

Overview

Wednesday, 18 December 2019 10:04

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Assignment Title: A portfolio which illustrates a critical reflection of progress made on the planning and implementation of three pedagogical principles.

Pathway: Secondary PCGE

Link to Onenote: https://uowtsd-my.sharepoint.com/:o:/g/personal/1903194_student_uwtsd_ac_uk/EqW9xN8OyxBFkFAMStDQWCQBjBOVciHGOOwy2OAMEg1dYg?e=XLzjln

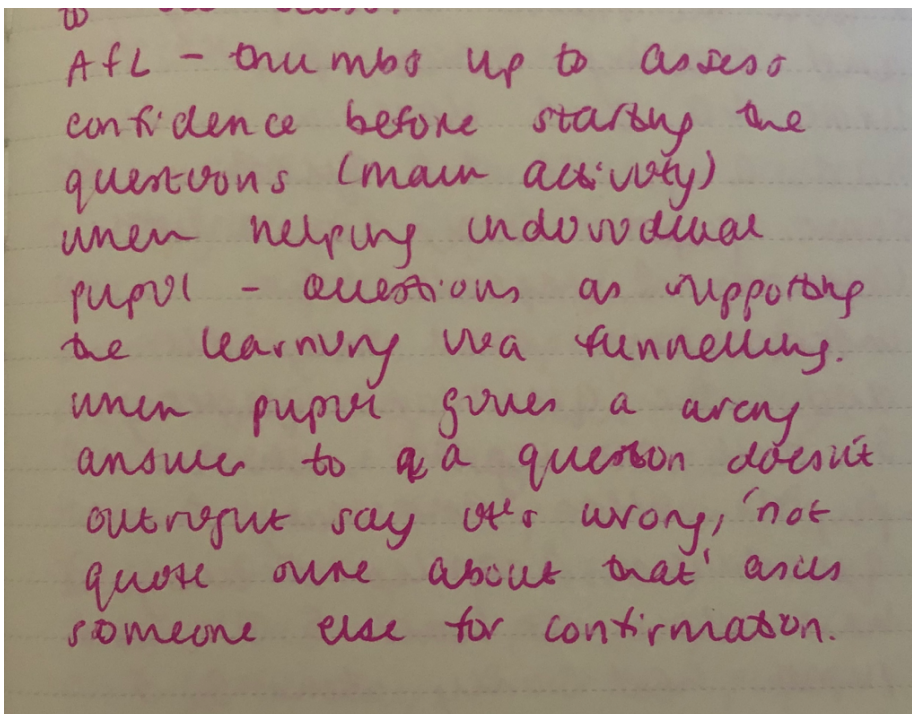
Assessment for Learning

Wednesday, 18 December 2019 10:05

Pedagogical principle: Good teaching and learning means employing assessment for learning principles

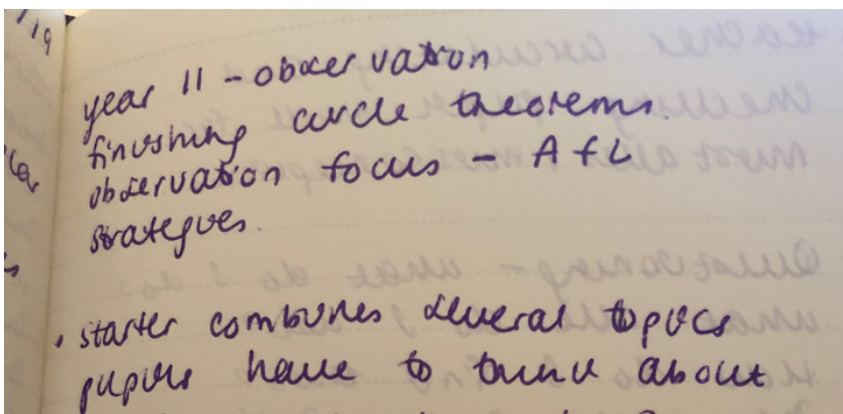
Illustrative Example 1

This example is section of a lesson observation from my learning journal. This was a Year 7 mixed ability class. I gained a practical insight into how AfL is used in the classroom in KS3 and incorporated some of these strategies into my early teaching.



Illustrative Example 2

As I would also be teaching a Year 10 class I wanted to see if the kinds of AfL strategies used in KS4. I did not think older pupils would respond as well to certain kinds of AfL such as thumbs up, as KS3 pupils. I observed that for KS4 much of the AfL comes from questioning and visually checking pupils' work. I was conscious of this when deciding what AfL to incorporate into the year 10 lessons I planned.



topics used, where to start and how to do each part. Activates prior knowledge needed for the lesson and AFL via verbal answers pupils will give explaining which topics have been combined and the methods that need to be used.

• Questioning used to assess what pupils know about the parts of the topic already covered.

Illustrative Example 3

This is a continuation from Example 2

• teacher circulating and checking pupil work for mistakes / misconceptions.

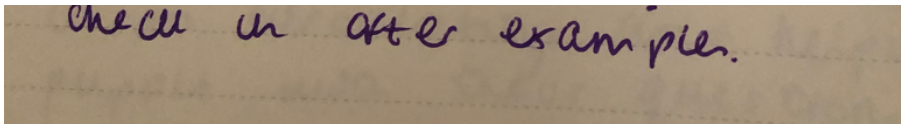
• Questioning - what do I do?
what rule do I use?
how do I find this?
then we want...?

closed - what does perpendicular height mean? what is a right angle? what is C?

(what does linear mean?)

Does anyone recognize any of these graphs to start - assess prior knowledge.

→ any questions so far? with



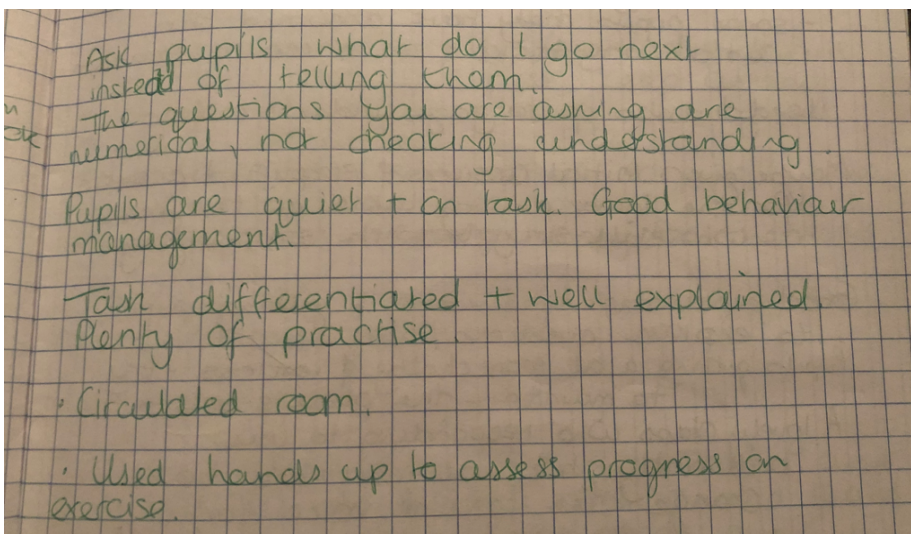
check in after example.

Illustrative Example 4

This is feedback given by my class mentor based on a lesson with a Year 7 mixed ability class at the beginning of PTE. These comments highlight that I initially struggled with questioning as an AfL strategy. In retrospect, if I had planned questions that assessed pupil thinking to ask as part of my exposition this would likely have improved my questioning as I tended towards asking numerical questions when I was thinking of questions on the spot.

This example also illustrates my use of hands up to assess progress on the exercise. I did this because the exercise was RAG differentiated and pupils started at different points. I needed to know how many pupils had reached a certain question

set so that I could adapt the lesson timings accordingly and ensure that pupils had enough practise on the questions.

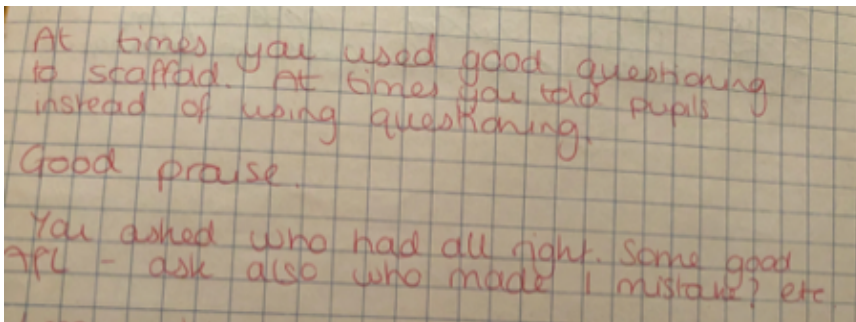


Ask pupils what do I go next instead of telling them.
The questions you are asking are numerical, not checking understanding.
Pupils are quiet + on task. Good behaviour management.
Task differentiated + well explained.
Plenty of practise.
• Circulated room.
• Used hands up to assess progress on exercise.

Illustrative Example 5

These are comments made by my mentor teacher on a lesson with the same Year 7 mixed ability class as the previous example. This shows that I was making progress with my use of questioning but that it was still not consistent. One of the reasons for this is that when pupils would ask me questions, I would automatically respond with the answer instead of using their question as a whole class teaching opportunity or using closed questions in response to guide the pupil towards the answer.

This example also demonstrates that I checked how many pupils completed the exercise questions correctly. My mentor makes the suggestion to ask pupils who only made one mistake? I then incorporated this suggestion into subsequent lessons as often pupils would get the majority of questions correct but make a simple numerical error on one or two questions, these minor mistakes do not negate pupils understanding of the main lesson aims.



Illustrative Example 6

These are sections from my second weekly reflection that follow the Meet, Test, Share model of reflection. One of my personal targets that week was to use questioning consistently, therefore I researched effect questioning and chose some strategies to test during teaching that week.

Think - develop your strategy

I need to develop my questioning in order to improve the quality of pupil answers and to enable the assessment of pupil thinking through their answers. David Wiliam suggests there are only two purposes for questioning in the classroom "to cause thinking and to provide information for the teacher about what to do next." Currently my questioning tends towards recall of knowledge or numerical questions which is the lowest skill in Bloom's Taxonomy of thinking

https://www.gwegogledd.cymru/wp-content/uploads/2018/04/How_to_develop_thinking_and.pdf.

I need to ask more open questions to develop higher order thinking during my exposition such as "How do I start?" "What do I do next?" "Why do we want to do ___?". I will incorporate open questions into my lesson plans to remind myself what needs to be asked during each phase of the lesson.

Incorporating more open questions will also develop my use of questioning as an AfL strategy. I need to question pupils who do not put their hands up as well as those who do in order to assess their learning and ensure they are actively involved in the learning.

Another issue with my questioning is the pace, it tends to be a little too fast and lower attainment pupils don't understand the examples discussed as well as they perhaps could given more time to absorb the information.

"Research has found that many teachers wait only for 0.9 seconds before seeking an answer." -

http://www.nsead.org/downloads/Effective_Questioning&Talk.pdf

I will focus on giving pupils more thinking time when I ask a question and not trying to rephrase it or answering it myself without giving pupils sufficient time to think.

Cohen et al. (2004) recommend wait times of three to five seconds for closed questions and up to 15 seconds for open-ended questions. - Cohen L, Manion L, and Morrison K (2004) *A Guide to Teaching Practice*. London: Routledge.

Tanner and Jones express that questioning is "one of the most subtle skills for the novice teacher to learn." and this target will therefore be an ongoing skill that I develop, research further and test strategies in the classroom.

Test - implementation

list the things you did in lessons

What went well:

- I used open questions as an AfL strategy.
- I called on pupils without their hands up during my expositions.
- I asked pupils to justify their answers or explain another learner's answer - I need to incorporate this more for it to have a real impact.
- I used assessment for learning strategies to adjust my teaching and planning for the next lesson. I created scaffolded worksheets for lower attainment pupils.
- After pupils self-mark their work I asked them to raise their hands if they had all the questions correct, one wrong, more than one wrong and don't know why. For differentiated exercises I asked pupils to raise their hands to indicate which colour question sets they completed.
- I used thumbs up, level, down to assess pupil confidence with the examples before moving onto exercise and to see who's work to check in more detail while circulating.
- I circulated the classroom checking pupils work.

Even better if:

- If I can see that some pupils are struggling with the method I am teaching make sure other pupils stick to this method during the exposition to emphasise it so that they do not become confused by multiple methods.
- I ask more questions where pupils need to make a justification for their response.

Think - reflect on your implementation

One of my class teacher's raised the point of using questioning to draw out misconceptions during the exposition. For certain mathematical topics it is better to ask pupils what they would do before modelling what they should actually do as it establishes good baseline from which to provoke cognitive conflict and challenge existing misconceptions.

Using questioning more consistently during the exposition has slowed it down considerably, to the point that it may now be taking too long as opposed to being too fast. My senior mentor has emphasised the need to model at least 3 examples of a new concept to give pupils enough time to take the new knowledge on board. Finding the balance between the right amount of examples and maintaining an appropriate pace to the lesson is an element of my practice that I need to work on next week.

Illustrative Example 7

Sections of a lesson plan on converting between fractions, decimals and percentages that I taught a Year 7 mixed ability class. I planned the questions that I would ask pupils in advance when going through the examples so that I could assess pupils' understanding while also developing an explanation of the mathematical concept. I then evaluated my use of AfL strategies and discuss areas for improvement.

Time	Activities/Methodology/Key Concepts (Teacher's Role – including key teaching points, differentiation strategies and key questions)	Pupil Tasks (Pupils' role –including differentiation, engagement in formative assessment and homework)	Resources (Including Health and Safety requirement)
Opening phase (with links to prior learning)	Instruct pupils to write the date and title starter in the back of their books. Question require use of rules covered in the previous lesson, activate prior knowledge needed for a consolidation task later in the lesson. Tell pupils that they do not need to write out the questions and that they can look back in their books at the rules and examples from last lesson to help them answer the questions. Take the register while pupils are working. Call on individual pupils to give answers and explain the method used. Ask how many pupils got all the questions correct to assess understanding.	Pupils will complete the starter questions. Pupils will provide verbal explanations and answers when called upon. Pupils will answer the register using the welsh phrase of the week. Pupils will raise their hands to indicate how many questions they did correctly.	

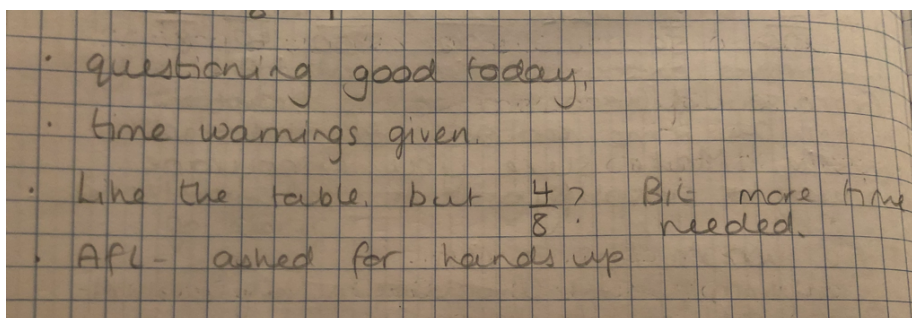
Teaching & Core Learning	Discuss the learning objectives. Instruct pupils to write the subheading Converting from decimals to fractions. Recap place value with pupils, write 123.567 on the board and ask pupils to identify the names of the columns. Write them above each number on the board. Once we've established tenths, hundredths, thousandths, ask pupils what 0.1, one tenth is as a fraction. What's 1 hundredth as a fraction? What's one thousandth as a fraction? $\frac{1}{10}$ $\frac{1}{100}$ $\frac{1}{1000}$ Example 1 0.7 ask what column the 7 is in? Tenths, so what should our denominator be? Repeat the process for the second and third examples. Instruct pupils to copy down the examples and then copy out the rule, surrounding it by a bubble or highlighting it. Give pupils 5 minutes to complete exercises, all pupils start on the green questions. Remind pupils to simplify their fractions where possible. Give pupils a 1	Pupils will write the subheading. Pupils will answer open and closed questions during the exposition. Pupils will copy down the examples and rule. Pupils will attempt the exercise questions, all pupils should complete the green questions, some pupils will complete the amber and red exercise questions. Pupils will call out answers to the green questions when asked. Pupils will mark their own work. Pupils will indicate which questions sets they completed and how many questions they did correctly by raising their hands. Pupils will write down a new subheading. Pupils will answer closed and open questions during the examples. Pupils put their thumbs up to indicate their level of confidence with the examples. All pupils will start on the green exercise questions, some pupils will complete all three sets of questions. Pupils will give answers to the green question set when called upon. Pupils will raise their hands to indicate how many questions that did correctly.
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Reflective Analysis of Teaching and Strategies For Development – including justification/rationale for pedagogical choices

Evidence of my Effective Practice	The pupils engaged well with the starter activity and the prior knowledge that they needed for later in the lesson was successfully activated for most pupils. The recap of place value leading into converting decimals to fractions developed pupils' relational understanding in line with the QTS standard progression in learning. Using the AfL strategies of questioning and thumbs up I assessed which pupils displayed understanding and confidence with the method and those that would need more guidance during the exercise. I gave pupils clear time limits and instructions for the exercises and made use of a timer to keep the lesson on pace. I think that using a timer, giving pupils warnings of how many minutes they have left and asking pupils for a show of hands to see how many of them have reached a certain colour question set has allowed me to make progress on my personal target for the week to keep the pace up. Asking the class who has got onto the amber questions for example has also allowed me to adapt the time limits if not enough pupils have reached the hinge question.
Areas for my Development Personal Targets for Progress	In discussion with the class teacher one of my areas for development is addressing common misconceptions. In future lessons where it lends itself appropriately to the learning experience I will incorporate some spot the mistake questions using common misconceptions as the mistakes. Another strategy by which to spot misconception would be using mini whiteboards, assessing how many pupils are making the same mistake and then raising this misconception with the class. I will conduct further research into effective practice concerning misconceptions and consult the scheme of work which provides some of the common misconceptions for each topic area.

Illustrative Example 8

Feedback given by my mentor teacher based on a lesson with a Year 7 mixed ability class, part of the lesson plan can be seen in Example 7. Due to the planning I had done and then the strategies I implemented I made progress towards my target of using questioning consistently.



Cross-Curricular Responsibilities

Wednesday, 18 December 2019 10:05

Pedagogical principle: Good teaching and learning regularly reinforces Cross-Curricular Responsibilities including, Literacy, Numeracy and Digital Competence, and provides opportunities to practice them.

Illustrative Example 9

This the meaningful links to cross-curricular responsibilities section of a lesson plan for a Year 7 mixed ability class. I incorporated these particular links as they were a natural part of the lesson and enabled pupils to meet the learning objective of the lesson.

Meaningful links to: Cross Curricular Responsibilities	Links to the Literacy strand of the LNF framework: Speaking – pupils will present ideas clearly, using formal language. Pupils will argue a convincing case using subject knowledge effectively. Listening – Pupils will respond thoughtfully to others' ideas and ask pertinent questions in response. Listen to explanations of processes and identify the main points in order. Reading Strategies – Use a range of strategies to pick of key ideas and information from worded questions. Language – use varied and appropriate vocabulary accurately, including subject-specific words and phrases. Links to Developing Numerical Reasoning strand of the LNF: Identify processes and connections - choose an appropriate mental or written strategy and know when it is appropriate to use a calculator. Represent and communicate - explain results and procedures precisely using appropriate mathematical language. Use appropriate notation, symbols and units of measurement, including compound measures. Review - interpret answers within the context of the problem and consider whether answers, including calculator, analogue and digital displays, are sensible.
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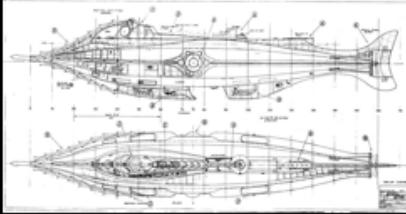
Illustrative Example 10

A Seaquest resource on fractions that I used as a starter for a Year 7 mixed ability lesson on fractions, decimals and percentages. I did not create this resource, it was provided for me to use by my placement school. I did however decide that most pupils should only attempt Bronze and Silver on this starter as the level of difficulty was pitched a little high for most of the pupils and I was mindful of how long I wanted pupils to spend on the task. This starter activated pupils prior knowledge on fractions and required pupils to use reading strategies to pick out key information and ideas from the text. Pupils vocabulary was also developed via a discussion of unknown key words from the text.

Fractions

The Nautilus is 70 metres long, 8 metres wide and 14 metres tall. The length is split into 7 main sections.

When surfaced, the Nautilus has $\frac{1}{10}$ of its total height above the water.



Modern submarines can be up to 170 metres long and up to 23 metres wide.

The Deck is one seventh of the total length of the Nautilus. The length of the Deck and Nemo's quarter are the same.

Length of Nautilus sections	
Section	Length (metres)
Horn	6
Deck	?
Crew quarter	18
Engine room	12
Nemo's quarter	?
Hold	6
Observatory	?

BRONZE

- Write the lengths of the Horn and of the engine room as fractions of the total length of the Nautilus in their simplest form.

SILVER

- Calculate the lengths of the Deck and of Nemo's quarter.

GOLD

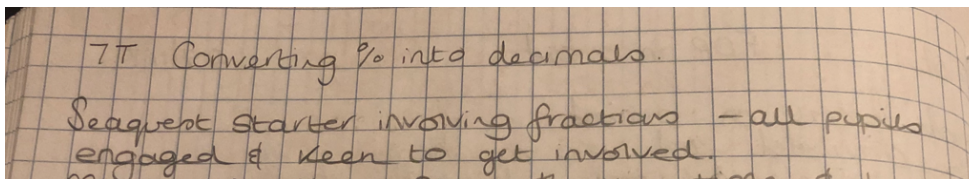
- Calculate the depth of Nautilus's base when surfaced.

PLATINUM

- Write the length of the observatory as a fraction of the total length of the Nautilus in its simplest form.

Illustrative Example 11

Comments made by the class teacher on the starter seen in Example 10. Asking pupils to read the text boxes aloud developed the reading skills of those who read and the listening skills of the rest of the class. Asking pupils to read aloud also tends to engage their interest.



Illustrative Example 12

A worded exercise and challenge question completed by one of the pupils in a Year 10 set 2 class. This class will be sitting the intermediate papers in WJEC Mathematics and Numeracy. The pupil has demonstrated the ability to use information from the question to find a sensible solution within context. The pupils has made the appropriate judgement to use a calculator to find a solution, this is clear by the lack of workings. In future I would encourage pupils to show all their workings even when using a calculator to enable them to check their solution and gain method marks. The Challenge question again demonstrates that the pupil is able to find key information in the text, they have structured their solution in a clear and logical order and partly labelled it. I encouraged pupils to label their workings but did not give them a structure to follow.

One of the issues that arises with these questions is that pupils already know which method they will need to use as these questions follow on from basic numerical questions. they are applying a method and not devising one which is one of the elements of numeracy that I need to develop further in my teaching.

1. The Ukrainian army has 420 javelin missiles that are used to destroy tanks. Russia has 360 tanks encroaching on Ukrainian territory. The Ukrainians destroy 65% of the Russian tanks. How many tanks do they destroy?

→ 234 ✓

2. An arena can hold 15,000 people. An hour after tickets go on sale, Beyoncé has sold out 96% of the seats. How many seats are still on sale?

→ 600 ✓

3. Kylie has saved £860 towards a holiday. Travis has only saved 32% of the money that Kylie has. How much has Travis saved?

→ £275.20 ✓

Challenge Question

In a survey, 20 people said that their favourite colour was yellow, these respondents represent 5% of the total number of people surveyed. 61% said blue was their favourite colour. Green was the favourite of 25% of the number of people who said blue. The remaining respondents said their favourite colour was red. How many people said their favourite colour was red?

→ 400 people in the survey.

$$\begin{aligned} & \bullet 5\% \text{ of } 400 \\ & = 20 \end{aligned}$$

$$\begin{aligned} & \bullet 61\% \text{ of } 400 \\ & = 244 \end{aligned}$$

$$\begin{aligned} & \bullet 25\% \text{ of } 244 \\ & = 61 \end{aligned}$$

Build on Prior Knowledge and Engage interest

Wednesday, 18 December 2019 10:05

Pedagogical Principle: Good teaching and learning sets tasks and selects resources that build on previous knowledge and experience and engage interest.

Illustrative Example 13

This is a codebreaker task that requires pupils to find percentages to fill in the missing letters. This task was part of a lesson on finding percentages without a calculator that I taught a Year 10 set 2 class. Pupils completed the task with little issue and it allowed them to check their own answers as if they got an answer that was not in the key or resulted in a letter that did not make sense they knew they had gone wrong. The task however did not particularly engage the pupils' interest, this was likely due to the fact that I did not know this class very well when I planned this lesson and wasn't well able to anticipate what would interest them.

Percentage of a Number Codebreaker

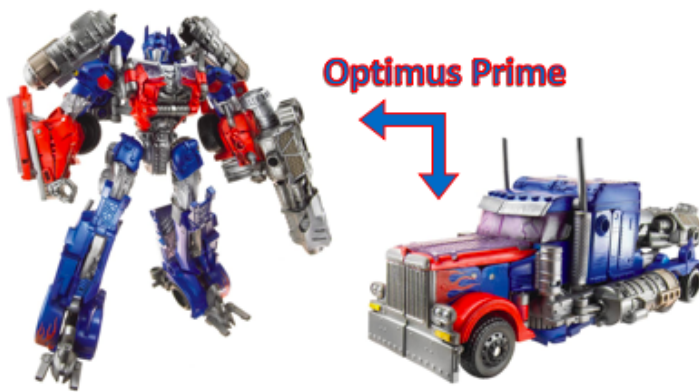
A	B	C	D	E	F	G	H	I	J	K	L	M
12	3	48	6	8	14	24	36	15	28	4	20	18
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
7	16	2	17	21	30	40	60	10	5	9	13	23

Find the percentages of a number, link your answers to the table above to reveal what the building firm said when I said I wanted a skip outside my house:

25% of 28	50% of 32	6% of 50	20% of 80	25% of 24	26% of 50	75% of 20	10% of 300
7	16	300	16	6	13	15	30
N	O	B	O	D	Y	I	S
15% of 200	25% of 160	2% of 800	1% of 200	0.5% of 400	3% of 500	14% of 50	15% of 160
30	40	16	2	2	15	7	24
S	T	O	P	P	I	N	G
5% of 260	4% of 400	12% of 500					
13	16	60					
Y	O	U					

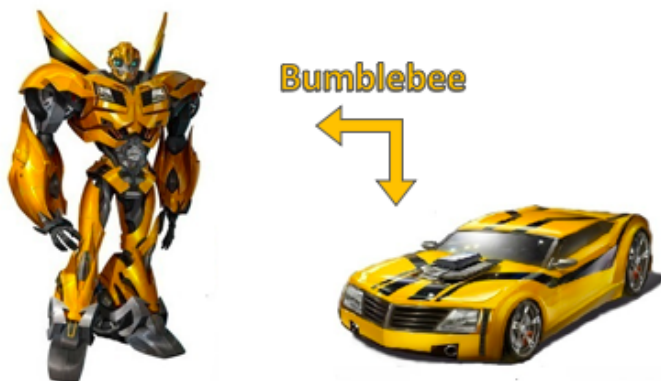
Illustrative Example 14

These are slides taken from the lesson PowerPoint on converting between fractions, decimals and percentages that I taught a Year 7 mixed ability class. I found these slides on the internet and adapted them for my lesson. I taught this lesson towards the end of block 1 of PTE and as such had a better understanding of the kinds of things that might interest pupils to use as a hook. I feel that using Transformers characters provoked pupils situational interest as they were interested in how the characters would connect with the mathematics of the lesson.



... From a robot into a truck and from a truck into a robot ...

BUT IT'S STILL THE SAME GUY!!!

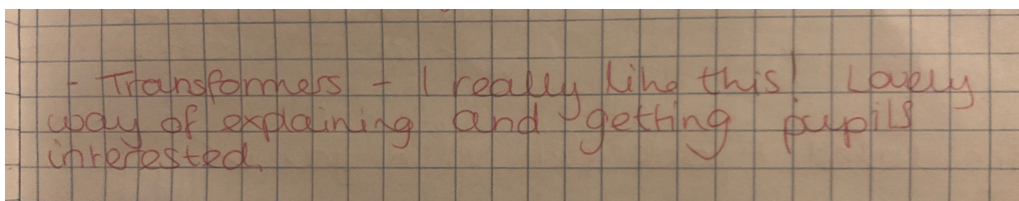


... From a robot into a car and from a car into a robot ...

BUT IT'S STILL THE SAME GUY!!!

Illustrative Example 15

Feedback from my mentor on the use of Transformers and their affect on pupil interest in the lesson.



Illustrative Example 16

An example of a pupils work from the fractions, decimals and percentages lesson that used the Transformers hook. The amount of work shown was typical of the majority of pupils in the class during that lesson and this is evidence of both pupils engagement in the learning and their understanding of the learning objectives. Engaging pupils interest was particularly important for this lesson as it was chunked into parts and there was a lot of content to get through. I think that engaging pupils interest improved pupils attitude towards learning and their focus on the tasks.

converting from percentage to a decimal

percentage = out of 100

example

1. 20%
 $20 \div 100 = 0.2$ (20)

to change a percentage into a decimal, use divide it by 100

2. 75%
 $75 \div 100 = 0.75$ (75)

3. 12.5%
 $12.5 \div 100 = 0.125$ (12.5)

exercise

1. 10%	8. 78%
$10 \div 100 = 0.10$ ✓	$78 \div 100 = 0.78$ ✓
2. 30%	9. 82%
$30 \div 100 = 0.30$ ✓	$82 \div 100 = 0.82$ ✓
3. 45%	10. 6%
$45 \div 100 = 0.45$ ✓	$6 \div 100 = 0.06$ ✓
4. 95%	rea
$95 \div 100 = 0.95$ ✓	1. 12.5%
5. 76%	$12.5 \div 100 = 0.125$ ✓
$76 \div 100 = 0.76$ ✓	2. 35.4%
6. 17%	$35.4 \div 100 = 0.354$ ✓
$17 \div 100 = 0.17$ ✓	3. 25.55%
7. 32%	$25.55 \div 100 = 0.2555$ ✓
$32 \div 100 = 0.32$ ✓	4. 103%
	$103 \div 100 = 1.03$ ✓

converting from decimal to percentage

example

$$1. 0.2 \times 100 = 20\% \quad 0.26$$

to change a decimal into a percentage, we multiply it by 100 and add a % sign

$$2. 0.57 \times 100 = 57\%$$

$$3. 0.175 \times 100 = 17.5$$

exercise

$$1. 0.1 = 10\%$$

$$2. 0.2 = 20\%$$

$$3. 0.3 = 30\%$$

$$4. 0.7 = 70\%$$

$$5. 0.9 = 90\%$$

$$6. 0.72 = 72\%$$

$$7. 0.34 = 34\%$$

$$8. 0.89 = 89\%$$

converting from fraction to percentage

example

$$1. \frac{80}{100} = 80\%$$

make the denominator 100, then read off the numerator and add a % sign

bottom needs to be 100

$$2. \frac{3}{10} = \frac{3 \times 10}{10 \times 10} = \frac{30}{100} = 30\%$$

$$3. \frac{35}{70} = \frac{35 \times 50}{70 \times 50} = \frac{1750}{3500} = 50\%$$

exercise

$$9. 0.56 = 56\%$$

$$10. 0.04 = 0.4 (4) \quad 100$$

Red

$$1. 0.126 = 12.6\%$$

$$2. 0.456 = 45.6\%$$

$$3. 0.012 = 1.2\%$$

$$2. \frac{72}{100} = 72\%$$

$$3. \frac{9}{100} = 9\%$$

$$4. \frac{1}{10} = \frac{10}{100} = 10\%$$

$$5. \frac{2}{10} = \frac{20}{100} = 20\%$$

$$6. \frac{2}{10} = \frac{20}{100} = 20\%$$

$$7. \frac{2}{10} = \frac{20}{100} = 20\%$$

$$8. \frac{2}{10} = \frac{20}{100} = 20\%$$

$$9. \frac{2}{10} = \frac{20}{100} = 20\%$$

$$10. \frac{2}{10} = \frac{20}{100} = 20\%$$

orange

x5

$$\frac{4}{20} = \frac{20}{100} = 20\%$$

$$\frac{20}{100} = 20\%$$

$$\frac{20}{100} = 20\%$$

converting from percentage to fraction

example

$$1. 10\% = \frac{10}{100} = \frac{1}{10}$$

write the percentage out of 100 and then simplify

$$2. 73\% = \frac{73}{100} \quad \text{you can't simplify this one.}$$

$$3. 22\% = \frac{22}{100} = \frac{11}{50}$$

exercise

$$1. 20\% = \frac{20}{100} = \frac{2}{10} = \frac{1}{5} \quad \text{you can divide } \times 2$$

$$2. 30\% = \frac{30}{100} = \frac{3}{10}$$

Illustrative Example 18

A section of a lesson plan for a Year 7 mixed ability class that highlights the use of starter questions to activate prior knowledge needed for the lesson. One of the ways that this could have been improved is to include possible misconceptions that pupils may have with the starter questions and how to address these misconceptions in my lesson plan.

Time	Activities/Methodology/Key Concepts (Teacher's Role – including key teaching points, differentiation strategies and key questions)	Pupil Tasks (Pupils' role –including differentiation, engagement in formative assessment and homework)	Resources (Including Health and Safety requirement)
Opening phase (with links to prior learning)	Instruct pupils to write the date and title starter in the back of their books. Questions require use of rules covered in the previous lesson, activate prior knowledge needed for a consolidation task later in the lesson. Tell pupils that they do not need to write out the questions and that they can look back in their books at the rules and examples from last lesson to help them answer the questions. Take the register while pupils are working. Call on individual pupils to give answers and explain the method used. Ask how many pupils got all the questions correct to assess understanding.	Pupils will complete the starter questions. Pupils will provide verbal explanations and answers when called upon. Pupils will answer the register using the welsh phrase of the week. Pupils will raise their hands to indicate how many questions they did correctly.	

Critical Reflection

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The first Professional Teaching Experience (PTE) that I have undertaken has been at a 3-16, English medium school in South Wales. The school is in a relatively deprived area with 28% of pupils receiving free school meals and an attendance rate of 93.8% for the academic year 2018/19. I have taught two Year 7 mixed ability classes that are comprised of pupils with prior attainment levels ranging from 3-5 on the national curriculum levels for Mathematics. I have taught a Year 9 set 1 class that is following the WJEC Higher tier specification for Mathematics and Numeracy. I have also taught a Year 10 set 2 class that is following the WJEC Intermediate tier specification for Mathematics and Numeracy. I have made a variety of pedagogical choices during PTE 1; these choices have been influenced by the theoretical knowledge I possessed at the onset of the placement and the practical knowledge I have gained while teaching. I will discuss the progress that I have made in planning and implementing three of the pedagogical principles that Donaldson outlines in *Successful Futures* which constitute good teaching and learning and suggest how I will make further progress towards these principles. The three principles that I will reflect upon are:

1. Good teaching and learning means employing assessment for learning principles.
2. Good teaching and learning regularly reinforces Cross-Curriculum Responsibilities, including literacy, numeracy and digital competence, and provides opportunities to practice them.
3. Good teaching and learning sets tasks and selects resources that build on previous knowledge and experience and engage interest.

Assessment for Learning (AfL) is defined as the approach of finding and analysing evidence that can be used by both practitioners and learners to consider where the learners are in the learning process and where to go next (Assessment Reform Group, 2002). Donaldson advocates the use of AfL strategies as a means of providing teachers with an awareness into the efficacy of their pedagogical choices and their effect on pupils' learning that is then used to feedback into, and modify teaching (Donaldson, 2015).

In day to day practice, informal AfL approaches are utilized during each phase of the learning. Questioning pupils, observing pupil activity and assessing pupils' progress throughout the lesson allows the teacher to make decisions as to how to proceed with the learning and make ongoing adjustments (Tanner & Jones, 2000; Donaldson, 2015; Welsh Assembly Government, 2010). Effective use of AfL strategies has been found to produce an improvement of one grade at GCSE for higher attaining pupils, two grades for average pupils and three grades for lower attaining pupils (Black & Wiliam, 1998). The benefit of successful AfL is therefore particularly marked for lower attaining pupils.

One of the criticisms of AfL strategies is that if learning is defined as “as a change in long term memory” (Kirschner, et al., 2006) then how can learning be assessed during the lesson in which the learning is taking place? (Didau, 2016; Nuthall, 2005). Didau suggests that what is actually being assessed is performance and what is perceived as learning is more likely to be mimicry. Critics of AfL argue that the only way to assess the effectiveness of teaching is to discern whether a change in long term memory has occurred (Griffin, 1989; Didau, 2016).

However, both critics and advocates of AfL agree that strategies can provide evidence that learning has not occurred (Didau, 2016; Wiliam, 2014). A pupils' correct answer to a question may not be sufficient to make judgements about learning but it can be interpreted as enough to move onto the next phase of a lesson (Barton, 2018). Likewise, an incorrect answer can indicate a lack of learning and allow practitioners to identify, then address, pupil misconceptions. It is widely agreed that AfL strategies are best used to make pedagogical choices based on the available evidence to move the learning forward (Tanner & Jones, 2000; Chambers & Timlin, 2013; Wiliam, 2011). To pitch future lessons within the pupils' zone of proximal development (Vygotsky, 1978) to encourage optimal learning, effective AfL is required (Tanner & Jones, 2000).

Effectively employing assessment for learning strategies was a particular challenge at the beginning of Professional Teaching Experience (PTE) 1, as I only had limited theoretical knowledge of AfL and lacked a practical understanding of how AfL strategies are used in the classroom. During lesson observations I focused in particular on the AfL strategies the teacher chose to employ during each phase of the lesson as seen in Illustrative examples 1 to 3. I began to use techniques such as questioning, thumbs up, circulating the classroom and asking pupils how many questions they did correctly after an exercise that I had observed other teachers use effectively.

One of the AfL strategies that I have developed throughout PTE 1 is questioning. Wiliam posits that questions only have two purposes in the classroom; to provoke pupil thinking and as means of giving the teacher evidence of how to advance the lesson (Wiliam, 2011). Questioning has been found to be the main approach practitioners use to assess understanding (Fisher & Frey, 2014; Heritage & Heritage, 2013). Initially much of my questioning consisted of recall and simple numerical questions. As PTE progressed I began to utilize this kind of questioning more effectively to assess prior knowledge and identify existing misconceptions (Tanner & Jones, 2000; Chappuis, 2015; Hattie, 2012).

The form of questioning that I most struggled with were probing and open questions that require pupils to justify their answers, as evidenced by my mentor's feedback comments in Illustrative examples 4 and 5. Based on the research this is common amongst novice teachers (Senk, et al., 1997; Tanner & Jones, 2000; Stiggins, et al., 1989). Research indicates that both lower and higher order questions need to be used in combination to facilitate effective learning (Cotton, 1988). Asking more open questions would develop pupils' higher order thinking and I would gain a deeper insight into pupils' conceptual understanding based on their responses (Morgan & Saxton, 1994). Developing my use of questioning was one of my personal targets and

as such I reflected on how to use them for effectively as an AfL strategy in one of my weekly reflections as seen in Illustrative example 6. I then started to plan the kinds of open questions that I wanted to ask pupils, and this resulted in an improvement in my questioning, comments by mentor teacher as seen in illustrative example 8 on subsequent lessons reflect this. As the Year 7 classes I was teaching were mixed ability with pupils ranging from national curriculum levels 3 to 5, open questions were particularly useful to assess understanding (Tanner & Jones, 2000).

The AfL strategies that I used most consistently were circulating the classroom to check pupils' work and asking pupils for a show of hands after they completed a task to check how many pupils got a certain number of questions correct or for differentiated exercises to check how many pupils completed each question set as supported by the Illustrative examples. Literature highlights the need for AfL strategies to be planned in advance for optimal success (Chambers & Timlin, 2013; Tanner & Jones, 2000; Welsh Assembly Government, 2010). Hence, I included these AfL approaches in my lesson plans and had an awareness of possible pupil misconceptions and how I might address them with pupils while circulating the classroom. This is an area that I will continue to develop in future. I used pupils' responses of how many questions they did correctly, compounded with the work I had seen while circulating to inform the next lesson, whether to cover more examples, give pupils more time on an exercise or move on. Through the use of these AfL strategies I was able to discern whether I had pitched the lesson at the right level and adapt the next lesson accordingly when I had not. This links to another of Donaldson's principles to set tasks and select resources that build on previous knowledge and experience.

I feel that during the first block of PTE 1 I have developed my use of questioning as an AfL strategy as evidenced by the illustrative examples for this principle. To develop my practice further I will use AfL strategies that elicit evidence of whole class learning that require all students to participate, such as using mini-white boards, loop cards and exit passes. These kinds of strategies allow the teacher to collect evidence about each learner's progress at the same time and help to avoid overreliance on the answers of a few confident pupils who volunteer responses (William, 2011).

The cross-curricular responsibilities of literacy, numeracy and digital competence are essential to develop the basic skills and capabilities that are required for learning across the subject disciplines (Donaldson, 2015). The Literacy Numeracy Framework (LNF) and the Digital Competence Framework (DCF) provide guidance for practitioners on how to meet these statutory requirements. Donaldson highlights the "fundamental role of language in thinking." and as such, recommends that literacy be developed and reinforced across all areas of learning experience (Donaldson, 2015). Language is integral to forming concepts and connections, for mathematics in particular language is essential to assimilate new information, produce new ideas, structure understanding of the connections between concepts and communicate this understanding (Adams, 2010). Pupils require the ability to communicate their mathematical thinking appropriately, analyse and evaluate the thinking of others and use mathematical terminology precisely.

When planning lessons, I have incorporated elements of the literacy strand of the LNF that pupils will be required to use during the lesson to meet the learning objectives, such elements can be seen in illustrative example 9. The Year 7 classes that I taught were completing a Seaquest project, as such I used the Seaquest resources as starter tasks to activate prior knowledge and engage interest. This also demonstrates Donaldson's principle to set tasks and select resources that build on previous knowledge and experience. illustrative example 11 reflects my assessment of pupils' engagement with the task. I called on individual pupils to read the text boxes aloud, then pupils would pick out the key information to be underlined on the board and any unknown words from the text would be discussed as a whole class. This developed their listening skills when listening to other pupils read and asked thoughtful questions based on what they had heard and pupils' reading skills were also developed by picking pertinent information out from the text.

Numeracy can be defined as the ability to solve everyday problems involving number by employing appropriate strategies based on mathematical knowledge and skills (Mathematical Association, 1992). Tanner and Jones add that the ability to construct solutions in context is also essential to numeracy (Tanner & Jones, 2000). During the first block of PTE 1 I did not incorporate enough problem solving into the lessons I taught. I favoured teaching approaches that separated out the areas of mathematics and focused on pupils practicing a method until they had gained fluency then applying them to more abstract or worded problems as seen in illustrative example 12. I now recognise that to improve pupils' numeracy skills I need to employ teaching that makes connections between areas of mathematics and that encourage pupils to devise the most efficient strategy for finding solutions (Askew, et al., 1997).

Practice that most effectively develops numeracy are found to be interactive whole class problem solving lessons where pupils are challenged and higher order thinking is fostered (Tanner & Jones, 2000). Studies have also shown that regular whole class questioning has a positive effect on numeracy skills (Askew, et al., 1997; Reynolds & Muijs, 1999). To develop pupils' numeracy, I will use rich tasks and whole class problem solving activities that require pupils to organise information, recognise relationships choose an efficient strategy and present their solutions. To use these teaching approaches effectively I will need to incorporate AfL strategies to be able to scaffold sufficiently and plan tasks that engage interest if pupils are to remain focused and on task throughout the lesson.

Digital competence is described as "the set of skills, knowledge and attitudes that enable the confident, creative and critical use of technologies and systems." (Gwegogledd Cymru, 2018). The Draft Curriculum for Wales 2022 guidance emphasizes that digital competence "is more than the interaction with technology." (Welsh Government, 2019). Digital skills can be utilized to enhance pupils learning experience and develop or strengthen pupils mathematical understanding. Conversely, strong conceptual understanding and the ability to transfer mathematical knowledge can also be used to develop pupils' digital skills. Research has consistently found that the use of digital technology in mathematics education results in at least a moderate improvement in pupils' learning (Ronau, et al., 2014; Cheung & Slavin, 2013)

I have made little progress towards meeting the responsibility to develop digital competence during the first block of PTE 1. I have struggled to incorporate opportunities for pupils to develop their digital skills into lessons as a natural part of teaching. Initially, I felt that the topics I taught did not lend themselves well to developing digital skills. I recognise now that this may be due to a lack of creativity and broad understanding of how digital competency can be developed on my part. Upon reflection I realise that software such as Excel could have been used for guided-discovery learning. For example, pupils could have used Excel to derive the formula for the sum of interior angles in a polygon. One of the reasons that I did not consider this at the time is that pupils do not have access to laptops in the classroom so a computer room would have had to be booked in advance of the lesson. To make further progress towards this responsibility I will plan lessons that include pupils' use of technology, use online quizzes such as Kahoot as an AfL strategy and set pupils homework to consolidate classroom learning using the online resource HegartyMaths.

Prior knowledge has been found to be integral to pupils' learning (Marzano, et al., 2000; Tanner & Jones, 2000). Prior knowledge can be defined simply as what a pupil already knows about a topic or concept coming into a lesson (Marzano, et al., 2000). When learning something new, pupils integrate the new information into their existing knowledge structures, build new understanding and adapt their current understanding accordingly. Piaget (1972) describes this process as "assimilation". Pupils who lack, or have difficulty activating prior knowledge tend to also have difficulty making progress in mathematics (Campbell & Campbell, 2009).

Practitioners also agree that engaging pupils is a key component of mathematics teaching and that such engagement is visible to observers (Wilson, et al., 2005; Appleton, et al., 2011). Engagement in the classroom can be defined as task-oriented thinking that pupils demonstrate by taking part in class activities (Helme & Clarke, 2001). Interest can be defined as pupils' personal engagement with topics and activities (Frenzel, et al., 2010). A correlation has been found to exist between interest and learning, with a lack of interest often resulting in a lack of learning (Schraw & Lehman, 2001). There is some criticism of attempting to tailor lessons to engage pupils' individual interests, by using football for example, as it is impractical to try to engage 30 different pupils' interests per lesson. Firsov (2004) advocates engaging pupils' situational interest instead. Donaldson (2015) states that a "one size fits all" approach to teaching cannot fit the differing needs of learners but also warns against separating pupils into "potentially superficial groups" based on interests or prior attainment alike.

During PTE 1, I used starter tasks to activate the prior knowledge that pupils required to meet the lesson's learning objectives. Activating prior knowledge by such simple means as asking pupils questions about a topic and recapping known methods before introducing a new concept has been found to increase achievement (Campbell & Campbell, 2009). Initially, I would call out the answers to the starter questions for pupils to self-mark but I quickly realised that I was missing the opportunity to assess

pupils' prior knowledge by doing this. Instead I began to call on individuals randomly to provide verbal answers and to explain the method they used to find the answer. I was then able to spot gaps in pupils' prior knowledge and identify misconceptions. The importance of knowing what pupils are likely to have previously learned and their possible misconceptions is emphasised by (Husbands & Pearce, 2012). The school's scheme of work that I used to plan my lessons was very detailed and this gave some insight into the kinds of prior knowledge pupils should have. I recognise now that I could have spent more time looking at pupils' books and discussing what had already been covered with the class teachers I would be working with during the observation week of PTE. Building on prior knowledge is an essential part of mathematics teaching and I will continue to create opportunities in my teaching for pupils to make complex connections between topics by utilising recapping strategies (Rosenshine, 2012).

I struggled with the concept of engaging pupils' interest at the onset of PTE as my ideas of what pupils would find interesting and what pupils actually find interesting did not align. I focused on using a variety of tasks and perhaps did not consider that it was the content of the task, not the task itself, that pupils should find interesting. Tasks such as the codebreaker seen in illustrative example 13 allowed pupils to practice finding percentages but the class was not especially interested in breaking the code. As the placement developed, I began to form a relationship with the pupils and became better able to predict what might interest them. I tried to create a hook to pique pupils' interests at the beginning of the lesson such as the use of Transformers characters in illustrative examples 14 and 15. This not only engaged pupil interest but also began to develop pupils conceptual understanding of what it means to convert between fractions, decimals and percentages as supported by my mentor teachers comments. To make further progress in engaging pupils interest I will try to place greater emphasis on the usefulness and real world applications of topics as this has been found to influence pupils' interest (Tanner & Jones, 2000). I may also try to develop hooks across topics not just individual lessons, especially for the KS3 classes I teach as they are familiar with this approach from the Primary phase.

Overall, during PTE 1 I feel that I have made good progress towards the pedagogical principles of employing assessment for learning strategies and setting tasks and selecting resources that build on previous knowledge and experience and engage interest as evidenced by the discussion of illustrative examples and the supporting literature. I feel that whilst I have made progress towards regularly reinforcing the Cross-Curriculum Responsibilities of literacy and numeracy, I have not made any progress towards developing pupils' digital competence and this will be one of the key areas for development in the second block of PTE.

3168 words

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Wednesday, 18 December 2019 10:06

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