Increasing Engagement in a Classroom and Online Learning Environment

Developing and Reflecting on Professional Practice

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Introduction

This assignment focusses on student engagement, specifically methods to increase participation and motivation both within a classroom and within an online learning environment. Planning a lesson based upon the literature reviewed, I aim to achieve an increase in engagement by employing strategies such as 'Think-Pair-Share' and allowing students to choose their own task, with students' progress being checked and recorded throughout. This aspect of my professional development was chosen after Review Point 2, with discussions with my mentor concluding that I needed to "generat[e] enthusiasm, participation and a commitment to learning".

Linking with Teachers' Standard 1, "set high expectations which inspire, motivate and challenge pupils", and Teachers' Standard 2, "promote good progress and outcomes by pupils" (Dept. for Education, 2011, p.10), it was of paramount importance that students were actively participating in online learning and taking responsibility for their own work at home during the COVID-19 lockdown. It was through engaging lessons that this could be achieved, with students forgoing the many distractions present at home in favour of involvement with the lesson. The review of literature regarding engagement will start with a standard classroom setting, with the benefits of planning such engaging lessons being observed within and outside of mathematics. This will then be extended to literature discussing the aforementioned online learning, with a more critical stance being taken due to the relative recentness of the subject matter, with little experimental data being available. I will then deliver a lesson on converting ratios to fractions, focusing on student participation to increase engagement. Concluding with an analysis of my own finding, I measure the impact that this had on my students by using an 'exit ticket', as well as exploring the development of my own personal teaching practice.

Research

When analysing engagement in a school setting, we first must define what engagement is. Many authors have constructed different definitions for the concept of engagement, with Veiga et al. stating that it is a "multidimensional construct that unifies affective, behavioural, and cognitive dimensions of student adaptation in the school" (Veiga et al., 2012, p.1336). Affective, or emotional, refers to not only the sense of belonging and identification within the school, but the students' emotional reaction with the teachers within a classroom. Behavioural refers to "the actions and practices directed towards learning and school" (Wirth, 2012, p.21), and also includes the learner's attitude towards their peers. Finally, cognitive refers to a student's personal aspirations and motivations, ranging "from simple memorization to the use of self-regulated learning strategies that promote deep understanding and expertise" (Fredricks et al., 2004, p.61).

When discussing engagement, we must endeavour to consider these related dimensions and their links to motivation, the latter being "seen in the direction, intensity, persistence and quality of what is done and expressed" (Maehr and Meyer, 1997, p.373). Reeve and Lee (2014) initially expresses the established forwards implication resulting from an increase in

motivation, showing an increase in engagement, before showing that a backwards implication is also present. Therefore, throughout this assignment and my analysis, I take engagement and motivation towards a lesson to be closely linked and sometimes indistinguishable from one another in regard to students' progress.

It is worth mentioning, however, that Headden and McKay (2015) and the Perth and Kinross Council (2018) found that engagement in a classroom is difficult to objectively measure, with different teachers and schools developing their own tools and assessments to measure engagement. This leads to anomalies, with direct comparison between results not always being possible due to differing measurements of engagement, be it measured behaviourally or academically. We therefore take caution when analysing results.

A lack of engagement with both lessons and the school system itself has been shown to lower a student's achievements (Fredricks et al., 2004), with boredom and alienation playing a part in the behavioural problems exhibited within both settings (Martin and Torres, 2016). It is therefore important for teachers to encourage and promote engagement and motivation within each of their lessons, contributing to a positive school climate and culture. There are many ways this can be achieved, with one such strategy being to give the students a sense of control (TeachThought, n.d.). Allowing the students to choose which task they want to complete provides them with an opportunity for independence and reflection on their own learning, with Cosden et al. (1995) finding that this approach helped those students with severe behavioural problems focus on work and kept them engaged within the lesson. Cosden et al. did however find that this approach worked best in conjunction with the more tradition teacher-controlled approach, with higher academic performance being observed when both procedures were combined. Another study by Beveridge (2004) showed that students wanted to take more responsibility in decision making and actively participate in lessons, with this ultimately leading to better behaviour and higher achievement. However, some students felt that the earnest was on teachers to be responsible for their learning and concerns were raised by teachers of the addition pressure put on pupils. These results highlight the need for a balanced approach to teaching, providing enough teacher led direction to keep students on track while also giving the students time to take responsibility and be engaged with their own learning.

One way of achieving increased student independence is by providing them with a variety of tasks designed such that the students can choose what they want to work on. This can also be used in conjunction with self or peer marking, so that the students can see their progress being made independently throughout the lessons (Sharma et al., 2016). It should be noted that as mentioned by Cosden et al. (1995), this needs to be monitored by the teacher as to make sure every student is on track and focusing on the work.

Another strategy shown to improve engagement within the classroom is "Listen-Think-Pair-

Share" (also known as 'Think-Pair-Share'). "With this strategy, students are taught to listen to the question, think about the question, to discuss the question in pairs, and finally . . . share with the total group." (Lyman Jr., 1981, p.110). In relation to mathematical discussions, Reinhart (2000) found that this technique, paired with 'cold calling' (Lemov, 2015), was effective in improving student confidence and engagement. He found that students felt less insecure when proposing their group's ideas, with responsibility for the answer being shared between the group or pair. Griffin also noted that his lessons seemingly had more energy after asking pupils "to explain to the rest of the group what you did" (Griffin, 1989, p.13). This approach builds on the need for positive relationships between peers, with Wentzel et al. (2004) finding that students without peer support and friendship suffered from a lower academic performance and more emotional distress in school. Topping furthers this, showing that a cooperative peer approach to learning "yield[s] significant gains in academic achievement." (Topping, 2005, p.635)

Stockard (2015) contrasts this approach with direct instruction, whereby the teacher has more control over student direction and thought through the use of questioning. Although this strategy has also been found to improve student progress on problem solving tasks, Kewley urges caution when favouring one method over the other. "The fact that both [peer learning and directed instruction] promote learning is supported by scientific evidence. However, . . . [r]ather than suggesting that one type of methodology should be exclusively employed in the classroom, the outcomes of this study emphasize the importance of having students experience a broad range of instructional strategies" (Kewley, 1998, p.31). Webster (2021) noted similarities between his and Griffin's lesson after implementing this balance of 'Think-Pair-Share' and directed instruction, with students being more engaged with the lesson and academic improvement being shown in topics the students previously struggled with.

Regarding online learning, strategies such as these cannot be fully implemented and are clearly not practical in certain contexts. Nevertheless, engagement with schoolwork and online lessons is still important, arguably more so when direct face-to-face contact is not possible. Merely live streaming lessons taught by teacher dictation has been shown to decrease engagement within the lesson, with the National Foundation for Educational Research (NFER) reporting that "[s]chools delivering learning content to pupils through online conversations, have higher general pupil engagement levels . . . and an increased probability of having highly engaged disadvantaged pupils" (Lucas et al., 2020, p.32). Martin and Bolliger (2018) also found that the use of online communication tools for peer interaction during online lessons was the most beneficial engagement strategy, while also finding that, in comparison, student to teacher engagement strategies appeared to be the most valued.

These results show the express need for collaboration and interaction with others, corroborating the prior findings regarding offline learning, while also highlighting earlier concerns by Cosden et al. (1995) and Beveridge (2004) about independent learning. Yates et al. furthers

this, stating that although "only a minority (10%) [of students surveyed] preferred learning at home [during the COVID-19 pandemic] ... [i]t was clear participants valued agency over the time and pace at which they learned" (Yates et al., 2020, p.6). A blended approach to online and in person teaching need not overlook these importances either, with the NFER stating that "[e]vidence on distance learning highlights the importance of interactive learning, consolidating learning and supporting pupils to self-regulate their learning as effective strategies as part of a mixed diet of provision" (Sharp et al., 2020, p.3).

A strategy to increase online engagement and discussion is based on 'game-based student response systems' (Wang, 2015). Using competitive quizzes, Wang found that student engagement and motivation to learn had increased, with Licorish et al. further finding that "the use of [technology dependent] games in the classroom can largely minimise distracting classroom behaviours and activities, and improve the quality of teaching and learning beyond what is provided in conventional classrooms (e.g., normal PowerPoint slides and chalk and talk)" (Licorish et al., 2017, p.755). Moreover, after a five-month period, student engagement was still boosted by the competitive nature of the games, despite heavy repeated usage. As these studies were done in a classroom with the student's own mobile devices being used, it is trivial to extend the usage to a wholly online learning environment, such as that during the COVID-19 lockdown.

With any fully online approach however, it is important that the students are not distracted by external factors such as social media or home life distractions whilst participating in online learning. A classroom study by McCoy (2020) found that using digital devices for non-class related purposes had a detrimental impact on overall academic outcome, with Schmidt (2020) noting that this effect carries over to students learning online. Although difficult for teachers to regulate students' distractions at home, Schmidt asserts that decreasing boredom can limit its effects. Thus, a teacher can eliminate the need to seek out a distraction by focusing the students' attention on an engaging task, the process of which has been discussed with the previous research.

Implementation and Reflection

Engagement is important within all my classes and was especially so during the COVID-19 lockdown. At the time of writing this assignment, students have returned full-time in school with health restrictions being in place. Hence while planning this lesson, these restrictions had to be considered, with certain activities being unfeasible due to movement around the classroom or a lack of social distancing being possible. The chosen class was a middle ability Y7 class consisting of 22 students in total, 12 girls and 10 boys. Of these pupils, 2 had Special Educational Needs (SEN) and 3 had English as an Additional Language (EAL). Provisions for these pupils were taking into account when planning the lesson, none of which had an impact on the execution of the lesson however. The lesson focused on converting ratios to fraction,

the lesson objective being to "be able to write a 2-part ratio as a fraction", with higher ability students being "able to write a 3-part ratios as a fraction" (see Appendix A). This follows previous work by the class on how to simplify 2- and 3-part ratios and how to share into 2- and 3-part ratios.

The lesson began with a starter used by the school to practice core skills required within mathematics at KS3. Students sat down quietly and worked through questions in their "Numeracy Ninja" booklets with a timer of 5 minutes on the board. This starter is part of the routine set up over the year by their host teacher and I, and as such, due to the day this lesson was taught, this starter was used. After marking answers to the starter, I used 'cold calling' and 'no hands up' (Lemov, 2015) to ask and target questions to introduce a link between ratios and fractions of amounts. These techniques provided me with the opportunity to target weaker students, and keep the whole class listening and engaged whilst exploring this together. Students were enthusiastic to give their thoughts and opinions on the shapes shown on the board, with one student giving the simplified ratio as an initial answer, a skill learnt and developed in previous lessons.

Moving onto two examples, I planned to use a variation of 'I do, We do, You do' (Lombardi, 2019). This was done to involve students with the examples and to gain a measure on how much the students understood. After viewing student's work from a distance, following health restriction guidelines, I again 'cold called' targeted pupils to give their answers and explain their working. On the first example, one student had wrote $\frac{2}{3}$ rather than the correct answer of $\frac{2}{5}$, and as such I asked the pupil sitting next to them to explain where they had gone wrong. I had hoped that this would increase engagement by bringing more students in on the discussion as well as strengthen their mathematical knowledge by explaining a concept in their own words. I also feel that this assisted the initial student too as later in the lesson they could explain their earlier mistake in their own words. Overall, these examples followed direct instruction from the teacher, keeping the warning of varied instruction in mind (Kewley, 1998). Following the examples, the students had around 10 minutes to complete a set of questions on the board. During this time, I visited certain students to check their current understanding and explain concepts to them again, allowing them to progress in the rest of lesson. Answers were then displayed, and students marked them following the school's marking policy.

Through the use of 'Think-Pair-Share', the class was introduced to writing 3-part ratios as a fraction. Presenting two questions on the board, I gave the class 2 minutes to think about the questions in silence. Although silence was not fully maintained for the whole length of time, I feel many students attempted to answer both questions by themselves. Following this, another 2 minutes was given for the pupils to talk in pairs about how to solve the problems and their relation to the previous 2-part ratios. The majority of students I listened to could either correctly identify this relation and could answer the question, or could identify the numerator of the fraction. Only one pair of students did not engage with this task, as was evident when taking answers from each pair. Through questioning, I identified three other pairs that did

not fully understand the procedure and explanation behind the answers. I note too that for the previous examples, students seemed more eager to give their answers and explanations to the questions. Although objectively hard to measure, as mentioned by Headden and McKay (2015) and Perth and Kinross Council (2018), overall engagement seemed to improve after this activity, running concurringly with Griffin (1989) and Webster (2021).

Following on from this, the next activity allowed the students to decide between three tasks, each on separate sheets, as advocated by Cosden et al. (1995). Each task was designed to give the students more practice working with ratios and fractions, focusing on the area that they felt they needed to work on the most. The first sheet consisted solely of converting 2-part ratios into fractions, with the latter half of the questions requiring the simplification of the fraction afterwards. Students that struggled with the initial examples and questions on 2-part ratios chose this sheet, as intended, and throughout the lesson made progress in consolidating this skill. The second sheet was designed for those who felt confident with 2-part ratios and wanted to practice working with 3-part ratios, with the majority of the students choosing this sheet. The third consisted of more 3-part ratios but also included the secondary step of simplifying the fraction afterwards; only three students chose this sheet. Although slightly harder for me to manage the variety of questions and stages that each pupil was at during this task, the overall atmosphere of the classroom was positive, and they appeared to enjoy working on the sheet of their desired level. This links with Mason's (2002) discussion of challenge, where tasks set "need not be insufficient, leading students to not fully engage with the task set, or be too excessive, as to discourage the students attempting the task" (Webster, 2020, p.8). Each member of the class could decide their own personal level of challenge in the lesson and focus on the skills they need or wanted to develop.

To conclude the lesson, I planned an 'exit ticket' to allow me to see how each pupil progressed while also designed to incorporate reasoning. The question started by asking the students to write both a 2- and 3-part ratio as a fraction before linking back to a previous lesson's work involving comparing fractions. This allowed me to see what the students had learnt this lesson and how each student had progressed, while also showing which students could link previous topics to the lesson. After marking these, all but one pupil could write the 2-part ratio as a fraction, while fifteen answered the 3-part ratio question correctly. This shows that pupils had made progress within the lesson and the engagement strategies deployed positively affected learning, as per Topping's (2005) findings. The second part of the 'exit ticket' was not answered as well however, with only seven students answering correctly. This may be due in part to the lack of time the students had to answer the question though rather than lack of knowledge.

Reflecting on the lesson as a whole, I feel that the students made strong progress with ratios and fractions, due in part to 'Think-Pair-Share' and the opportunity for the students to decide

upon their own activity. 'Think-Pair-Share' was very well received by the students and, with the use of questioning throughout, ratios and fractions were explored as a class rather than as individuals. Throughout, the majority of the class was engaged with the activities and made progress towards the higher skill of writing 3-part ratios as fractions. Due to the COVID-19 restrictions however, I was unable to listen to every pair and make sure they were all on task, a similar regret to a previous lesson taught (Webster, 2021). This limitation contrasts the advice given by the NCETM (2008), with teacher communication with the students being limited throughout the activity. However, through questioning and by checking the answers and reasoning for every pair, I was able to gauge student progress and engagement with the task.

Allowing the students to choose their own worksheet also helped to maintain engagement within the lesson through the freedom of choice and putting them in control of their own learning. Although hard to judge based on a single lesson, I feel that the students were also better behaved during this task when compared to other similar activities in previous lessons, agreeing with the finding by Beveridge (2004). Other factors may also have influenced this, such as my continued effort to set and maintain my expectations in the classroom, along with other day-to-day factors. Without more data covering other lessons and classes, the impact of this in relation to engagement was inconclusive.

In the future I would like to explore further the use of 'game-based student response systems' as mentioned by Wang (2015). For this particular class I feel that a competitive game-based activity would be very engaging and would increase the overall energy of the classroom. This could be achieved through the use of technology, such as using the website 'Kahoot' to design quizzes, as mentioned by Licorish et al. (2017). The warnings of McCoy (2020) must be considered when introducing personal mobile devices into the classroom however, with non-class related activities needing to be monitored and avoided.

Although the lesson taught contained no online aspect, the impact of the COVID-19 pandemic has shown the need for more research in this area. A blended classroom approach has become more common place, with the important role that technology plays within a learning environment becoming evident. The current need to make lessons engaging for students at home as well as within a classroom provides me with the perfect opportunity to develop my teaching practice to reflect this, as it is the role of a teacher to encourage engagement, "inspire, motivate and challenge pupils" as per the Teachers' Standards (Dept. for Education, 2011, p.10).

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A Taught Lesson

Included below is the scanned lesson plan for the taught lesson along with the PowerPoint slides displayed.

A.1 Lesson Plan

Lesson Plan and Evaluation Template 2

Title of Lesson Ratios: Converting to Fractions

1. What is the CONTEXT of the lesson?	**TS2 TS3**
Students have simplified and shared into ratios in previous lessons. Focusing on increasing engagement through Think-Pair-Share (TPS) and choice of task.	
2. What PROGRESS do you want the students to make?	**TS2**
All will be able to write a 2-part ratio as a fraction. Some will be able to write a 3-part ratio as a fraction.	
3. How will you START your lesson?	**TS1 TS3 TS4**
Numeracy Ninja booklets. Time and Mark. Then explain the difference between a ratio & a fraction.	
4. What are the main? LEARNING TASKS/ACTIVITIES/CHALLENGES	**TS4 TS3**
I Do, you do, followed by practice with 2-part ratios. TPS looking at 3-part ratios before choose own task.	
5. How will you ADAPT your tasks and activities to meet the needs of all pupils?	**TS2 TS5**
Students can choose their own task focussing on 2-part, 3-part, or harder ratio questions including simplifying.	
6. How will you ASSESS PROGRESS?	**TS6**
Use Exit Tickets at the end of the lesson with a 2- and 3-part ratio, including reasoning. Questioning throughout.	
7. What RESOURCES will you require?	**TS4 TS5**
-Numeracy Ninja booklets. - PowerPoint - Printed questions (TPS & 3 sheets) -Exit Tickets	
POTENTIAL STUDENT MISCONCEPTIONS	**TS2 TS3**
Writing the fraction as 1 part over the other, rather than using the total. Incorrect notation using : and —.	
LESSON OBJECTIVE /OUTCOMES	**TS2 T56 TS6**
TBAT convert ratios into a fractions. Parts of a	

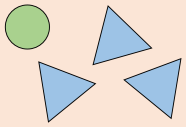
A.2 PowerPoint Slides

Ratios : Converting to Fractions

Starter

Numeracy Ninjas!

Sit down quietly and get your Numeracy Ninja books out



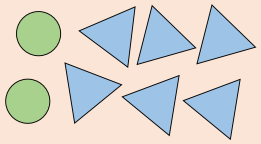
A ratio compares **quantities**.

1 :3

1 circle — 3 triangles

A fraction describes the parts of a **total**.

1 circle → $\frac{1}{4}$ ← 4 shapes



A ratio compares **quantities**.

2 :6

2 circles — 6 triangles

1 :3

'For every circle there are 3 triangles.'

A fraction describes the parts of a **total**.

2 circles → $\frac{2}{8}$ ← 8 shapes

$\frac{1}{4}$

'If we split the total into 4, one part of the shapes are circles.'

I DO

Describe the **first amount** in this ratio as a fraction of the whole.

1 :2

1) How many parts are there in total? = the denominator

2) How many parts is the first number? = the numerator

YOU DO

Describe the **first amount** in this ratio as a fraction of the whole.

2 :3

I DO

Describe the **first amount** in this ratio as a fraction of the whole.

3 :9 Simplify first!

1) How many parts are there in total? = the denominator

2) How many parts is the first number? = the numerator

YOU DO

Describe the **first amount** in this ratio as a fraction of the whole.

12 :8

Describe the **first amount** in this ratio as a fraction of the whole.

a) 1 : 4 $\frac{1}{5}$

b) 2 : 7 $\frac{2}{9}$

c) 6 : 1 $\frac{6}{7}$

d) 3 : 5 $\frac{3}{8}$

$\frac{7}{10}$

e) 7 : 3 $\frac{3}{18} = \frac{1}{6}$

f) 3 : 15 $\frac{20}{45} = \frac{4}{9}$

g) 20 : 25 $\frac{10}{40} = \frac{1}{4}$

h) 10 : 30 $\frac{16}{48} = \frac{1}{3}$

$\frac{10}{35} = \frac{2}{7}$

i) 16 : 32

j) 10 : 25

Challenge

2.5 : 15 $\frac{1}{7}$

Think, Pair, Share

1) For 2 minutes, in silence, think about how we could convert the two questions below.
2) For 2 minutes, talk to the person next to you about what you think.
3) I will call each pair to give their thoughts

Describe the **first amount** in this ratio as a fraction of the whole.

1 :3 :5

Describe the **first amount** in this ratio as a fraction of the whole.

2 :8 :4

Describe the **first amount** in this ratio as a fraction of the whole.

1 :2 :4

1) How many parts are there in total? = the denominator

2) How many parts is the first number? = the numerator

Describe the **first amount** in this ratio as a fraction of the whole.

14 :21 :35

Choose your task!

Choose one of the 3 sheets to complete!

Sheet 1: More practice converting 2 part ratios to fractions

Sheet 2: Converting 3 part ratios to fractions

Sheet 3: More 3 part ratios including simplifying

Exit Ticket - Reasoning

a) Describe the **first amount** in these ratios as a fraction of the whole.

1 :6 2 :6 :4

b) Which fraction is bigger?