



**CENTRES FOR
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RUNSHAW COLLEGE

What impact does the introduction of Flipped Learning have on learners' experience of the GCSE maths resit course?

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Summary

During the academic year 2020 – 2021, Flipped Learning was implemented within the GCSE mathematics resit Scheme of Work. An online platform was selected to host the Flipped Learning activities given the restrictions posed on the Northwest of England throughout the pandemic. Three hundred and forty-eight students were tracked across two campuses throughout a nine-week period, however, the activities were embedded throughout the whole teaching year. Additionally, a mid-cycle snapshot of both student and teacher opinions was conducted, along with three student focus groups, and one teacher focus group at the end of the tracking period. Results showed that student confidence was higher when learners completed Flipped Learning prior to lessons, and those teachers that bought into the concept, and chased students to complete the work, showed higher levels of engagement. Recommendations as a result of this study suggest that up front investment into teacher's skills and understanding of Flipped Learning is vital to success, and tasks must better reflect the resit learner journey.

Thanks go to our research team and Centre's for Excellence in Maths partners at Runshaw College, along with the whole GCSE maths resit teacher team at Nelson and Colne College Group.

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Introduction

Our Setting and The Effects of COVID-19

The Department for Education (2020) gave the responsibility of balancing teaching and learning, with student and teacher safety, to individual school and college settings (Gov.uk, 2020). Due to the high levels of infection within the North West of England, colleges shifted towards a blended learning model for the academic year 2020-2021 and there was a need for learners to become more independent than ever before. Students, however resistant to homework and revision, were forced to work more independently and follow an approach more similar to a higher education (HE) setting than of high school or Further Education (FE) whilst learning remotely from home.

This shift to a blended model required a certain level of technology access to enable students to take part in lessons and activities. A study commissioned by The Sutton Trust found that during the first lockdown in 2020 “A third of pupils [were] taking part in online lessons while schools [were] closed” (Cullinane and Montacute, 2020, p.1). For such unprecedented times this exemplifies the education sector’s ability to react and implement new strategies for learning, yet, two thirds were reportedly not accessing lesson. The same investigation reported more than 50% of students in fee paying schools were accessing online lessons, which puts into questions why there were more public-school attendees to virtual lessons.

There continues to be disparity between socioeconomic backgrounds where access to education is concerned. This inequality impacted the standard of student entering FE settings in September 2020. A large majority of students did not have access to online lessons in the first lockdown of 2020, due to technology poverty or secondary schools unable to support the lessons. It was clear to the team when reviewing initial assessments that this impacted on students’ content knowledge and ability to work independently on GCSE maths resit courses.

For this study setting we must consider the social climate and the impact that has had on the research. National data shows that Pendle, Burnley and Hyndburn rank in the 20% most deprived areas in England on a multitude of scales. For example, these council areas fall in the top 20% of most deprived areas for health deprivation and employment deprivation; with Whitefield ward in Pendle ranking the most deprived ward in England on the scale of living environment (Lancashire County

Council, 2020). This level of deprivation has had a huge impact on planning for action research. There is a reliance on access to technology to support this work; however, the college itself did strive to give laptops to all students without access before, or in the early stages of September 2020. Therefore, to ensure equality across the research, no platform that required more than a laptop or tablet to access the work was used, therefore, ensuring all students were given a fair chance to take part and benefit from the work.

Literature Review

The GCSE Mathematics Resit Landscape

As teachers we are constrained by the prestige of the GCSE qualification. However, resit students have not managed to pass in school, therefore, their experience studying GCSE in secondary school, be it teaching, or other external factors, hasn't worked for them. If FE maths education, and employers, continue to hold GCSE qualifications in such high esteem then a radical rethink about what goes on in the classroom to support the progression of our students, and address the way in which we access the skills of vocational learners is needed (Noyes and Dalby, 2020).

“Well-established evidence shows that adults with basic numeracy skills earn higher wages and are more likely to be in employment than those who fail to master these skills...In England, the link between better basic skills, higher wages and lower risk of unemployment is particularly strong.” (Report of Profession Sir Adrian Smith's Review of Post-16 Mathematics, 2017, p.24). GCSE maths teachers have a duty to their learners to provide them with the best opportunity to pass the GCSE qualification during their resit year[s] at college; not only to ensure they are desirable to employers, but also to invest in their futures and ensure they have the best chance for employment. A person needs a functional understanding of basic maths to be able to contribute to society as a worker and citizen (Wilkins & Ma, 2003).

For many students, academic year 2020-2021 was their last year in FE study and their final chance to gain a GCSE in Mathematics qualification. A key concern when learners start their study program is the lack of basic conceptual understanding in Mathematics. As the GCSE Maths resit course runs for one year, there is little time to find and rectify gaps in knowledge during the course of the year. Manjul Bhargava (Rajghatta, 2014) suggests that mathematics is taught as a robotic subject.

Students who have had experiences where they view Mathematics as something

abstract to real life generally have less understanding and low levels of attachment to the subject. Within resit courses, teachers must try and provide a new way of accessing the content, inspirational insights into the use of mathematics, and engage students in an attempt to reverse poor prior experiences. This is not always a straight forward task.

The Flipped Classroom

Given the limited amount of teaching time in GCSE maths resit, flipped learning has become more favourable as a teaching style as it offers the opportunity to gain face-to-face time with students in the classroom. The flipped classroom model reverses traditional teaching methods and ideas. Students complete low level, low stakes tasks outside of the classroom before the lesson; as a result, in class work focuses on higher level, extension style tasks, usually set as homework in a traditional model (TES, 2019).

Teachers have been turning to a flipped classroom approach in order to accommodate more targeted in-class teaching (Muir, 2019). This approach has had a positive impact on teaching and learning, benefits include; more time for independent and student-led learning, more time for applying knowledge and skills, and freeing up the teacher to provide individualised support (Straw et al. 2015). This free time can be used to target gaps in knowledge and enable more one to one time in the classroom. As well as this, reports of increased student achievement, success and engagement have been found with some studies indicating a preference for Flipped Learning when compared with traditional methods (Muir and Geiger, 2016; Muir, 2016).

The flipped classroom model addresses various challenges with the traditional way of teaching. It provides space for active learning strategies and time for learners to engage in higher levels of Bloom's taxonomy (Krathwohl, 2002); for example, application, analysis, and synthesis (Nouri, 2016). These more sophisticated levels are essential for all reasoning and problem-solving questions and require students to understand topics more thoroughly.

Many researchers have investigated this model by asking learners to access an online video uploaded by an instructor prior to a classroom session, and use class time to participate in meaningful learning activities, instructor-guided problem

solving, and discussions (Fautch, 2015). As a result of flipped learning, students spend more time in discussion, group work and problem solving than just skimming over a textbook (TES, 2019; Hayes, 2019). One benefit of the flipped classroom is how it produces a more student-oriented approach whereby students can stop, rewind, and watch a video again, whereas typically in a traditional classroom some content may be misinterpreted. This allows the students to learn at their own pace (Fautch, 2015; Sahin, Cavlazoglu and Zeytuncu, 2014). We are warned in numerous studies that content creation, when using videos, can be an off-putting feature of the Flipped Classroom for teachers who are new to it, mainly due to the aforementioned time constraints. Straw et al. (2015) provide an example of using existing instructional video resources, rather than teachers' creating their own video content. The teachers in this study used existing resources for their Flipped Learning activities with positive results.

Additionally, Sahin, Cavlazoglu and Zeytuncu (2014) have shown that when students have completed Flipped Learning tasks they score significantly higher in class quizzes, compared with mini assessments in lessons where Flipped Learning did not feed the content. Practitioners often find that students cannot see the relevance in what they are doing because the exam seems months away. Quick, snappy, in class quizzes that show a clear impact for the students could have a positive effect on their confidence to partake in the lessons.

Research warns us that setting up a Scheme of Work which embeds Flipped Learning in its core is time consuming in its initial set up (Rutherford, 2016). The benefits however, are that once the set-up is complete the resources can be used in the future with minor tweaks as the years develop. Rutherford (2016) also states that student communication prior to Flipped Learning is imperative. We must show the learners what to do, how to access the work, what is expected of them when completing the tasks and why it is beneficial for their learning (Bullock, no date). Practitioners can fall foul to the idea that students will know how to use a piece of technology, or work independently, however, this is not always the case.

Recommendation 16 from Noyes and Dalby's (2020) Mathematics in Further Education Colleges Report states that "more effective strategies for out-of-class mathematics learning for FE students' needs to be developed, evaluated and

disseminated” (Noyes and Dalby, 2020, p.9). We need to develop students who are capable of taking ownership of their learning, and can work independently to prepare, or consolidate in-class work. The GCSE resit is taught within very limiting time constraints and development of out of class work is essential, not forgetting the importance of teaching students how to conduct this independent study, and not simply expecting them to know how to do it.

Benefits of Flipped Learning

Multiple sources state that Flipped Learning is beneficial, particularly for low level learners (Nouri, 2016). The cohort of learners on the GCSE program have achieved a maximum of a grade three, in previous years of study, and can be categorised in this low-level group. Due to the restrictions imposed regarding social distancing and class sizes, management in this college took the decision to change the make-up of the GCSE cohort in the academic year 2020-2021, to ensure staff and student safety. Traditionally, only those with a previous grade three would attend GCSE maths resit classes, and all others would be entered into a Functional Skills qualification; in the year 2020-2021 those who had a qualification on entry of a grade two also sat in GCSE resit classes as a result of the pandemic. The flipped approach may enable students from this group to build on their existing knowledge in a way that allows them to access the grade 4 topics and above, and with both grade two and three students mixed in classes, it can be argued that the need to find and reduce gaps in knowledge is greater than ever before.

Flipped Learning has been shown to create a more memorable experience (Oakes, Joubert and Lyakhova, 2019), potentially, this can create a new way of learning that resit students have not experienced before, thus making it memorable. Furthermore, Nouri (2016) states that the majority of students, in his study, had a positive attitude towards a flipped classroom and it strongly correlated with increased motivation and engagement.

On Craig Barton’s podcast, John Corbett describes how completing some of the learning beforehand can shift the focus of the lesson towards problem solving with the support of a teacher. This is essentially what this research wants to embed - a learning environment based on challenge and support, and not solely focused on fluency tasks and repetition. In addition, Butrymowicz (2012) notes in her article that Flipped Learning participation can lessen the achievement gap between low-income,

minority students and their more affluent peers. This piece of research could have an impact on students from low income and minority backgrounds, this study was conducted in an area with large portions of social deprivation.

“Maths and English skills are vital to economic growth, and to helping individuals to progress to further study, training and skilled employment.” (Report of the Independent Panel on Technical Education, 2016, p.48).

Arduser (2016) believes that the Flipped Classroom develops transferrable independent learning skills needed in the work place. Flipped Learning removes the teacher from the position of sole ‘expert’ and encourages the learners to investigate topics for themselves (Arduser, 2016). Students take ownership of their learning, or acquisition of base knowledge, skills which are valuable to employers. However, teachers must be careful and ensure students are ready for the independent responsibility of Flipped Learning. Often, practitioners assume that when learners reach Post 16 learning they are able to be independent learners, yet for many this is not the case. Additionally, students need to be taught how to work independently. Flipped Learning requires organisation, concentration, structure and engagement with note taking (Learning Foundation, 2020); it’s important to build an infrastructure for students to become independent learners.

However, there is a very real issue across Britain, and specifically for this work in the North West, of technology poverty. Staw et al. (2015) cites one of the challenges to Flipped Learning is access to technology; some students may not possess the technology to engage with Flipped Learning video tasks (Learning Foundation, 2020). Although the sector was catapulted into an educational world driven by technology due to the global pandemic, there continues to be learners across the country with limited access to the technology. This research had the support of college policy to ensure our learners were given access, however, it is a huge logistical project to manage.

Challenges to Flipped Learning

A key challenge for anyone introducing a Flipped Learning model is how to implement it to a new cohort of students. Mellefont and Fei (2016) found that students’ lack of preparation may hinder the effectiveness of the flipped classroom; and video length can leave students disengaged Hall and DuFrene (2015). The

team decided to use an existing virtual learning environment (VLE), as this was used by the team in 2019-2020 and students were somewhat familiar with it, and videos along with practice questions average 10 minutes to complete. It was reported by Toto and Nguyen (2009) that students were easily distracted when they watched a video in their study. Furthermore, a study from Wang (2017), states the effectiveness of the flipped classroom heavily relied on students' self-motivation. The way in which students are directed to the learning and the type of videos used essentially impacts the engagement of the students as a whole. It is also difficult for teachers to monitor student comprehension and provide real-time feedback for each student (Milman, 2012). A research assistant was assigned to manage this along with the course tutors. Students were also provided with a Flipped Learning book to make notes in whilst watching the videos.

A further challenge to the success of Flipped Learning in previous studies, noted by Hall and DuFrene (2015), a flipped classroom can create a lot of work for teachers in the initial stages. Content creation can be time consuming, and Flipped Learning becomes another add on to an already complex SoW for maths resit. This is something that the research team was alert to, especially given the impact of a global pandemic and the unprecedented times teachers were dealing with. Due to the CfEM project staff time release was safely secured to prepare and support the research, along with a project team to firmly monitor and support the administrative effects of the initial implementation of Flipped Learning. Yet, settings may not always be in this privileged position, literature is clear though that up-front investment is key to success.

[What Are We Hoping to Achieve?](#)

It's important not to put too much emphasis on student attainment as the only quantitative measure of Flipped Learning success. Garner and Chan (2019) conducted a case study review of previous literature, along with their own trial using two groups – traditional and Flipped. They note in their results that, although the Flipped Learning students showed increased levels of engagement and attainment throughout the year, there was no significant impact on their final result at the end of the year. This poses a dilemma for FE practitioners conducting research in the classroom. A lot of the Flipped Learning studies talk about increased engagement, and the benefits of this type of classroom for the lower level learner, however, if we

cannot significantly improve results for level 2 resit can we fulfil the main aim of the CfEM project. As a research team, to attempt to address this predicament, it must be acknowledged that, 1) we want to improve progression, there is no silver bullet that will work for everyone in FE, 2) implementation of new systems requires grit and determination and may not have a significant effect immediately, and 3) FE practitioners understand that many learners enter the resit classroom having been knocked back by failure three or four time in some cases. If this way of teaching provides learners with the confidence to enter the classroom feeling more comfortable with the lesson content, for teachers, that's half the battle won.

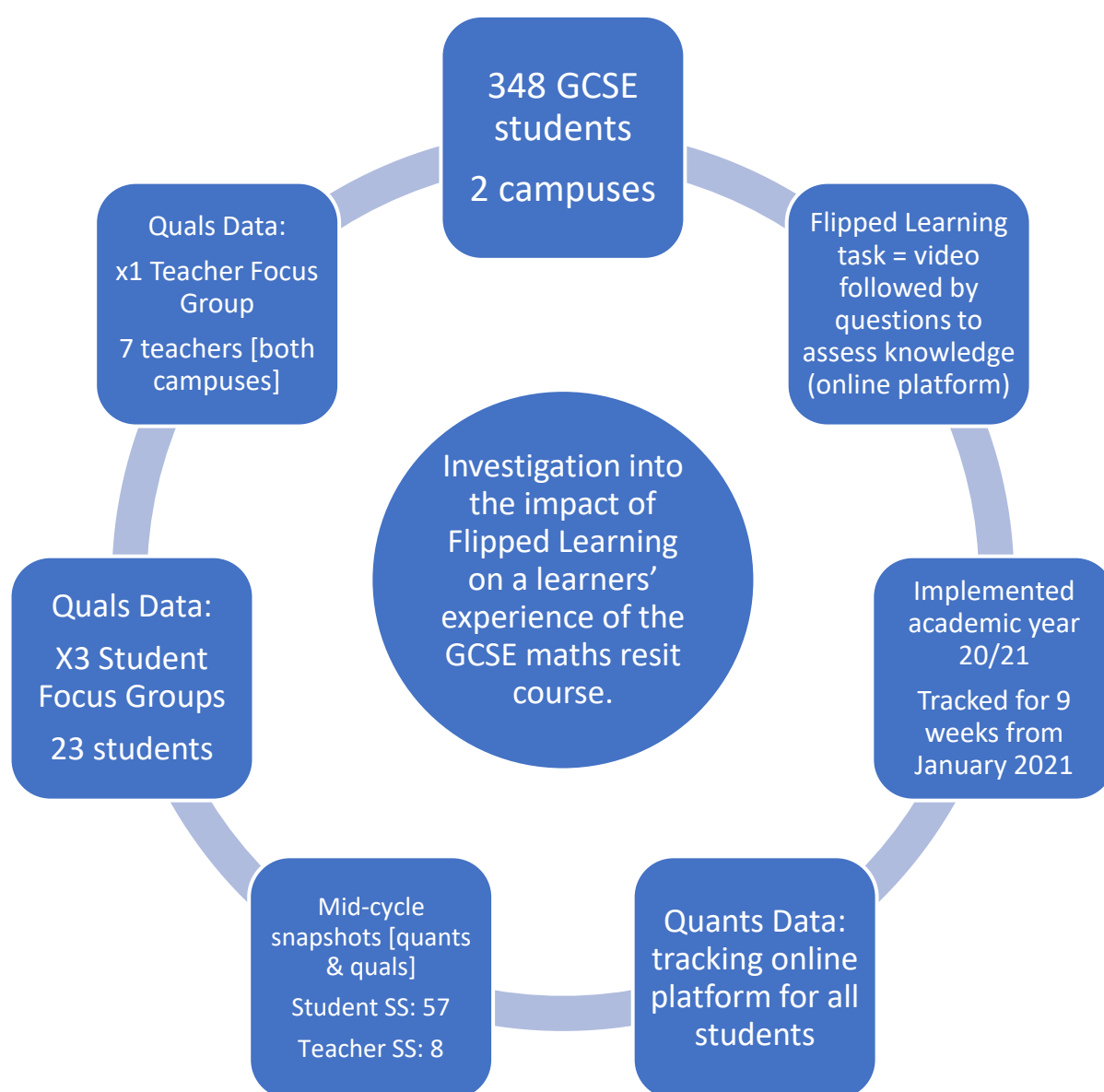
It is clear that Flipped Learning isn't a one-size fits all approach, rather the results differ between approach and subject. There are clear connections in the literature between low-attaining students and successful engagement, yet none to provide evidence of this trend in the GCSE resit sphere. Additionally, it is clear that introducing Flipped Learning is not an easy task both with students and teachers, and an upfront investment in student skills is required to support success when using this strategy for learning. This study provides an insight on the implementation of a Flipped Learning model within an FE GCSE resit mathematics course; and it reflects on the process, engagement and impact of an unprecedented year for the education sector as a whole.

Methodology

The Research Process

This piece of work was supported and implemented by the whole GCSE maths team across two campuses. Flipped Learning tasks were made mandatory within the GCSE maths SoW, and all students had to complete them weekly. Tasks were released using a VLE after lesson two each week, and students were expected to complete the task before lesson one the following week. Although this was a mandatory part of the course throughout the year, a data extraction of student engagement was taken weekly during the period January 2021 to April 2021.

Data Collection Design



Quantitative

As stated above a weekly extraction was taken to review student engagement. This was a percentage which reflected a student's success rate in answering questions following the completion of a video.

Half way through implementation - January-April 2021 when the engagement was tracked - snapshot questionnaires were conducted with both students and tutors. A short questionnaire was the perfect collection tool for numerous reasons – remote learning due to COVID-19 meant that virtual data collection was the best and only way to communicate. Additionally, during a very turbulent time, magnified by COVID-19 restrictions, questionnaires provided a quick and standardised method of data collection to inform mid-cycle changes and improvements (Bartram, 2019).

Qualitative

Qualitative data collection took the form of focus groups with both students and teachers. Initial plans included a cycle one and cycle two focus group, however, due to the national lockdown in January 2021, a decision was made to conduct a cycle one reflection as a snapshot questionnaire.

Focus groups were chosen for numerous reasons. Firstly, the group nature encourages a wider range of discussion points, and the opportunity to seek clarification; when compared to interviews, focus groups provide a comfort in the group to open discussion through its heuristic format (Queiros, Faria and Almeida, 2017). There is a risk that some members of the group may just agree with the strongest participant; however, it is the responsibility of the interviewer to manage dominant personalities. Students and teachers all gave fully informed consent to participate in the focus groups, and the research team assured all participants in that any information provided is confidential and kept anonymous in any reporting of findings.

Our Study

Following a review of the literature this piece of action research proposes the following question: What impact does the introduction of Flipped Learning have on learners' experience of the GCSE maths resit course?

Objectives set out to guide, but not restrict our investigation are as follows:

1. What factors impact on who does engage with the videos?
2. What factors and barriers impact on who doesn't engage with the videos?
3. Do teachers feel that Flipped Learning has an impact on student's resilience when working with AO3 activities in lesson?
4. Do students feel that Flipped Learning has made them more confident when working with AO3 activities in lesson?
5. Does completing Flipped Learning activities have an impact on student's confidence in lesson?
6. Is there a difference in student behaviours of those who have completed Flipped Learning tasks, compared to those who have not?

Results

Developing an Understanding of Flipped Learning as a Concept and the Potential Gains for Students

Clear differences were found across the campuses which took part in this study. Engagement at campus one was overwhelmingly higher than campus two. The graph below (*figure one*) displays the difference, with 248 making the total cohort at campus one, and 100 making the total cohort at campus two.

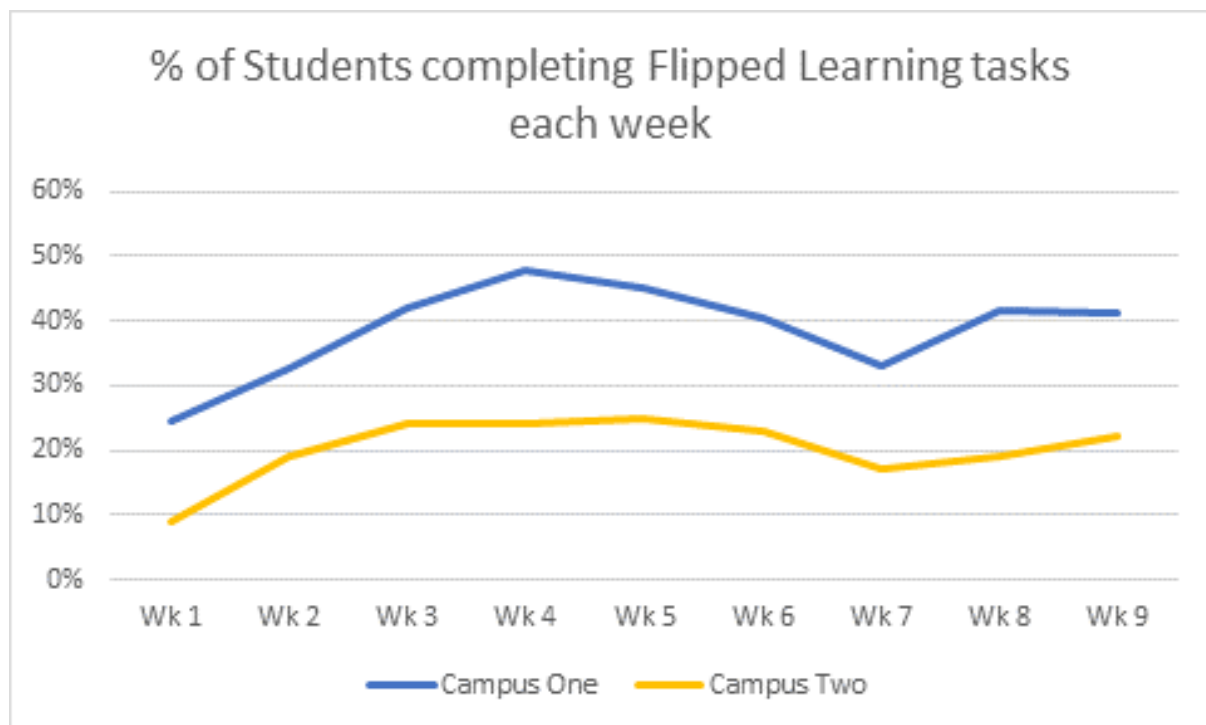


Figure One: Graph to show the percentage engagement across both campuses within the intervention tracking period

Both campuses followed a similar trend in engagement, with both campuses experiencing a dip in week seven, yet it's clear that campus one was consistently more engaged. When analysing the quantitative data, the research team found that campus two skewed the overall picture of engagement, therefore, all other data discussed in relation to trends focuses on campus one's cohort who were more engaged and have a larger number of students. Although the team discarded campus two's data from in-depth trend analysis, we did not discount them from qualitative data collection; and student and teacher views are reflected across all other analysis.

It was clear from the student focus groups that there were mixed messages in relation to the concept of Flipped Learning and its potential gains for learners themselves. Some students noted that teachers allowed them to complete the task

at the end of the lesson if all in-class work was complete. Another learner suggested that it would be more beneficial to complete the task after the lesson rather than before. This suggests to the research team that some students did not understand that a Flipped Learning task is to be completed before a lesson and focuses on the AO1 skills, with the opportunity to build on these skills, in class, and develop problem solving with the support of a teacher.

Further support for disparities in understanding the concept of Flipped Learning were evidenced in the student snapshot survey, conducted part way through intervention. Fifty-seven students responded to the snapshot survey. They were asked whether they completed the Flipped Learning tasks as prescribed [watching the video, then answering questions, if they only accessed one part of the tasks, or they regularly didn't complete any. Of the fifty-seven responses, three learners indicated they didn't complete any Flipped Learning tasks; fifty-four did attempt it regularly, and of those fifty-four, thirty students only completed one part of the Flipped Learning [the video or the questions]. The table below details student responses when asked why they didn't complete both elements of a task (*figure two*).

Response choice	Percentage of students who selected response
Already understood the subject	67%
Didn't realise I had to	13%
Didn't have time	7%
Other	13%

Figure Two – Table to show responses of thirty students who said they did not complete both parts of the Flipped Learning tasks [video and questions] as designed

Two thirds of students asked suggested they did not complete the tasks because they already understood the subject. There is a clear miscommunication regarding why students were being asked to complete these tasks prior to the lesson; and the benefit of reviewing content prior to classes. Further discussion was conducted around the paradox of Flipped Learning within the resit culture, as these learners are not learning new facts to then expand on in class, they have seen GCSE maths course content before.

Upon reflection of all three student focus groups, these attitudes were communicated more strongly in student focus groups one and two. Comments which reflected a misinterpretation of the concept of Flipped Learning were picked up in real-time by the focus group lead, who subsequently chose to explain the concept again to students during focus group two. Students agreed that Flipped Learning, as a concept, would be a good idea for their learning and progression, however, the research team cannot determine whether learners agreed because they thought it was a good idea, or because they felt they had too at the time. What is clear is that

there were discrepancies in the way these tasks were delivered to different groups across the cohort.

On the other hand, within focus group three, students showcased slightly different attitudes towards the concept as a whole. They responded positively to the intervention as a group; something that was reflected in their engagement levels which averaged 73% for completion of tasks throughout the entire intervention period. They seemed to portray more positive attitudes towards the concept and liked that they 'already [had] an idea of what the next lesson is going to be' (student focus group 3, student A, May 2021). However, again, students could not articulate exactly what the benefits of Flipped Learning are, but they could explain the positive feelings they felt towards it which contrasts the majority of attitudes in focus groups one and two.

It's clear from the teacher snapshot survey, conducted part way through the intervention period, that some teachers adapted and altered the initial stages of their lessons to promote Flipped Learning engagement. One teacher describes, in their response to the snapshot survey, how they began to instruct students to start at various points of a pre-planned activity categorising an activity into bronze, silver, and gold levels, as a way of determining understanding of Flipped Learning tasks. They detailed how this challenged those who had completed it, and then how it was used to inform the pace of the rest of the lesson in response to Flipped Learning engagement levels. This is a great example of how one teacher began to adapt the activities and Scheme of Work to meet the needs of the learners on a weekly basis, in response to Flipped Learning completion.

At the end of the academic year, GCSE maths teachers took part in a focus group to explore the strengths and weaknesses of Flipped Learning. In contrast to the lesson adaptation described above, three of the seven teachers in the focus group talked openly about how they felt the current GCSE scheme of work was not flexible enough to effectively conduct Flipped Learning. This is arguably a matter of opinion as it is clear from the snapshot that teachers had ways of utilising completion of Flipped Learning to inform a lesson.

There were further disparities displayed in the teacher focus group, suggesting that the way in which students were encouraged to complete their Flipped Learning tasks differed. One teacher describes how they 'tried to sell it as creating...confidence, [and being] prepared for the lesson' (teacher focus group, teacher 2, May 2021), whilst another member of staff talks about how students were emailed, Microsoft Teams messaged, and verbally told about Flipped Learning and its importance; they also describe professionally created, and college branded posters on corridors encouraging Flipped Learning completion (teacher focus group, teacher 2, May 2021). All of this was encouraging to hear and suggests these teachers made every effort to engage students in this concept. This level of enthusiasm is reflected in their class's engagement levels, which averaged 40% across the whole intervention period, and reached highs of 60-66% for one hundred and forty-two students taught by these two teachers.

On the other hand, one teacher, who's average engagement for their students was 16% suggests that learners thought Flipped Learning tasks were another form of homework, with colleagues agreeing and suggesting they got confused. At this point, it's clear that feelings and thoughts about Flipped Learning differed across the team, and campuses, and we cannot attribute low engagement solely to teachers. There are various other factors at play; type of student, environment, COVID induced lockdowns and the impact of 100% online teaching. Yet, it's clear that more clarity is needed for students, from their teachers, to explain the benefits of this type of learning; and further support for teachers to adapt and utilise student engagement with Flipped Learning tasks within their lessons, so students see a benefit and purpose.

Signs of Improvement to Student Confidence, with Flipped Learning Allowing Students to Feel More Comfortable in Their Own Knowledge Prior to a Lesson

Out of the two hundred and forty-eight students who took part in the research on campus one, three quarters of them attempted Flipped learning, however only 55% went on to regularly complete Flipped Learning tasks. Regularly has been defined as three or more times in the nine-week control period (*figure three*). Additionally, tracking data demonstrated that the majority of students that engaged in Flipped Learning every week were the same, with some fluctuation and differences, with teachers also stating they “could almost predict who was going to do it” (teacher focus group, teacher 3, May 2021).

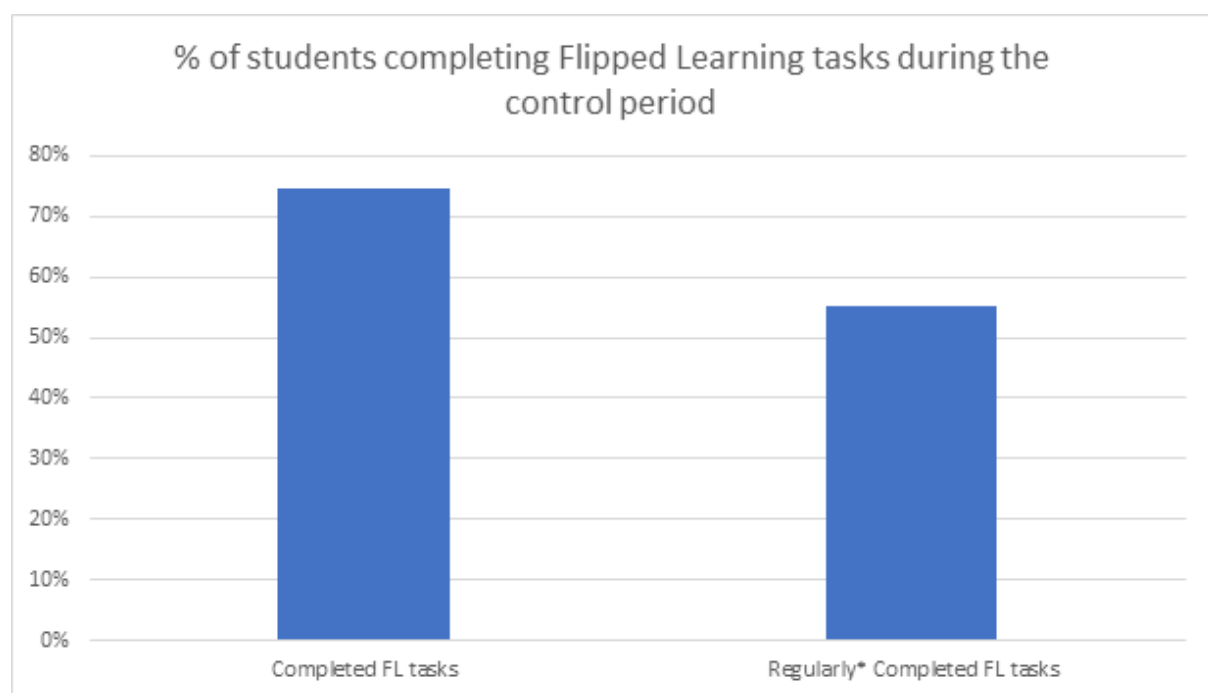


Figure Three – Graph to show the percentage of students who have a) attempted Flipped Learning tasks at least once throughout the tracking period and b) those who regularly attempted Flipped Learning throughout the tracking period

Given that this was the first year Flipped Learning had been implemented into the GCSE resit Scheme of Work across campuses, 55% regular completion on the larger of the two campuses is arguably a good start. However, when only a proportion of the class are completing tasks designed to inform teaching, a recap of knowledge is needed to ensure a fair starting point for all learners in the lesson. Some students found the constant repetition of knowledge demotivating, and they realised that they did not need to complete the Flipped Learning activities. This was evident in the Student Snapshot Survey data where students commented that their teacher would recap Flipped Learning anyway, so it became pointless to complete the tasks prior to lesson.

In the mid-cycle Student Snapshot Survey, learners who completed Flipped Learning tasks were asked to rank their confidence levels after completing Flipped Learning on a score of one to five, with one being not very confident and five being very confident. All of the fifty-four students who responded as regularly completing Flipped Learning tasks gave a confidence score of three or more, with 37% feeling very confident when entering the classroom after completing Flipped Learning tasks (*figure four*).

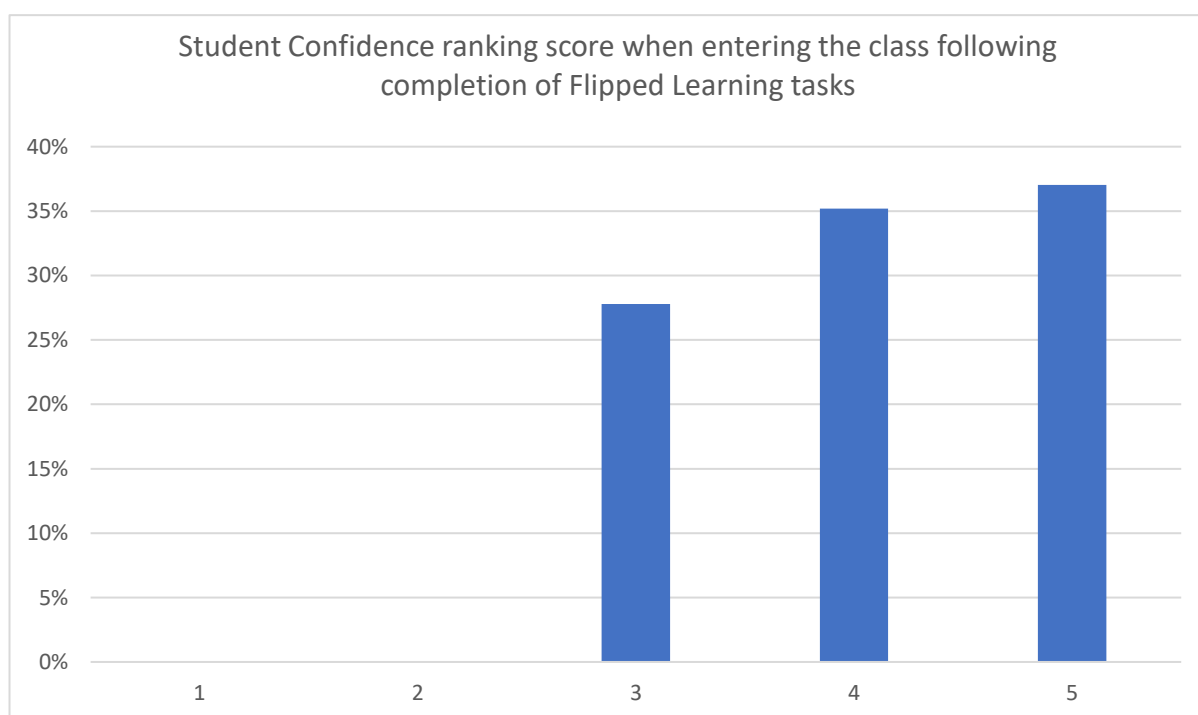


Figure Four – Graph to show student confidence ranking score upon entering the lesson following completion of Flipped Learning tasks

An increased student confidence and knowledge base was also evident from the Teacher Focus Group. Teachers commented that students who had completed the Flipped Learning tasks demonstrated a higher level of base knowledge in lesson and

“did seem to have more of an idea” (teacher focus group, teacher 3, May 2021). When discussing perceived levels of student knowledge upon entering a lesson, following completion of Flipped Learning tasks, teachers agreed that “you didn’t have to go all the way back to the beginning” (teacher focus group, teacher 3, May 2021) of a subject. This suggests that when students did engage with Flipped Learning tasks prior to a lesson, there was a noticeable change in level of base knowledge. One teacher commented that students who completed the Flipped Learning tasks were able to answer questions in more depth than those who didn’t (teacher focus group, May 2021). However, this particular teacher was unsure whether this was down to completion of Flipped Learning or prior knowledge of a subject due to the ability mix of this year’s GCSE Maths resit cohort.

“It’s actually really hard to judge it this year because we’ve got a cohort of students that we potentially wouldn’t have put through to GCSE this year...There’s a real mix of levels of students this year.” (teacher focus group, teacher 2, May 2021)

Motivation to Work Independently

Flipped Learning encourages students to work independently, particularly with unfamiliar topics. The nature of this learning technique means learners do not have a teacher on hand to ask questions when they are unsure; the Flipped Learning tasks set provided students with a video to fill the void where a teacher would usually assist. Students spoke honestly about the need “to be independent” (student focus group 3, student E, May 2021) when completing Flipped Learning activities, yet, they also suggested that they “need someone to say get on with it” (student focus group 1, student B, April 2021), and actually they struggled to work independently without the support of a teacher. Teachers also noted this lack of student motivation, and suggested students seemed to forget to do their Flipped Learning tasks without continuous reminders. One teacher commented that “they just need someone at the back of them to keep them moving on” (teacher focus group, teacher 4, May 2021), and went on to say that it had been a difficult year for students to establish a routine with everything else going on, namely COVID and its environmental and social impact.

Due to the second national lockdown in January 2021, teaching moved 100% online, and face-to-face contact with teachers diminished. In the focus groups, students admitted to feeling demotivated during this time, suggesting that working at home meant they weren’t ‘in the mindset to do anything’ (student focus group 1, student C, April 2021). It was difficult for students to motivate themselves to do Flipped Learning tasks due to constant distractions, with one student commenting that ‘sometimes you feel like you can’t be bothered to do work’ (student focus group 3, student B, May 2021). Listening to the students describe their experiences of online learning, it was clear to the research team that GCSE maths resit students found it particularly hard to motivate themselves to complete Flipped Learning activities at points. Although at times, these same students did complete assigned tasks. Therefore, we cannot attribute all disengagement to the national lockdown, and other factors must be considered when exploring how to motivate resit students to complete Flipped Learning tasks.

As a result of the move to 100% online learning, the college issued all students, who needed them, with laptops, to ensure that the pandemic did not create a digital divide. This was beneficial to the research as it ensured all students were equipped with the physical resources needed for Flipped Learning. Teachers agreed that learner's lack of motivation was not down to technical resources, believing that "those who have [a higher] level of resilience adapted better to online learning rather than the other way around" (teacher focus group, teacher 2, May 2021). Yet, it was noted within the teacher focus group that 100% online learning did hinder relationships between teachers and students, and staff felt, sometimes, they "never really got to the bottom of some of the issues [students] were having" (teacher focus group, teacher 2, May 2021), and a lack of conversation online, teachers felt, contributed to a lack of engagement with Flipped Learning from some students.

"I didn't feel I had them all under my wing this year like I normally would." (teacher focus group, teacher 3, May 2021).

Timing, arguably, also had an impact on student motivation. Learner engagement with Flipped Learning was measured following the Winter break [December 2020 – January 2021], until the Easter 2021 college holiday period. The graph (*figure five*) shows the percentage of students participating in Flipped Learning on campus one – weeks one and seven are the first weeks of a new half term, following a college break. It is clear that motivation to complete Flipped Learning following a college break is lower in both instances. This could be due to forgetfulness during the learning break, yet there is clearly an element of timing that impacted engagement. Another interesting event to note: on the 25th of February 2021, which fell at the end of week seven during data tracking, it was confirmed that Teacher Assessed Grades [TAGs] would take the place of GCSE exams for Summer 2021. In the week following this announcement, the data shows a significant increase in engagement with Flipped Learning. The teaching team suggested that this could have been due to the fact learners were made aware of this government decision, and colleges were unsure what the evidence for grades would look like, and therefore, learners were keen to prove their commitment to the course.

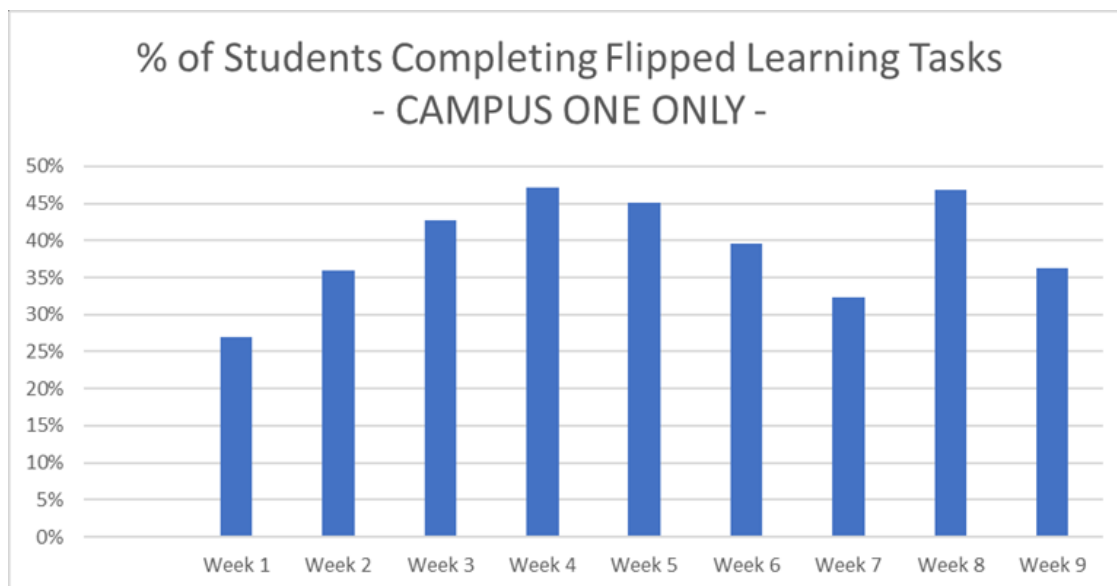


Figure Five – Graph to show percentage engagement across the GCSE cohort during the intention period January 2021 – March 2021

Student Confidence Following the Completion of Flipped Learning – Has it had an Impact?

Confidence is a subjective concept to measure, but the student focus groups allowed us to explore students' feelings towards Flipped Learning and whether they felt it affected their confidence. Across the three focus groups there were indications that Flipped Learning activities, when completed prior to the lesson as prescribed, did make students feel more confident entering the lesson space. However, students did not describe this as a confidence increase, but rather characterised this as a feeling of knowing what they were doing (student focus group 1, April 2021).

This idea filters through the focus groups, with students feeling Flipped Learning helped because there was less need 'to keep going over stuff' (student focus group 3, student E, May 2021), and it helped them 'understand more about what [they are] doing in lesson' student focus group 2, student D, April 2021). Again, the students did not explicitly talk about a correlation between completing Flipped Learning and an increase in confidence, but did talk about a feeling of comfort in the lesson; feeling "more prepared" (student focus group 3, student F, May 2021) and able to "understand more about what [they are] doing in [the next] lesson (student focus group 3, student G, May 2021), having completed the Flipped Learning tasks.

Learners who must resit GCSE maths in Further Education are inherently de-motivated, yet, there are clear suggestions within the data that, when the Flipped Learning tasks were completed as prescribed, an increased feeling in confidence, or even comfort, was felt by students in these focus groups. Additionally, teachers do comment that they could tell who completed the work set, suggesting there was

some impact on basic skills and knowledge. It is not definitive, but we can make recommendations from this data to further improve these small impacts in future research cycles.

The Task is Key to Engagement, and Must be Considered In-depth, Particularly in Relation to the Resit Student and their Past Experiences with the Subject.

The Flipped Learning tasks followed the same format every week. Students were set a Flipped Learning activity on the online platform, released following lesson two each week, which linked to, and must be completed before, lesson one the following week. A task consisted of a short video explanation and then a set of questions for completion.

Within the student snapshot survey fifty-seven learners were asked whether they completed both elements of a task. Below shows the spread of students who completed both video and question, just questions, or only watched videos (*figure six*). It is interesting to note that half the students surveyed completed the tasks as prescribed and designed, yet, almost half again only used the questions. Following the snapshot, the team built exploratory questions into the student focus group schedules to better understand this trend, and whether it was representative of the cohort.

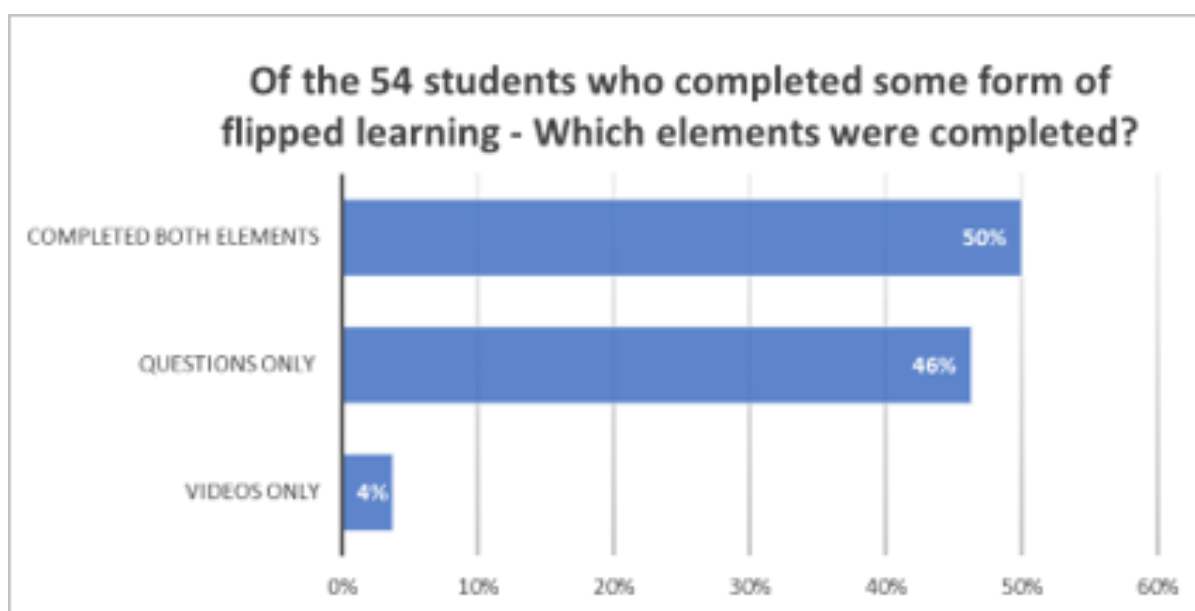


Figure Six - Graph to show the responses of fifty-four learners who responded when asked which element of the Flipped Learning tasks they complete. Fifty-seven learners we surveyed in this snapshot, yet three students opted to say they do not complete Flipped Learning

The Videos

The spectrum of answers across the three student focus groups in relation to the videos, their usefulness, whether students watched them, and how engaging they

were, varied greatly. At one end of the spectrum students found the step-by-step nature of the video very useful, with one student describing them as 'straight forward' (student focus group 3, student F, May 2021). Yet, others choose to only use the videos once they'd completed the questions as an aid or refresher for anything they got incorrect. Some students didn't use them at all, but did acknowledge that it's a personal choice, as other students really liked them (student focus group 2, April 2021).

Additionally, there was no clear affirmation as to whether students preferred the voiceover on videos from the online platform, or whether they would prefer teachers to present the videos. Again, a very broad spectrum of opinions, we could not recommend that students prefer pre-made videos, or their teachers voice, confidently, from this data.

Notably, two students in different focus groups, acknowledged that when they began the academic year they did not complete the Flipped Learning tasks as prescribed, yet, once they started to complete them as designed, the content was sticking with them, and their understanding in lessons improved.

The Questions

Overall, students liked to answer questions. As previously stated, they'd often attempt the questions before watching a video. Learners portrayed a feeling of comfort and familiarity with answering exam style questions on a topic. There was some discomfort at first with the online platform, yet the landscape of a global pandemic helped to ease frustrations with online platforms as the whole course shifted to the virtual world, and students became more comfortable.

However, the online platform, although more familiar as the months progressed, did prove a hinderance for what students perceive as more practical tasks and skills. Students in all three focus groups spoke about tasks whereby they were asked to complete graphs or diagrams using inbuilt mathematical tools such as rulers, protractors and compasses. As well as the maths skills, there was an additional skill within these tasks, and learners commented on how difficult it was to use, and understand.

This is reflected in the quantitative tracking data. Below are two graphs which evidence this trend. Graph A (*figure seven*) shows the average and range of scores for Flipped Learning tasks by topic area, Graph B (*figure eight*) shows the same spread of topics but details the percentage of students who attempted to complete the task. The task focused on Distance/Time Graphs as the students to utilise multiple in-built tools. As a result, learners had to navigate the maths equipment within the online platform before even attempting the questions. For this topic, the spread of scores is dramatically lower compared to others, whilst the percentage of students attempting this task is not an anomaly when comparing it into other tasks. This suggests that a similar number of learners attempted the Distance/Time Graphs task, yet the average score and achievement was low which can be attributed to the extra layer of complexity of in-built tools as detailed by the student focus groups.

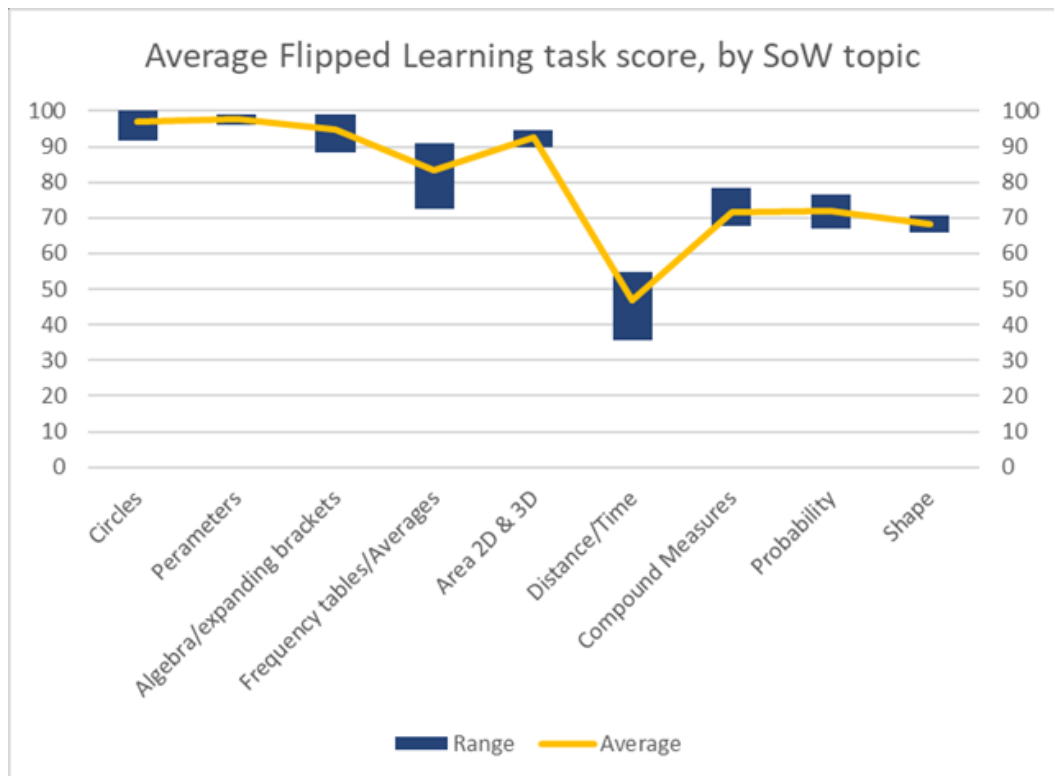


Figure Seven - Graph A displaying data for 248 learners who completed Flipped Learning tasks during the tracking period. Data shows both the spread and average scores for each task by Scheme of Work topic area

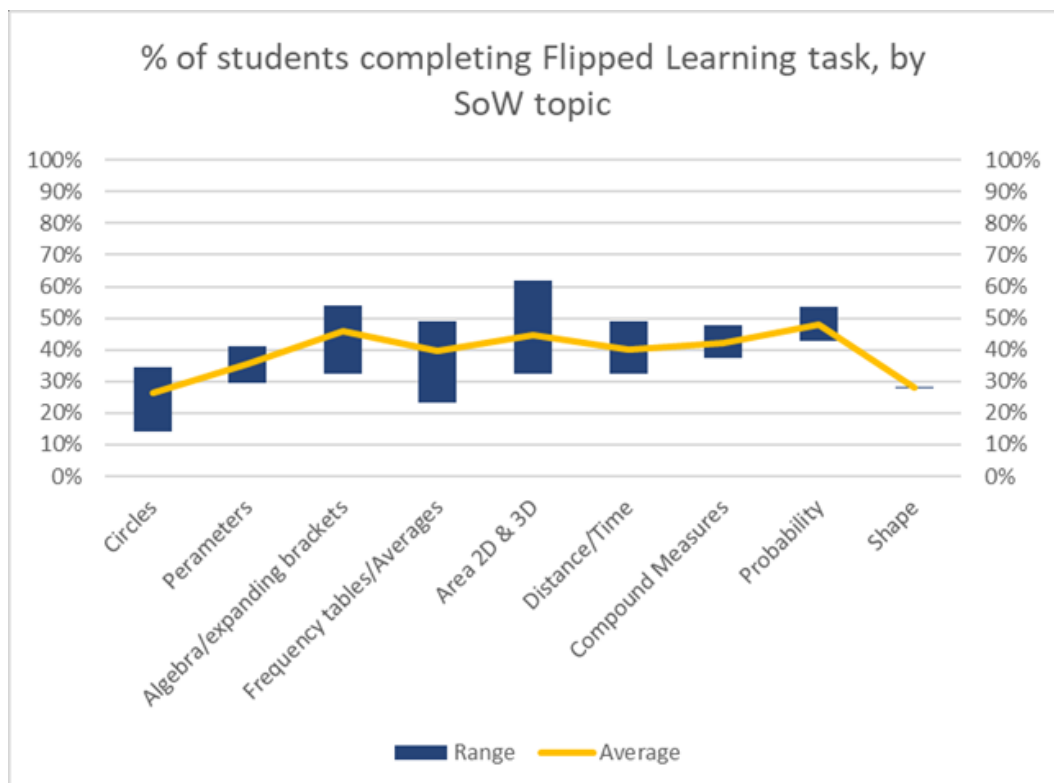


Figure Eight - Graph B displaying data for 248 learners who completed Flipped Learning tasks during the tracking period. Data shows both the spread and average percentage of students who completed each task by Scheme of Work topic area

The online platform was also identified as a hinderance to success for students within the teacher focus group, yet teachers felt it was their lack of understanding that may have been a contributing factor. One staff member commented “it was a new platform to me and then I couldn’t help students who were struggling with it” (teacher focus group, teacher 3, May 2021). This theme filtered through the focus group with varying degrees. There are two arguments at play here; the research team should have spent more time training teachers in the initial stages to support their understanding of the new platform, yet there is also a responsibility for teachers to ensure their knowledge is sufficient enough to effectively support learners.

Although there were a number of teething issues in this first year of whole cohort Flipped Learning, a clear advantage to using an online platform, particularly for students in focus group three, was the instant feedback. Learners liked the fact that it showed them when an ‘answer is wrong [meaning] you have to look back and check your work’ (student focus group 3, student A, May 2021). This element of the tool encouraged students to check their work as they were motivated by the need to get questions correct. Whether this encouraged deeper learning and a need to understand, or simply created a drive to keep going until the answer was correct is unknown. However, teachers are able to see how many attempts students have made on a question, and an element of teacher judgement on learning taking place can be used.

One student in student focus group one (student B, April 2021) summed up the majority attitude towards tasks of this style for our learners. When questioned whether it would be better, in future, to give students questions first:

“We could do the ones we do know and then watch the video just for the ones we are struggling on”.

From this data it was concluded that a structured video and then questions does not work for the majority of resit learners in this context, and a wider discussion about the design of tasks is needed.

Consideration for SEND and ALS Needs when Designing Flipped Learning Tasks

Within the GCSE maths resit sphere there are many neurodiversity’s within each group of learners, and all activities in class, and through Flipped Learning, must accommodate them. The online platform used for task completion this year was positively received due to its large text and simple layout, with one learner commenting that the text style helped her personally as she has dyslexia and can struggle with small writing on screen. However, the tasks prescribed asked students to watch a video and then complete questions. One learner commented that videos were ‘too fast’ (student focus group 2, student C, April 2021), making them unclear to follow, and therefore they did not use them. The content and presentation of tasks is vital to ensure students can successfully access the work we are asking them to

complete. Adapted resources that support SEND students will inevitably support all learners.

Discussion

It cannot be denied that the academic year 2020-2021 has been turbulent for students and teachers alike, whilst also becoming an unexpected opportunity for personal and professional growth. From the initial planning stages, the research team chose to move Flipped Learning online for the entirety of the year. This was influenced by the geographical catchment that the college feeds; the Northwest of England was in the highest level of restrictions, or lockdown, for the majority of the academic year 2020-2021 as a result of the COVID infection rates faced throughout the pandemic. This was a positive move for tracking and planning purposes, as it meant that the year was less disrupted in the sense that the tasks could be carried out whether 100% online teaching, or some face-to-face lessons were conducted. From the literature review it was clear that Flipped Learning can be successful using instructional videos (Straw et al. 2015) and therefore, the team felt comfortable with the decision to utilise all online tasks, knowing there was evidence for success using this design.

Although there was an aim to engage all students in the Flipped Learning tasks, it was expected that not all students would have 100% engagement throughout the tracking period, and an average 45% for campus one, 26% for campus two on activity completion felt like a success for the team in this first phase of implementation. Yet, it's clear that improvements and tweaks need to be made as the college ethos is to continue to strive for improvement, and do what is best for our learners' progression.

Throughout the academic year 2020-2021 learners faced varying degrees of motivation, not only for Flipped Learning, but for their wider college experience. Students reported moments when they could not be bothered to do anything, and needed someone to tell them what to do. As a research team this was saddening to read, but reflective of the unprecedented circumstances our young people were experiencing. It was clear from the results that the teachers felt the same, and reported a negative impact on student teacher relationships due to online learning. Teachers could not support students effectively with IT issues because they didn't see them on the screen, or they would not unmute online, which diminished the bond teachers rely on to build supportive relationships.

For low-attaining learners the student teacher relationship can be pivotal to success. Yan (2019) suggests that teachers play a crucial role in building learner confidence to enable them to successfully engage in self-directed learning; yet this year COVID has proven a hindrance to teachers' ability to do this in some instances. This is not unique to the research context, it has been discussed on the national stage, yet the team can learn from this experience and ensure that, going forward, investment is made in teacher understanding of online platforms to improve the level of support they can provide learners. Additionally, as the sector is aware of this as a

hinderance and the impact it can have, if there is a need to conduct online learning in the future, the breakdown of student teacher relationships can be addressed and supported in the first instance through planning, tutorials, and pastoral support. This finding should not be dwelled upon, but learned from, and an action plan put in place moving into the next phase of research.

Upon reflection, the team agreed that, although we can weigh heavy on the impact of COVID when trying to explain the levels of engagement with Flipped Learning, it cannot be credited entirely. Little research has been published utilising resit students in a 16-19 further education environment. It is imperative that the Flipped Learning content reflects the resit learner journey. It was noted that a significant number of students were completing the questions element of the Flipped Learning tasks, and only using videos when help was needed, if at all. Although it is something that resit tutors are mindful of when teaching, not enough emphasis was given to the idea that this was not the first-time learners had seen the GCSE maths content when in a resit course. The videos represent, in some cases, years of previous learning that has been unsuccessful. Further developments within the GCSE maths scheme of work for Flipped Learning need to embody and reflect that journey. The next iteration of this work will ask teachers and team leaders to consider the following when planning Flipped Learning tasks;

- What have learners been exposed to in the past?
- What level of knowledge can we truly expect that they will have retained?
- What is the purpose, from their viewpoint, of completing this task?

Not only do teachers need to reflect upon the learners' journey when designing Flipped Learning tasks, but also address the concept of Flipped Learning as a support mechanism for student success. Results highlight that students were receiving mixed messages from teachers, and particularly across campuses. One class that is highlighted in the report averaged 73% completion of tasks, and also reported on feelings of comfort when entering the classroom after completing Flipped Learning prior to the lesson. When this teacher was quizzed on their strategy for encouraging engagement they detailed a multi-platform approach, that was consistent and clear. This was reflected in the approach of other teachers on the same campus [campus one which displayed higher levels of engagement throughout], where teachers had high expectations of students, and were consistent and disciplined in their approach.

Campus two on the other hand, produced lower levels of engagement throughout the tracking period, some teachers here expressed more negative views towards Flipped Learning as a concept, and the ability of students to be disciplined in completing it. As a research team we must consider that teachers view and knowledge have an impact on student engagement with Flipped Learning. Other factors across campuses rarely differ, therefore teachers must play a role in the differing levels of task completion. Reflecting on the year that this work was introduced to the college, it's clear that the impact of the pandemic did not support conducive, joint-up thinking, and teachers were faced with a very lonely situation when working and teaching from home. Additionally, the research team felt they could have invested more time at the

beginning of the academic year to improve teacher skills and knowledge on how to effectively utilise Flipped Learning in a lesson to provide clear benefits to students completing the prescribed work. The literature highlighted the need for preparation and upfront investment in preparing teachers and learners alike (Rutherford, 2016; Bullock, no date), and this potentially wasn't conducted as well as it could have been by the research team; it is something to develop in the next cycle of work. Yet, teachers must also be open to change and development in the future to open up honest communication between the team and support successful change.

A Reflection in September 2021

The past eighteen months have not been easy for anyone within the education sector. Disruption to learning due to lockdown, isolation, IT poverty, and socioeconomic disadvantage became the norm for Further Education colleges up and down the UK. Yet, teaching and learning continued, as did the Action Research, and it is important to reflect on what was gained from the past eighteen months in education, as well as what has been lost.

When reviewing the in-year progression for students on the GCSE maths programme 2020-21 the following terms were defined:

- Engaged with Flipped Learning = learners who completed five or more tasks AND four or more tasks achieved a 70% success rate out of the nine tasks set during the tracking period.
- Low-level or No Engagement with Flipped Learning = anyone who did not meet the 'Engaged with Flipped Learning' criteria.

The results of this analysis make for interesting reading:

	Number of Learners	Average Grade Starting Point	Average Grade Difference (in-)
Engaged with Flipped Learning	74	2.60	1.91
Did not Engage with Flipped Learning	149	2.56	1.19
Whole Cohort [Campus One]	223	2.57	1.43

Figure Nine – Table displaying in-year GCSE maths grade differences on campus one for learners who did engage with Flipped Learning tasks compared to those who did not, in line with definitions provided above.

When comparing the two groups of learners – engaged and not – analysis considered students starting points using points awarded from 2020 performance tables (Department for Education, 2019, p. 41), and Teacher Assessed Grades (TAGs) awarded August 2021. Results show that those who engaged with Flipped Learning tasks produced an average grade difference, in-year, of 1.91, compared to those who did not engage at a 1.19 grade difference. This is an astonishing

difference, and supports the idea that those who engage fully with Flipped Learning show higher levels of progression than those who do not.

Additionally, when looking at the TAGs data by grade further support is given to the hypothesis that learners who engage with independent learning tasks show higher levels of success. Figure Ten shows that a higher percentage of learners who got a grade five engaged with Flipped Learning tasks, and the same shows in grade four achievement. This trend flips when looking at grade three, two and one. In all three cases the percentage of students achieving these grades is higher in the 'Did not Engage with FL' category.

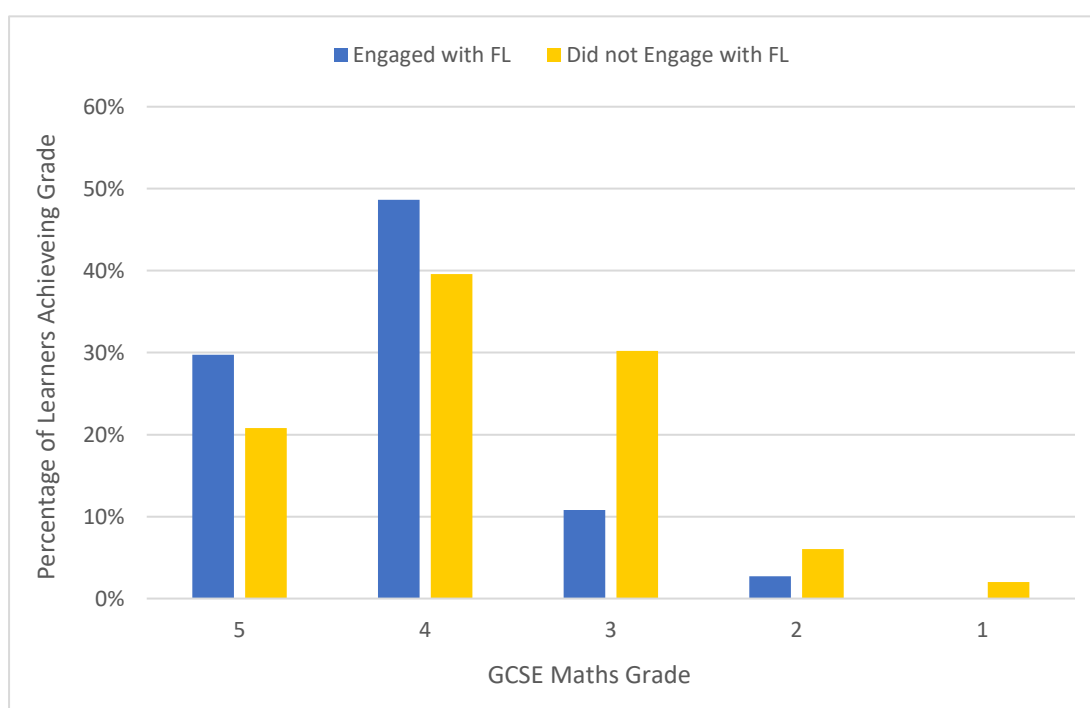


Figure Ten – A graph to show the percentage of learners who achieved grades one, two, three, four and five in TAGs awarded August 2021 when comparing those who engaged and did not engage with Flipped Learning.

The first thing to note about this data is that it only reflects data from campus one. As previously discussed the research team chose to discuss and analyse quantitative data gained from tracking campus one and not campus two because the latter showed significantly lower levels of engagement and therefore the data was not large enough to make any clear inferences.

Additionally, it's important to consider the context in which these results were achieved. This research was not conducted in a 'normal' teaching year, and therefore, the team felt they were not able to instil the routine usually seen within the classroom due to continuous changes in teaching delivery designed primarily to ensure student and staff safety. Additionally, a number of learners did not have access to appropriate IT facilities to access lessons, and Flipped Learning tasks.

The college worked rapidly to get laptops to those disadvantaged students, yet it did still disrupt learning.

It must be considered whether those learners who did engage did so because of their own personal drive and discipline, and these students would have engaged with Flipped Learning no matter the circumstance, or whether other factors were at play. On the other hand, Figure Nine shows that the average grade starting points for learners who engaged with Flipped Learning compared to those who did not was a mere 0.04, arguably not significant enough to suggest that those who engaged with Flipped Learning were already on a positive trajectory to success; leading us to conclude that engaging with Flipped Learning tasks did have a positive impact on learner progression.

Moving forward a new iteration of the Flipped Learning programme within GCSE maths resit, at Nelson and Colne College Group, has been designed and wholly informed by what learners and teachers spoke about within the data collection process.

Maybe the true effect of Flipped Learning engagement within 2020-21 will never be truly clear as it will forever be intertwined with the disruption of the global pandemic, yet the team has learned, reflected and adapted following the experience, and are keen to continue the Flipped Learning journey with the aim to improve progression for learners in level 2 resit maths courses year on year.

Conclusion

It cannot be denied that learners struggled due to the impact of the global pandemic. This was reflected in both the student and teacher focus groups. Yet, we cannot ignore the pockets of success that some teachers had utilising Flipped Learning. Tracking has showed that a consistent approach with clear and high expectations supports effective use of Flipped Learning with GCSE maths resit students. The work is not without faults, and more consideration needs to be given to the platform and content of Flipped Learning tasks, along with upfront investment in teacher's skills and understanding of the concept of Flipped Learning. The research team will continue to work with GCSE maths teachers to develop their knowledge and understanding with the aim of improving engagement and progression in the next academic year, building and learning from the experiences and impact of a year like no other, 2020-2021.

Recommendations

- A clear and consistent approach is key – ensure both learners and teachers understand what is expected from Flipped Learning, and when and how to complete the tasks; additionally, ensure that the utilisation of Flipped Learning acquired knowledge is done consistently and effectively within each lesson that a task is designed to support.
- Invest in teacher's knowledge and understanding of Flipped Learning – if an online tool is preferable in the context ensure teachers understand how it works and can utilise all aspects to support student understanding. Emphasise the benefits of effective Flipped Learning and the wealth of literature evidence that proves it works.
- Consider the tasks that are being used and how that is presented to learners – the resit journey is a complex beast and students have often seen everything that is being presented to them in a previous year or course.
- Ensure that tasks do not hinder student's ability to engage with the learning – tasks must be suitable for SEND learners, and IT accessibility should not prove a barrier to accessing the work and its benefits.
- Embed training for students on how to access and complete Flipped Learning tasks – the expectation that learners know how to complete self-directed tasks effectively can lead to a reduced level of engagement and demotivation. Investment is needed upfront to reap rewards later in the academic year.
- Careful consideration is needed when choosing to conduct all online Flipped Learning tasks – is the platform accessible for all students? Does it meet the SEND needs of the learner cohort? Is the platform age appropriate for resit learners? Do the students understand how to access all elements of the platform, and are the team prepared to spend the time to support learners when using the IT platform or VLE?

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Appendices

Appendix One - Flipped Learning Student Focus Group Schedule

Thank you for coming today. I must make you aware at this point, this focus group will be recorded so we can analyse it. It will not be shared with anyone outside of the research team and it will be stored securely. Is that OK?

The aim of today's meeting is to gather your thoughts and opinions on the Flipped Learning tasks you've been set through Mathswatch this academic year as part of the Maths Centres for Excellence project. We are particularly keen to understand what you thought of the tasks, whether you found them useful and what we can do to improve them. There are only a few basic rules to keep in mind while participating today:

- a) Everyone is encouraged to be an active participant.
- b) There are no "right" or "wrong" answers.
- c) Speak freely but remember not to interrupt others while they are talking.
- d) Note taking is for reporting purposes only and will be used for analysis. Names are not attached to the notes.
- e) We are conducting numerous sessions. All information gathered will be analysed to determine trends and make recommendations to the project.
- f) All feedback today will remain anonymous. In order to maintain anonymity, I just ask that anything that is said during our session is not repeated outside of our session.

1. What is your opinion of flipped learning?
 - a. Do you enjoy it?
 - b. Do you find it useful?
 - c. Do you understand the purpose of it?
2. Did you watch the videos?
 - a. Why?
 - b. Why did you think it was important?
 - c. Why not?
 - d. What prevented you from watching?
 - e. Did this change over time?
3. What is your opinion of the Mathswatch platform?
 - a. Do you enjoy it?
 - b. Is it easy to use?
 - c. Do you prefer other online platforms? Which ones?
 - d. Do you use Mathswatch for anything other than the set FL tasks?

4. Did watching the video/completing the FL tasks change how you felt when entering the classroom/starting a lesson?
 - a. Did you feel more prepared for the lesson?
 - b. Did it change how you felt about answering questions?
 - c. Did you feel differently if you hadn't completed the task?
 - d. Were you nervous about the lesson?
5. How did the videos/tasks support you in answering problem solving questions in class?
 - a. Did they help? How/why?
 - b. Can you tell me about a specific task you thought they helped with?
 - c. Did you feel more confident?
6. Do you think that FL has had an impact on your achievement in maths this year?
 - a. What is the impact?
 - b. What makes you think that?
7. Is there anything else that you would like to add with regards to your experience of flipped learning?

Thank you for your participation today, we really appreciate your comments and time.

Appendix Two - Flipped Learning Teacher Focus Group Schedule

Thank you for coming today. The aim of today's meeting is to gather your thoughts and opinions on the Flipped Learning that has been implemented this academic year as part of the Maths Centres for Excellence project.

We are particularly keen to understand changes in student behaviours.

There are only a few basic rules to keep in mind while participating today:

- a) Everyone is encouraged to be an active participant.
- b) There are no "right" or "wrong" answers.
- c) Speak freely but remember not to interrupt others while they are talking.
- d) Note taking is for reporting purposes only and will be used for analysis. Names are not attached to the notes.
- e) We are conducting numerous sessions. All information gathered will be analysed to determine trends and make recommendations to the project.
- f) All feedback today will remain anonymous. In order to maintain anonymity, I just ask that anything that what is said during our session is not repeated outside of our session.

- 1) Now you have experienced Flipped Learning in your teaching practice for a number of months, what are your general thoughts on Flipped Learning as a concept?
 - a. What are the benefits?
 - b. What are the disadvantages?
 - c. Have your opinions changed during this academic year?
 - d. Why?
 - e. What makes you think that?
 - f. Can you explain in a bit more detail?
- 2) In this next question I would like you to focus on your personal experience. Tell me about any barriers you've faced with using Flipped Learning this year.
 - a. How?
 - b. How did the SoW create a barrier?
 - c. What adaptations did you make to accommodate FL?
 - d. How did you overcome this?
 - e. How would you change it?
 - f. How would you have designed it?
- 3) In this next question I would like you to focus on your student's experience. Tell me about any barriers your students faced when completing Flipped Learning this year.
 - a. Student feedback?
 - b. Negative or positive?
 - c. Do you feel FL has increased the digital poverty divide?
- 4) In your opinion, how do your students feel about Flipped Learning?
 - a. What makes you say this?
 - b. How do you know?
 - c. Did you ask your students for an opinion on the Flipped Learning?

- d. Why?
- 5) What impact has Flipped Learning had on your students in lesson?
 - a. How?
 - b. What makes you say that?
 - c. Do students appear to have an increased base knowledge during the lesson?
 - d. Do they appear more confident in their subject knowledge?
 - e. Do they show more resilience when solving Maths problems?
 - f. Is there a difference compared to last year?
 - g. Why is there no change?
 - h. What could be done to make a difference?
- 6) How were students made aware of expectations of flipped learning?
 - a. How do you know?
 - b. What were the student's responses to this expectation?
 - c. Did you reinforce this?
 - d. How?
 - e. Why?
- 7) How did you reinforce the benefits of Flipped Learning during the course of the teaching year?
 - a. Why?
 - b. How?
 - c. Please expand
 - d. Did this take more admin time than last year?
 - e. Did you feel it helped?
- 8) Is there a noticeable difference in student behaviours of those who have completed Flipped Learning tasks, compared to those who have not?
 - a. How?
 - b. Why?
 - c. Please expand
 - d. Has there been an increase in attendance?
 - e. Has there been an increase in engagement?
 - f. Has there been an increase in assessment marks?
- 9) I'd like to discuss the effects of COVID in a bit more detail, both positive and negative.
How has the current COVID situation impacted FL?
 - a. How?
 - b. What are the positive impacts? Eg. Flexibility of home learning, additional online support
 - c. What are the negative impacts? Eg. Low attendance or inadequate home learning environments
 - d. Would this research have been better or worse without COVID?
- 10) Would you choose to use a Flipped learning approach in the future?
 - a. What makes you say that?
 - b. Why?
 - c. What would you do differently?
 - d. Has your opinion changed over the course of this year?

11)What is your opinion of Mathswatch?

- a. Why?
- b. Are there any strengths?
- c. Are there any weaknesses?
- d. Which other platforms would you recommend?

12)Is there anything else that hasn't been covered in today's session that you would like to share with us with regards to your thoughts and opinions of Flipped Learning?

- a. Personal experiences you would like to share and are relevant to the research
- b. Changes you would like us to consider for future iterations

Thank you for your participation today, we really appreciate your comments and time.