can include joint pains, and having difficulty standing or sitting up straight. You may have no warning before a minor fall or sudden impact causes a bone fracture. When the bones are significantly thinned (a low bone mass), breakages of the wrist, hip, or spinal bones (vertebrae) are most common. A cough or a sneeze may cause the fracture of a rib, or the partial collapse of one of the bones of the spine. A fractured bone in an older person can be serious because the bone is no longer able to repair itself effectively. This can lead to arthritis, and even disability, such as long-term problems with mobility

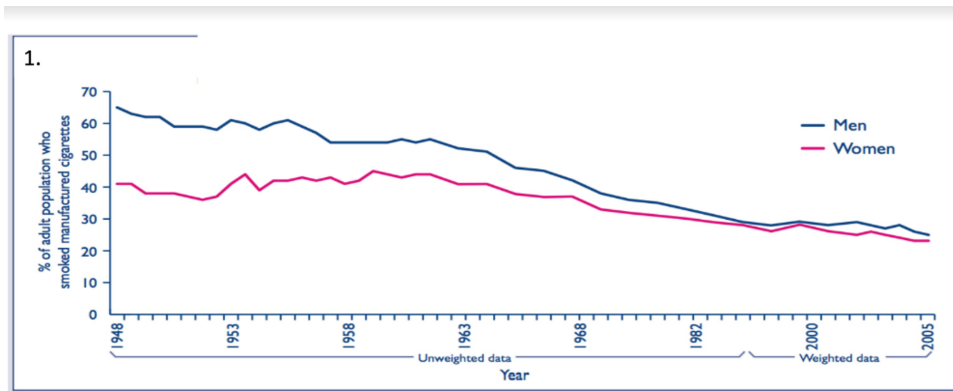
Ways to prevent osteoporosis include:

- **eating a healthy diet that contains plenty of calcium** - at least 700 mg per day (equivalent to one pint of milk), foods include milk, cheese, yoghurt, fish,
- **stop smoking** - cigarette smoking is associated with an increased risk of osteoporosis, and
- **limit your alcohol intake** - the recommended daily amount is between 3-4 units for men and between 2-3 units for women.
- **Regular exercise** - Regular exercise is essential. Try to do at least 30 minutes of exercise, a minimum of 3-4 times a week. Two types of exercise are particularly important in improving bone density and helping prevent osteoporosis - weight-bearing exercise and resistance exercise.

This information sheet along with several others was handed out on a lesson about deficiency diseases. Students had to sort through the information to see what was relevant to answer questions on the diseases.

Good Teaching and Learning means employing a blend of approaches including those that promote problem solving, creative, and critical thinking.

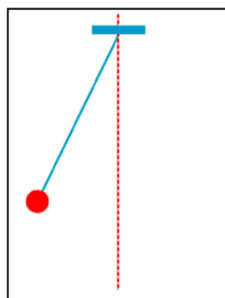
Monday, December 9, 2019 9:34 AM



1. What does this graph show?
2. How has the % of men and women who smoke changed over from 1948 to 2005?

Extra challenge: Why might this change have occurred?

This is a graph from a set of five used with a top set year nine biology lesson on smoking. The students were required to work as a group to answer questions on how attitudes towards smoking have changed over time.



- What force causes a pendulum to swing?
- What forces might slow down a pendulum?
- What variables might affect the speed of a pendulum?

Investigation Aim

To find out how the speed of a pendulum swing is affected by:

- Mass
- Length

This picture shows an investigation into pendulums given to a year seven class. They had to on their own, create a method for how to measure how a pendulum is effected by mass and length. This critical thinking activity requires them to draw on prior knowledge and their own notes from previous lessons to present a proper experiment.

Analysis

1. Which surface had the most static friction? Explain your answer.
2. What did you do to make the experiment a fair test?
3. What could you do to make the results more reliable?

These analysis questions are from a lesson on friction and apply to a practical done where students measured friction on different surface types. These analysis questions prob students to go beyond just the results but think critically and creatively about the experiment, including what went well, and what could be improved.

Critical Reflection

Monday, December 9, 2019 9:38 AM

During this professional teaching experience there was a focus on developing good teaching practice with a focus on preparation for Donaldson's Successful Futures curriculum for Wales. One such focus to prepare for the new curriculum was on the 12 Pedagogical Principles for good teaching practice. These principles provide a set of guidelines to help teachers and teacher trainees develop their practice and help understand what approaches can help students. This writing will focus on three of the twelve pedagogical principles that are at the forefront of Donaldson Successful Future curriculum for Wales. The three principles to be focused on from this placement are assessment for learning, cross-curricular responsibilities, and providing blended approaches that support critical thinking and problem solving (Donaldson, 2015). Illustrative examples of these key principles have been given above with annotation, however it is essential to look at the examples with a wider lens and see the theory that supports these examples when they are used in the classroom.

The school where the professional teaching experience took place will be referred to as School A as instructed by BERA guidelines (BERA, 2019). School A is in the south of Wales and is an English medium school. The school is in the green support category. The green support category is defined as a school that needs the least support and intervention (Welsh Government Guide for Parents and Carers, 2019).

The school has 1242 pupils, including those in the sixth form, with the free school meal percentage of School A being at 24.9%. The school is made up of 27% minority ethnic pupils. 25% of all pupils have been diagnosed with additional learning needs. Another important note is that 38% of the pupils who attend School A live in areas that are in the top 20% of deprived areas in all of Wales (Estyn, 2015). In this placement the classes taught were all key stage three with one top set year nine class, one bottom set year eight class, and two top set year seven classes. All of these classes were in the science specialty, with specific topics being chemistry, biology, and physics.

The pedagogical principle known as assessment for learning comes in a variety of forms, be it summative assessment at a particular moment in time, or formative assessment which is an ongoing process. Often times students are assessed with testing at the end of a topic. Testing, also called high stakes testing if the grade is reflected in a report on the student, has some benefits for both students and teachers. Students enjoy benefits such as increased knowledge retention, it encourages studying, and stops old material from interfering with new material learning. Teachers can use testing to identify gaps in student knowledge and provides feedback for all the students in the class at one time, something not easily done normally (Roediger III, H.L., Putnam, A.L. and Smith, M.A., 2011).

Testing, however, is not without its drawbacks. High stakes tests, and tests that include all information from a topic cannot be given everyday, meaning that it

provides feedback for just one day and for some students there may have been external circumstances preventing them from doing their best on that day. Another issue that may arise from testing is students learning knowledge simply by rote instead of intimately knowing the information being tested. This means that the knowledge learned can just be repeated without deeper understanding of where the knowledge comes from (Roediger III, H.L., Putnam, A.L. and Smith, M.A., 2011).

Low Stakes Quizzing can help work around some of the problems that are exhibited by testing. Low stakes quizzes are short review quizzes given at the beginning of lessons to help students review material they have learned previously. These quizzes usually consist of a few multiple choice questions that students answer silently in their workbooks before self-assessing them. This is rooted in Rosenshine's Principles of Instruction, where he suggests having daily review in every lesson. These quick reviews lasting only five to ten minutes can help strengthen students' understanding of new vocabulary and previously learned topics that students might not think to go over on their own (Rosenhine, B., 2012).

Implementing the low stakes quizzing is not complicated and easily done with short multiple choice questions at the beginning of a lesson, but can also be done by going over homework with a class or using the review time to overlearn new material. The short multiple choice questions were given to year seven students primarily during this first placement as it has become part of the policy from School A's science department. Students are expected to be quiet and respectful while answering the

questions. To assess themselves on these questions they are called at random to answer the questions to the entire class. The class then raises their hands in agreement to the single student's answer. This provides a quick way to see what students may be struggling with the questions. After checking for agreement, the teacher would confirm the correct answer and the students mark themselves.

The students at School A seemed to respond well to the low stakes quizzing. Most of the students were noticed to be very intent on answering the questions and wanted to offer their answers to the teacher. They seemed to want to compete against one another as well. Some questions were asked every time

Several problems do arise from this method including the fact that these are multiple choice questions which means students could just guess. To navigate around this problem one or two short answer questions could be added and talked about instead. Another problem is since these quizzes are self-assessed, the students aren't necessarily giving themselves the correct grade or grading them at all (Topping, K., 2009). Peer-assessment could help work around this but would take up a great deal more time. These are potential solutions to problems with low stakes quizzing that need to be thought about in more depth to see if they can be implemented to solve some of the problems with low stakes quizzing.

Assessment for Learning is a principle that is a constantly occurring process in the classroom. Simple questioning can always be developed further to allow for the

teacher to understand where every single student in their classroom stands on the topic at hand. Part of developing the right assessment for learning strategies in the classroom is understanding the students within each class to know where they struggle and where they excel. Knowing this can help any teacher understand what methods will work best.

Allowing students to use the skills they learned in other classes in every setting is an important part of education. Science, in particular, can allow for the use of technology on a regular basis and time to practice numeracy skills. With the right planning, there are even ways to include literacy in every science lesson. Including numeracy, digital competency, and literacy in lessons is essential to ensuring the success of students. It helps students move beyond single subject thought and allows them to learn material in a deeper manner and apply what they've learned in a variety of ways (Johnson, B., 2013).

In science there is a great deal of vocabulary that can be difficult for learners which means the more reading that is done, the more likely the students will see these words and be able to use them correctly based on spaced time repetition (Rodriguez, J.G. and Towns, M.H., 2018). To implement reading in lessons during the placement at School A, a variety of methods were done including the use of "Science Readers" and activities that required picking out key points from a text.

Science Readers are a concept from the Michaela School in London where all

students read a piece of text on a science topic aloud together. This is suggested to promote students literacy (BIRBALSINGH, K., 2016) and at School A it is used with year seven pupils to get them to read more than they would on their own. In implementation this resulted in students actively wanting to read. Whenever the opportunity was given to read students raised their hands instantly and many students desired to read more. This shows that these science readers may not only help students read more in their science classes, but also encourage them to want to read as well.

Tasks are also given in science classes involving texts that students must read and analyse to gather information about a topic. Literacy is not just about reading, but also gathering information from a text and being able to apply and share that information in a coherent manner. In giving students tasks that require them to read and then share that information, it is encouraging them to read more carefully as they know that their peers will count on them to give them the information.

When it comes to literacy in the science classroom, there are some things that make it difficult to plan. One such thing is time management. Students read at different paces and require more or less time depending on their current reading ability.

Though an activity may seem to be ten minutes long on paper, in reality it can take much longer. The science readers tend not to take up a great deal of time, but it can be difficult to see if every student is reading at once. One work around for this is to have every student read along with a ruler. This allows the teacher to see at a glance

if a particular student is in the same place as everyone else. Using both of these methods in tandem could be a way to integrate more reading into science lessons.

Students are also often encouraged to answer analysis questions after performing a practical. These analysis questions often contain one to two numeracy problems that require outside knowledge to perform. Giving these to students gives them an opportunity to practice numeracy skills in a setting that is outside the mathematics classroom. Students are able to practice basic numeracy after most of their practicals. It is even attempted to fit numeracy into topics that do not normally include it to show how numeracy is seen everywhere in the modern world and how useful it is.

There are some drawbacks to attempting to place cross curricular subject matter into lessons. The most obvious drawback being sometimes one can focus for so long upon trying to place numeracy, literacy, or digital competence into a lesson, that the main lesson focus may be put second. This can have more detrimental effects on the student learning as it puts the main topic to learn behind the other focus. To avoid this it is important to put the lesson focus first, and think of the cross curricular responsibilities as an added bonus to the lesson. Focusing on how the lesson can be delivered to have these responsibilities included can be done with more practice. In order to practice this it is also important that the teacher speak with teachers outside of their subject area to see what can be incorporated into the lesson to help students solidify knowledge for all subjects.

The final pedagogical principle this writing will touch upon is employing a blend of approaches to teaching. Teaching is no longer just standing in front of a classroom and speaking to students. It is now important to insure that tasks are set to promote problem solving with creative and critical thinking as well. Science lessons are often giving students problems in which they need to solve critically and work in different ways to get an answer. Practicals in science are a potential way to encourage students to perform more problem solving (RODRIGUEZ, J.G. and TOWNS, M.H., 2018).

One method to put problem solving and critical thinking at the forefront of practicals is to allow students to create their own methods for a practical experiment. At School A these types of experiments are at the end of every science unit and are a great way to help students think creatively and critically about an experiment. By allowing students to develop their own methods for an experiment and design nearly every factor of the experiment, you are giving them the potential to think without limits. The teacher is always there to give suggestions and be the expert to converse with to see if the experiment idea makes sense, but the students are allowed to do most of the work on their own. This also helps students be more independent learners.

As for activities outside of practicals, students were given opportunities to find information from data sheets, graphs, infographics, and readings to learn about different topics. Having students use resources to gather information requires them to think about what information is important, and what information they do not need.

An example of this would be a set of graphs that have questions about the graphs on

the sheets. This requires students to think critically about what the graph is showing.

Both of these methods saw positive implementation in student engagement. Giving students the ability to set up their own experiments had them discussing proper techniques to use and questioning what their next steps should be. Using the information sheets allowed for problem solving as a group with further discussions beyond just the questions being asked.

One issue that needs to be avoided when implementing these independent learning activities is having students reinforce incorrect concepts. This reinforcement of incorrect information could be circumnavigated by discussing all of the correct concepts at the beginning of the lesson. Another potential solution would be to give out key concepts as an extra sheet as they plan their experiments. With classes of lower prior attainment, this would be something that could potentially make them more confident as they would not need to constantly refer to the teacher for help, but instead work more independently. For further development in using a blended approaches to promote critical, creative thinking for problem solving it would be wise to research how to incorporate other pedagogical principles into lessons to advance this goal. Allowing students to use their literacy and numeracy skills in science to problem solve could be successful in making ties between the three skills in students.

When putting students into group activity for problem solving there is always the

chance that students will use the time to socialize rather than use the time to work.

With proper room circulation by the teacher, and enough knowledge of the class to put them into groups well enough, this can be lessened, but to eliminate the problem entirely a teacher would need to give no group work and instead have the students work alone and in silence.

Incorporating the pedagogical principles into everyday teaching practice is a goal teacher trainees should strive for. These principles are helpful to improve teaching practice and help provide a deeper insight to how students learn. Assessment for learning is a principle easily placed into everyday practice. From tiered and guided questioning to summative tests, assessment for learning can help guide the objectives of both the teacher and the students. Though it does not come without problems, there are ways to constantly improve methods of assessment. Teachers also have a responsibility to ensure that literacy, numeracy, and digital competence make their way into lessons. These skills are essential for students to have and therefore need to be supported and reinforced in every subject. However, these should not overtake the main objectives of a lesson for fear of undermining the subject of hand. Using a variety of blended approaches to teaching, such as direct teaching and student based tasks, can be used to help develop problem solving skills, critical thinking, and creative thinking in students. These skills are needed to advance further in education and have successful futures.

In this first placement it was time to try and implement these principles into teaching

practice. Implementing these principles took a variety of methods and planning. Most of the methods saw positive implementation particularly when considering student engagement. There were some challenges in finding methods that did not disrupt learning or make learning a gimmick without paying attention to the material that needs to be learned by the students in accordance to the curriculum.

References

Monday, December 9, 2019 9:38 AM

BERA, 2018. *Ethical Guidelines for Educational Research*. London: .

BIRBALSINGH, K., 2016. *Battle hymn of the tiger teachers*. Melton, Woodbridge: John Catt Educational Ltd.

DONALDSON, G., 2015. *Successful Futures: An Independent Review of Curriculum and Assessment Arrangements in Wales*. Cardiff: Welsh Assembly Government.

ESTYN, 2015. *A Report on School X*.

JOHNSON, B., 2013, Jan 15,. DEEPER LEARNING: WHY CROSS-CURRICULAR TEACHING IS ESSENTIAL. *States News Service*.

KANG, S.H.K., 2016. Spaced Repetition Promotes Efficient and Effective Learning. *Policy Insights from the Behavioral and Brain Sciences*, **3**(1), pp. 12-19.

KEITH J TOPPING, 2009. Peer Assessment. *Theory into Practice*, **48**(1), pp. 20.

RODRIGUEZ, J.G. and TOWNS, M.H., 2018. Modifying Laboratory Experiments To Promote Engagement in Critical Thinking by Reframing Prelab and Postlab Questions. *Journal of Chemical Education*, **95**(12), pp. 2141-2147.

ROEDIGER III, H.L., PUTNAM, A.L. and SMITH, M.A., 2011. Ten Benefits of Testing and Their Applications to Educational Practice. *Psychology of Learning and Motivation*. Elsevier Science & Technology, pp. 1-36.

ROSENSHINE, B., 2012. Principles of instruction: research-based strategies that all teachers should know. *Education Digest*, **78**(3), pp. 30.

WELSH GOVERNMENT, 2017. *National School Categorisation System A Guide for Parents and Carers*. Wales, United Kingdom: Welsh Government.