

Improving the motivation and engagement of maths GCSE resit students in FE by utilising a blended learning approach

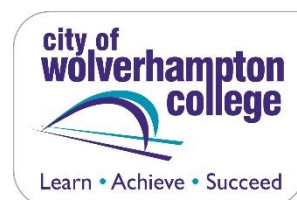
Theme: Motivation & Engagement

Key Principles:

Developing a positive blended learning environment and teacher-student relationships

Use technology to support students' learning in and outside the classroom

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About CfEM

Centres for Excellence in Maths (CfEM) is a five-year national improvement programme aimed at delivering sustained improvements in maths outcomes for 16–19-year-olds, up to Level 2, in post-16 settings.

Funded by the Department for Education and delivered by the Education and Training Foundation, the programme is exploring what works for teachers and students, embedding related CPD and good practice, and building networks of maths professionals in colleges.

Summary

Our Action Research project focused on delivering resit GCSE maths to 16-18 year olds in Further Education settings. Due to the enforced lockdown following a global pandemic the usual delivery methods were incapable of supporting the continual learning and development of learners in an education setting. As a group of FE colleges in the North West Midlands of England we focussed on how the use of a blended learning model (encompassing face to face delivery, online delivery, asynchronous delivery and independent study) impacted learners' motivation and engagement towards maths and how in turn this affected their achievement and progress. Other factors that were considered touched on the use of technology, social anxieties about learning maths, and communication through remote platforms; and these all impressed in some way on our research direction and themes. We ensured that everyone had a voice; we gathered learner views on blended learning and the influences this had on their learning and we gathered staff views on how blended learning affected not only their students' learning but also their teaching. Overall we surveyed c1000 students and c50 staff in order to better understand the advantages and disadvantages of working in a blended learning environment. Due to the nature of having 7 different settings involved with 9 different teachers conducting the Action Research we collected a wide range of data and information surrounding the many facets on different delivery methods, all of which are explained here. Our goal was to ensure that the disruption was as minimal as it could be and to provide recommendations and key suggestions that could help with organising and operating a successful blended learning delivery model. All of our data collection and delivery methods were carried out using remote software packages ensuring full compliance with social distancing and lockdown measures and this should be considered when reading the findings of the research. In summary, the majority of students said they preferred to have face to face lessons where there was a physical classroom dynamic although there was a small portion who liked online classes citing no peer pressure and a quiet place to work. Students had a variety of accessibility and communication issues due to a number of factors although a smaller number preferred the remote element of delivery and had a minimal number of issues. The overriding outcome was that a blended learning model impacts every student differently depending on their own personal experience and learning style and digital learning can have a number of advantages, but this must be balanced carefully alongside other delivery methods. Anyone considering the use of a blended learning model must ensure that the methods used are suitable and flexible enough to adapt to suit every learner.

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Background

Introduction

Newcastle and Stafford Colleges Group (NSCG) is a General Further Education College, based in Staffordshire. NSCG is a CfEM Centre which has facilitated an Action Research Group in the academic year 2020/21. The Network Partners who have collaborated on the Action Research along with teachers from both Newcastle and Stafford Campuses are five GFE's from the region: Reaseheath College, Buxton and Leek College, Telford College, City of Wolverhampton College and Macclesfield College. The researchers are nine teachers in total, with two teachers from Reaseheath College.

The size of the group has allowed for a wide ranging scope of learners and teachers from differing backgrounds to be surveyed and created a varied, engaged and supportive discussion group at the teams fortnightly meetings.

Each teacher has participated in the group with the common aim of finding ways to better support their learners and finding ways to enhance their teaching delivery, with a challenging subject that is not chosen by the learner.

College's and Learner Cohort Make-up

Newcastle and Stafford Colleges Group is a leading General Further Education College. The college provides a wide range of academic, vocational and apprenticeship qualifications from entry to degree level, along with support services. The college has 4841 full time learners, with 1700 maths resit learners (1650 GCSE, 50 Functional Skills).

Buxton and Leek College was formed in 2013 by the University of Derby combining together their FE operations of Buxton College and Leek College. The college offers academic and vocational courses, including apprenticeships, NVQs, BTECs, GCSEs, Access to HE and HNC/HNDs, as well as a range of short/leisure courses. Vocational courses include Motor Vehicle Maintenance, Catering, Hair & Beauty, Art, Engineering, Health & Social Care. The college has 893 full time learners with 355 maths resit learners (86 GCSE, 269 Functional Skills).

Telford College is a General Further Education and A-Level provision college, of medium size delivering the spectrum of technical, vocational and academic skills and subjects including Apprenticeships. The college has 2300 full time learners, with 753 maths resit learners (308 GCSE, 445 Functional Skills)

Macclesfield College is a vocational college specialising in trades courses and apprenticeships. The college has 1200 full time learners, with 440 maths resit learners (350 GCSE, 90 Functional Skills).

The City of Wolverhampton College is a further education college based in the city of Wolverhampton. The college has four sites and the college goal is 'Defining Futures.' The majority of students are from the local area. The college offers BTEC's, A level's and Access Courses. The college has 2000 16-19 students, with 850 GCSE resit students. (Functional Skills is not offered to the 16-19 provision)

Reaseheath is a leading land based/agricultural college based in Nantwich, south Cheshire. The college attracts local students who arrive via funded college transport as well as students from all over the country who are residential during term time. Learners come from a wide variety of backgrounds and are able to access various levels of course from entry through to degree levels. Reaseheath offers a wide range of varied courses including agriculture, horticulture, forest and arboriculture, construction, equine, animal management, engineering, sport and business. There are also options for accessing HE as well as for adult learners and aged 14 plus home-schooled children. The college has 2212 full time learners, with 792 maths resit students, (GCSE 675, Functional Skills 117).

Research Focus and Aims

This Action Research report focuses on the impact on a learner's motivation and engagement of a blended learning model.

During the pandemic everyone has had to change the way that education is delivered to our learners, the 'normal' ways of working and preparing our students for their maths resits has drastically changed over the past few months and everyone has had to adapt to a remote learning model.

We wanted to investigate the different blended learning models that exist in terms of their delivery and their structure and how they can have an impact on GCSE maths resit learners. We drew in key findings from our previous Action Research experience about seeking student views and opinions and used these to attempt to develop approaches for a blended learning model that includes many aspects of delivery.

Face to face, live online, independent online and paper-based have all been considered and analysed as to their effectiveness and how we can incorporate them (or not) with our approach.

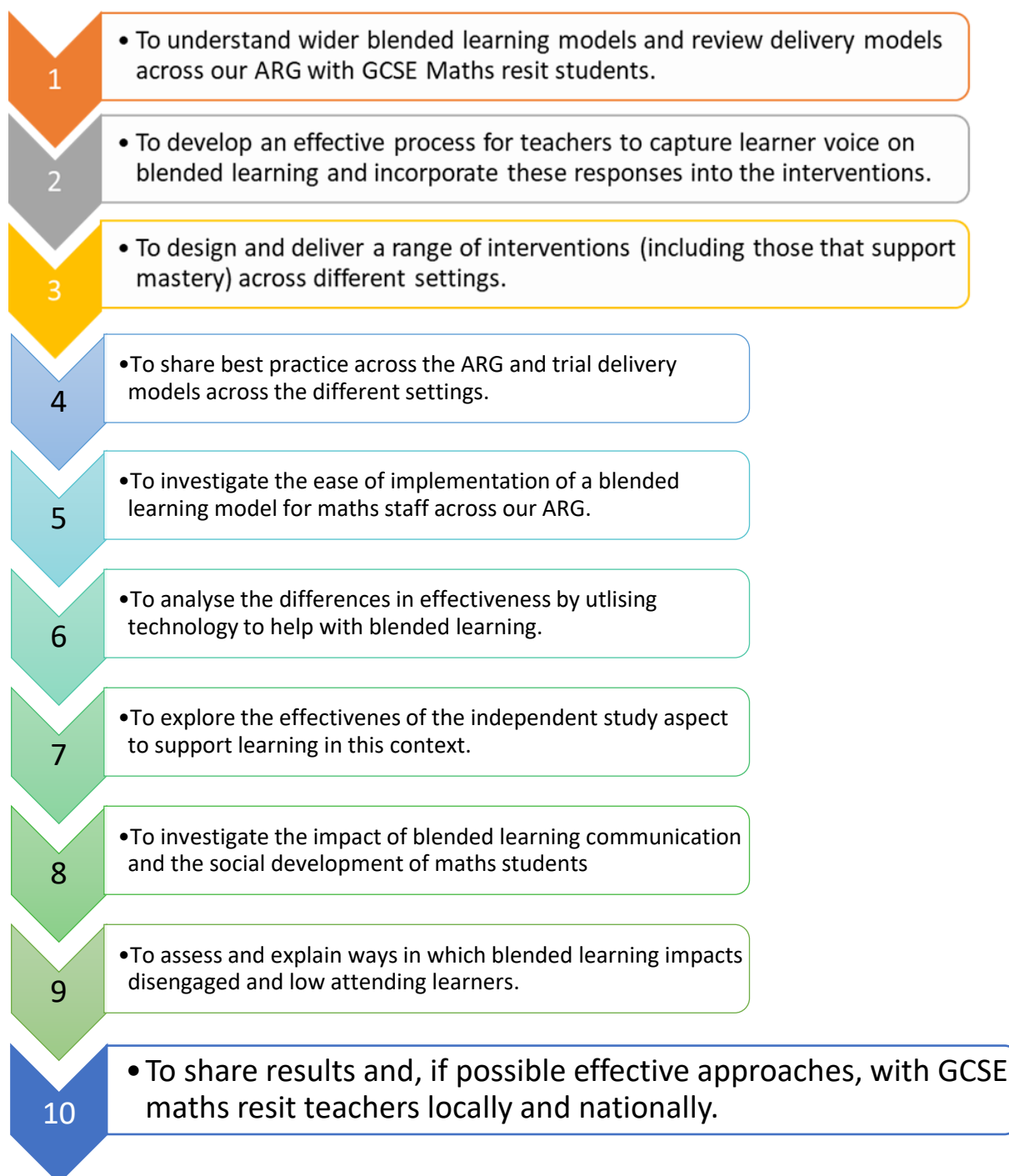
We are also aiming to analyse the effectiveness of technology in this approach and what the impact is for students who are learning with a blended model as well as the relationships that can be fostered between teachers and students. We hope to analyse the impact on different subgroups of learners, including resistant learners/low attenders, and hope to draw conclusions about the extent at which a blended learning model supports these different groups of learners. Everyone in the education sector has faced an uncertain 12 months and we hope our research, that will focus on GCSE resit maths students, will help FE providers find structural and behavioural approaches that can support our learners utilising a blended learning model. The NSCG Action Research group's aims and objectives (*Figure 1*) reflect the aspects that we will be focusing on.

Blended Learning in Post 16 Maths GCSE Resit

The first aspect the group considered was how do they define what 'Blended Learning' means to a maths GCSE resit teacher. The group's discussion led to the following agreed definition. 'A combined learning approach- live teaching with either online platforms or face to face delivery supported with a blend of independent learning, utilising a mix of different digital and non-digital learning techniques'.

The group wanted to consider on a wider scale therefore, what the learners experience and opinions on each delivery method are and consider how does the teacher's perspective compare to this? How does the use of technology impact this, what is the effectiveness of independent study to support learning in this context, what is the impact on the social development in terms of the ease of communication in remote learning, and how can we ensure a blended delivery method which considers all learners, in particular hard to engage learners.

Figure 1: NSCG ARG Research Objectives



Literature Review

Blended Learning

Over the past year the collective use of online learning has sky rocketed, the Covid-19 pandemic has shifted the educational sector abruptly from traditional face to face teaching to the more technologically based blended learning style. Online learning has vast potential, starting in its infancy decades ago, it has grown substantially. Given how much communication and internet technologies have revolutionised many aspects of society, it follows that these transformative innovations can be applied within further education in the 21st century. The transformations of these learning environments towards a more technological approach is vital to ensure all benefits are achieved (Williams, 2002). Consistent with Rasheed et al (2020), the challenges faced by educational institutes is primarily the effective support for teachers and appropriate instructional technology. A fundamental part of this technological revolution ensures learners have the opportunity to connect with other learners without the need to be in a traditional classroom setting, this also allows them to link with their peers at any given time or place and forms a collaborative community of online learning (Garrison et al, 2004).

The quintessential test of blended learning is the effectual amalgamation of the two key components (internet technology and face to face) so that we are not simply augmenting the prevailing dominant delivery style. This of course is correct whether it be a totally internet based or face-to-face learning experience. The intended aim of blended learning represents a momentous divergence from either of these styles. It signifies an essential reorganisation and reimaging of the teaching and learning approach, beginning with a key understanding of numerous contextual eventualities and needs, for example resource creation and effectual engagement/discipline strategies. As they can vary wildly, no such designs are equal. Thus, we see the many intricacies behind blended learning. Ultimately, the key issue is with regard to our comprehension of the properties of the internet combined with the understanding of how to assimilate this technology to elicit the most valued and desirable attributes of face-to-face teaching. In essence, it is the quantity and quality of these meaningful interactions to foster a sense of community based on the tenets of learning and inquiry. The ideologies are predicated on the fact that to be successful that our learning experiences are interactive (Garrison & ClevelandInnes, 2003). Concerning education, the true ramifications of the Covid-19 pandemic are still not known and it may be a number of years before the after effects are fully realised. Ultimately blended learning will play a pivotal role in education for the foreseeable future.

Methods

Outline of Data Collection Approach

Our Action Research Group has 9 teachers in 7 different GFE settings. The 7 GFE College settings differ in type of course offered and the economic and social environments of the learners. They range from a land based provider with the option of residential accommodation located in a rural setting offering a high percentage of vocational course's to providers in an urban town setting offering a mix of academic and vocational courses with high rates of deprivation when compared nationally. We targeted mixed previous grades GCSE maths resit groups across a number of settings. This gives the research a wide reach of learners with varying backgrounds and experience of differing delivery models.

Learner view capture was central to our research approach. The group collaboratively designed a learner survey using a mixture of quantitative and qualitative methods with open and closed questioning to find out attitudes, behaviours and beliefs towards what the current maths resit teaching model is for a learner and how they felt about it.

They asked what the learners thought about each teaching delivery format: face to face, live online and independent study/homework (remote delivery and paper based), depending on how they are taught. Where possible the exact same questions were used in each section so direct comparisons could be made. They used an online google form which was delivered to 7 different College settings, each with differing delivery models, and received 428 responses. To supplement this the group designed a Teachers Survey, 36 responses, with the same structure, plus a section on measuring the impact of Covid -19 on teaching, (to be taken by the all the maths resit teachers who teach in the 7 College settings).

The focus was 'What did teachers want to find out?' so they could discover ways to improve the learning and attainment. The design process was conducted using a discuss, submit, write, critical review, amend and test cycle until the final version was approved by all of the group. This process took a considerable amount of time, however it was necessary as it would form the basis of the research. The results of the survey's then informed the design of the interventions to test the outcomes.

The findings were reviewed and discussed by the group in detail, who then each chose an area of focus within the research which they had found particularly interesting and delved into a mini case study with their own maths cohort. The areas were blended learning delivery impact, independent study, use of technology, communication and social development. The methods used were online surveys, with a mixture of open and closed questioning and student interviews to give a more detailed insight with the aim of investigating the findings of the initial survey in greater depth.

Data Collection Formats/Tools

The Learner and Teacher surveys were delivered via an online google form. This allowed the use of multiple choice, tick box, ranking and free text answers in a quick, clear format which can be divided into sections. The survey can be easily shared with the teachers and

given to the students via a number of digital devices. The responses are instantly fed back and immediately available to the editor.

Ethics

The ethics of asking the learners and teachers to take the surveys was discussed by the group during the online meeting and it was agreed to put an ethics statement at the beginning of the survey which participants had to tick a box to show they had read and understood the statement. This outlined what the survey was for and why the information was being asked for and how the results would be used. They were informed that the survey responses were anonymous and no personal data would be taken or stored and that they could withdraw from the survey at any time. It was explained that the reason for the study was to make sure all learners and teachers opinions would be heard and would be used to inform research to help improve the maths GCSE resit teaching approach in regard to blended learning delivery.

Covid-19

The pandemic did inform the choice of research, however the extent to which this would continue to affect teaching and learning was unprecedented. It meant that aspects of blended learning, such as remote delivery and increasingly, independent study was ultimately a forced method of delivery rather than a considered choice, where it had hitherto been used. This meant that the previous research on this topic, whilst still useful, was limited in its scope. In addition, the learner experienced remote learning where teachers had to adapt ferociously quickly in the first instance and with no option other than remote learning for periods of time. However, conversely it has meant that all learners have now experienced a full range of blended learning options.

The research has sought to find out how the learners experience of this, in a subject that is not their main programme, Maths GCSE, may inform more considered future blended learning delivery models.

Results

Initial Group Learner Survey + Teacher Survey

Learner Survey

There were 428 responses from learners at 7 GFE Colleges. Out of the 428 learners, 148 had received face to face lessons only (34.6%), 35 had received live online lessons only (8.2%) and 245 had received a combination of live online and face to face (57.2%). Out of 428 learners, 379 (89%) said they completed independent study. 81.1 % were GCSE learners and 15.9% were Functional Skills learners. This survey was carried out during December 2020 and January 2021.

Teacher Survey

There were 36 responses from teachers at 7 GFE Colleges. Out of the teachers 58.3% taught live online lessons only and 41.7% taught a combination of live online and face to face at that time. The survey was carried out in January 2021. The most popular platform to use to deliver live online was MS Teams (94.4%) and by a significant proportion the most commonly used software was MathsWatch (21%), closely followed by Desmos (18%) and Kahoot (11%). Out of 36 teachers, 24 different software packages were listed as being utilised.

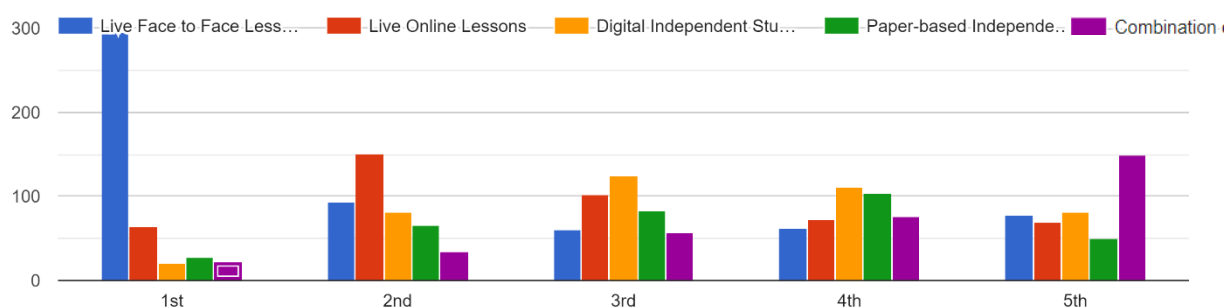
Impact of Blended Learning Delivery

Face to Face Lessons

All learners were asked to rank which method of delivery they thought was more effective, and face to face came out as a clear first choice, followed by live online, digital independent study, paper independent study and combination respectively (*Figure 2*).

Figure 2: Students' ranking of delivery style preference

Q1a. Put these delivery styles in order of preference in terms of how effective they are in helping you to learn.



This was supported by the response to asking if they thought remote learning (live online and independent study) was more effective than face to face. An high percentage, 62% thought face to face was most effective, with 19.6% reporting no difference and 16.3% saying they thought remote was more effective. This also needs to be considered within the context of the pandemic, where remote learning was not a choice, but a necessity, to facilitate the continuation of learning during lockdown.

Live Online Lessons

Both the combination and live online only groups, when asked what they liked about live online learning rated the ability to 'work without distractions', (combination 38.8%, live online 48.6%) and being able to 'choose where I work' the highest (combination 40%, live online 34.3%), a lower portion, but still important (combination 11.4%, live online 8.6%) said they liked it as they had anxiety issues about being in a classroom. Similarly for the teachers survey, 20% thought 'fewer distractions', 'students more focused' and 'much improved behaviour management' were the main benefits, with 16% saying they thought it reduced student anxiety.

For both combination and live online the highest response when asking about the disadvantages of online was that the learners said they found it difficult to ask for help (live online 45.7%, combination 50.6%). This was something the research teachers all found concerning. When the same question was asked to teachers again the highest percentage (37%) was 'learner engagement loss/low participation/learners lack of social interaction'.

The next highest responses for learners were that they missed the social aspect of being in the classroom (live online 25.7%, combination 27.8%) and working in small groups (live online 22.9%, combination 37.1%), and a smaller, but again still important issue when related to how many learners this affects, was the difficulty in being able to find an appropriate workspace outside of College (live online, 14.3%, combination 12.2%).

Communication and Social Development

Learners were asked which method of communication are you most likely to use during either a face to face lesson or in a live online lesson.

In face to face lessons, the responses were almost identical across the face to face group (50%) and combination group (48.6%) with whole class group discussion being the preferred method. This was followed by asking the teacher for 1:1 help (face to face 37.2%, combination 43.7%) and then small group discussion (face to face 24.3%, combination 29.8%).

However in live online, for both online only and combination, the preferred method was by group chat (chat function) with live online at 68.6% and combination 48.6%. Group verbal discussion was chosen second (live online 28.6%, combination 38.8%) and private messaging the teacher third (live online 17.1%, combination 36.3%). This suggests that live online teaching inhibits whole class group verbal discussion.

Camera Use

All the learners were asked if they had their camera on during live online lessons. Only 1.6% (4 learners) picked 'Yes, because I prefer to' from the combination group only. No learners picked this from the live online group. A high majority, 62% in the live online and 55.5% in the combination groups said 'No, because they preferred not to', followed by 25.7% for live online and 22.9% for 'No, because our teacher asks us not to' and 8.6% for live online and 12.7% for combination because 'It did not work'. This raises both communication and social questions for live online learning, we then start to ask, what are the implications of teaching without visual interaction for both the learner and the teacher?

Independent Study

Out of 428 learners, 379 (89%) said they completed independent study. Out of the 89%, 61.9% said they completed this occasionally with only 26.6% completing it regularly every week. When asked if they preferred completing it by paper or online/using technology the result as was a split, 26.6% strongly believed or believed online/using technology was better as opposed to 29% strongly believed/believed paper was better, with 44.3% not minding either. Whilst the benefits were most strongly seen as the ability to work at their own pace (62.5%) and working without any distractions (27.7%), the negatives were that there was no one to ask for help (46.7%) and they missed the 'social aspect of a live class'. The main reason given for those that said they did not do any Independent Study (11.4% of respondents) was that they 'struggle to work alone' (59%). The aspects teachers liked with online independent study were the ability to track progress (19%), learners able to study at their own pace (17%) and auto self-marking (13%) which gives the learner instant feedback. The biggest negatives for the teachers were the lack of engagement (30%) and digital poverty (18%). Can engagement with independent study be increased by utilising technology that better responds to the learners needs?

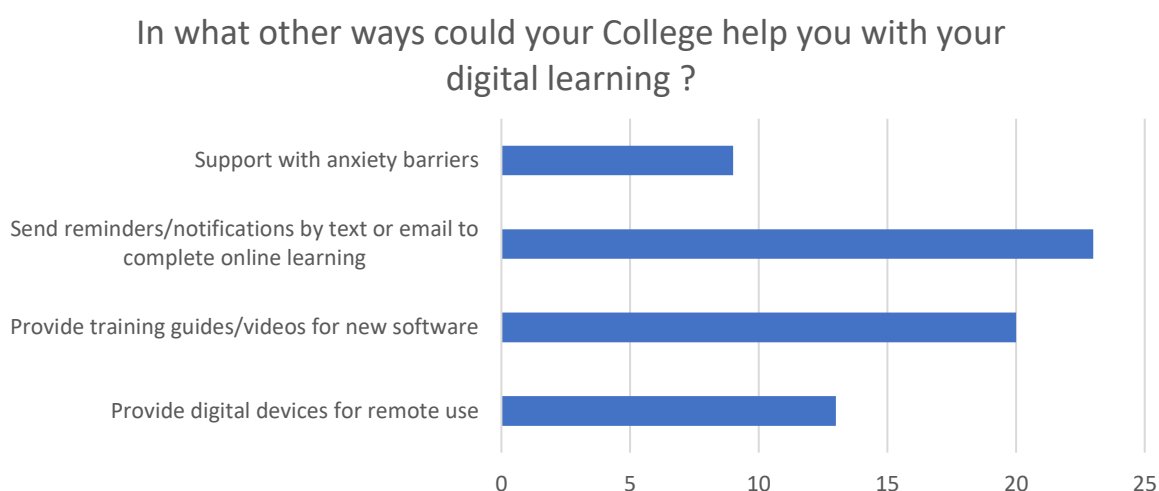
Technology

Regarding how happy learners are to use new software 79.7% were very happy or happy, with 20.3% unhappy or very unhappy. The majority of learners, 83.4% said that they found it very easy or easy to access digital learning with 14.4 % finding it difficult or very difficult.

The data suggests that all learners are not given equal access to maths teaching and whilst the majority feel happy using new software, a fifth do not. In the teacher's survey, no teacher felt that learners had had equal access to maths, with 25% strongly disagreeing that it had been equal.

Learners were asked what ways the College could help students with their digital learning (*Figure 3*). A high proportion asked for the College to send reminders and also to provide training guides/videos to help with new software.

Figure 3: Student responses regarding extra measure to support digital learning



Mini Case Studies

Following these findings the Action Research Group selected a focus that was pertinent to them and their setting. They then focused solely on students and teachers within their own setting. The mini case studies are titled below.

1. What are learner's opinions of Blended Learning delivery and how has delivery during the Covid-19 lockdowns impacted this?
2. Why post-16, maths resit students struggle to seek help during an online lesson?
3. Investigating learner perception with regards to the loss of visual contact during maths sessions.
4. Can an online resource improve the engagement of maths resit learners with Independent Study?
5. Can an online resource incorporated into flipped learning improve the engagement of maths resit learners with Independent Study?
6. What are maths resistant and low/non-attenders opinions on Blended Learning?
7. Investigating learner's digital training needs for online maths GCSE resit lessons

Mini Case Study 1

What are learner's opinions of Blended Learning delivery and how has delivery during the Covid-19 lockdowns impacted this?

Rob Harrop NSCG Newcastle College

Introduction

I am continuing to delve into student and staff opinions concerning blended learning with a particular emphasis on how the most recent lockdown has influenced their opinions.

Blended learning is a practice within the educational sector that combines traditional face-to-face teaching, streaming into a live class and using educational online materials in order to engage over some technological medium. This offers the learner flexibility and convenience as they can learn remotely and control the pace of their learning.

Methods

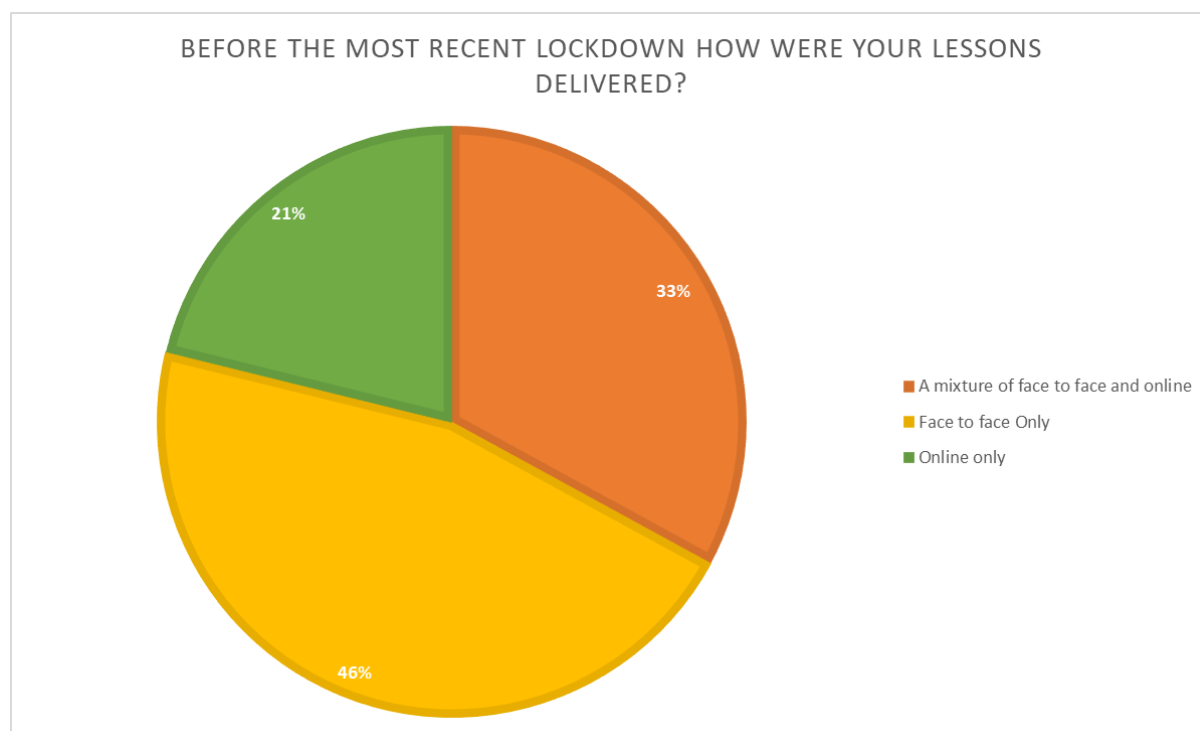
Traditionally, to gauge students or staff opinions we would use a survey comprising of a mixture of open and closed questions. A major advantage of completing these surveys online ensures all current lockdown restrictions are met, as we are not needlessly using paper. This method of collection is advantageous when it comes to data analysis. With these surveys completed online only we must consider those who do not have access to the internet. As college policy, we have ensured that all students do have access to some form of device, which can access the internet; therefore, all students have equal opportunities to complete the survey. My entire cohort of students were all informed and given a week to complete the survey. Of these, 85 distinct cross college students completed the survey over this time, 51 of these students were female and 34 were male. The survey was comprised of 15 questions. These were primarily closed questions using a 5-point Likert scale and asked participants to rate how strongly they agreed with each statement. The survey began with two open questions used to ascertain the student and their group number. I could then ensure that when answering their third question concerning how their sessions were delivered pre lockdown that this would match with my data.

The survey given to the teaching staff was based around the survey given to the students but was longer at 19 questions. This survey was shared between our Action Research Group (ARG) and all staff were asked to complete this. Of those invited to complete the survey, 10 teachers completed this over this time. The vast majority of the questions followed a similar format to the student survey comprising of 5-point Likert scale, with 3 open ended questions to allow for more opinions to be expressed. Three questions in the survey comprised of a 10 point Likert scale from 1 to 10 to rank confidence and feelings on a particular subject. The data for both surveys was then collected and analysed using Excel.

Results

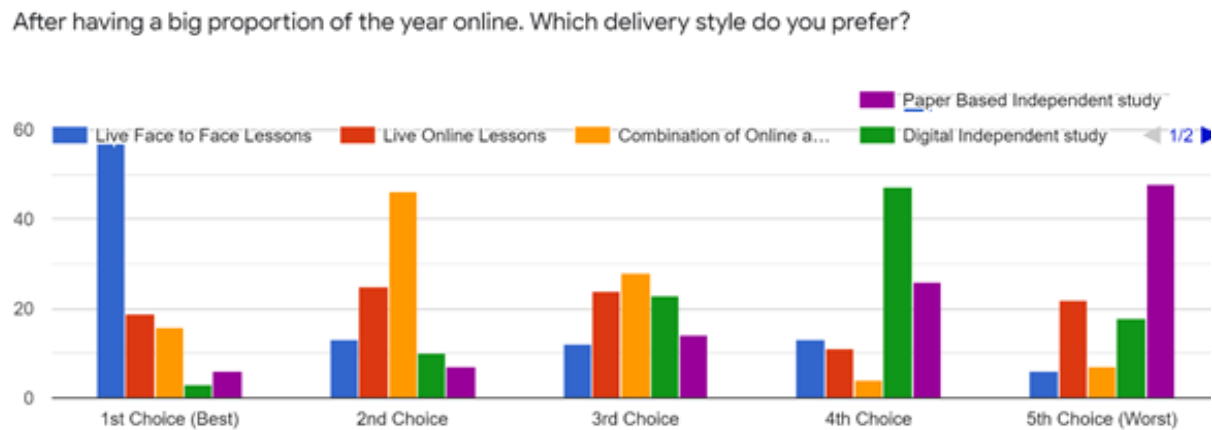
The first three questions in the survey were designed to find which type of blended learning students experienced prior to lockdown. Students received a number of different protocols of blended learning during the lockdown period (*Figure 4*). 46% of students did manage to maintain face-to-face delivery, with some elements of their course using online learning tools. 33% received a mixture of both face-to-face and online sessions. This was delivered over a two-week period. Students completed online sessions on alternate weeks. The final 21% of students only completed online learning and streamed into live lessons.

Figure 4: Student responses regarding delivery method of maths lessons



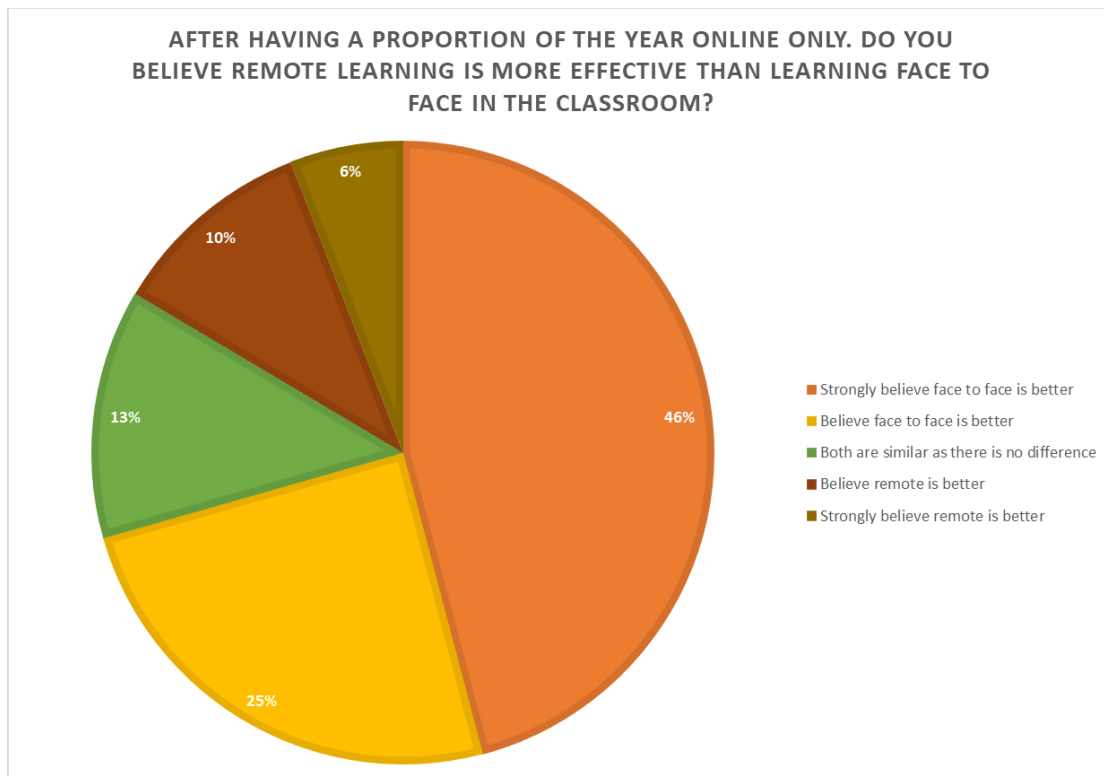
We see how students' have ranked their preference to blended learning styles (*Figure 5*); the vast majority, around 67%, selected live face-to-face lessons as their preferred option, this agrees with Grace et al (2018) concerning students' preferences for learning experiences. All here are of course GCSE resit students, many of whom have never really experienced online learning up to this point in their academic studies. It would therefore follow that as online learning was thrust upon them so abruptly, that they struggled to make the effective transition to remote delivery due to the many challenges that come with blended learning. This can be further seen as students second preferred choice was a combination of online and face-to-face teaching. It is interesting that this shows slightly different ranked preferences than the ARG initial whole group survey of students which was submitted in December/January, where the second choice was Live Online Lessons, and Combination came fifth (*Figure 2*). This could be due to the students having had more time to experience the different delivery methods.

Figure 5: Students' ranking of delivery style preference.



It is clear that a strong proportion of students' believe that face-to-face sessions are more effective and conducive to successful learning outcomes (*Figure 6*). 71% of students prefer this type of learning; this could be due to many contributing factors. The unilateral introduction of this type of learning due to implications with Covid-19, national lockdowns and social distancing guidance. The fact that this type of learning is substantially different from any previous type of education these students have received coupled with the stress and nature of these unprecedented times could explain their results. Some students felt it made no real difference between remote learning and face-to-face teaching. A slightly larger proportion (16%) have found that remote learning is a more effective learning strategy.

Figure 6: Students responses to effectiveness of remote learning vs face to face learning.



We asked the students to rank their confidence levels concerning mathematics before the mandatory lockdown and after. The respective *Figure 7* and *Figure 8* show their responses, 1 being least confident and 10 being the most confident. It is clear that their confidence with mathematics has decreased during this time.

Figure 7: Student confidence score pre-lockdown

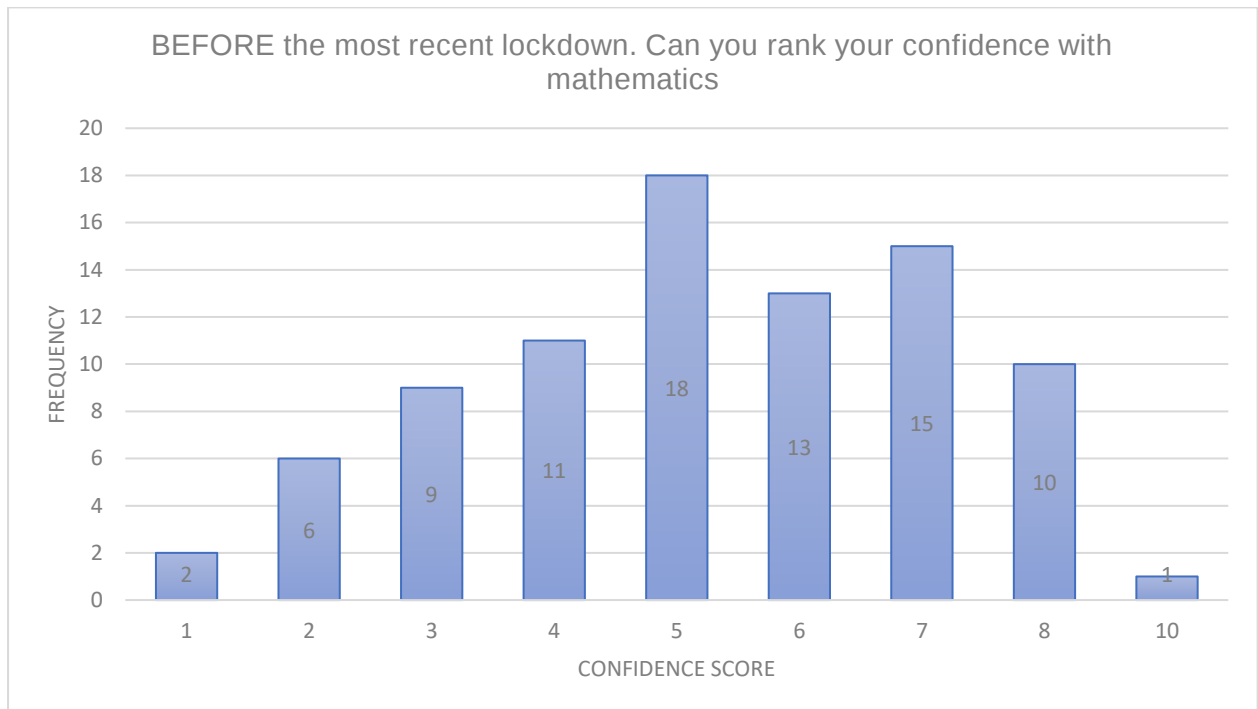
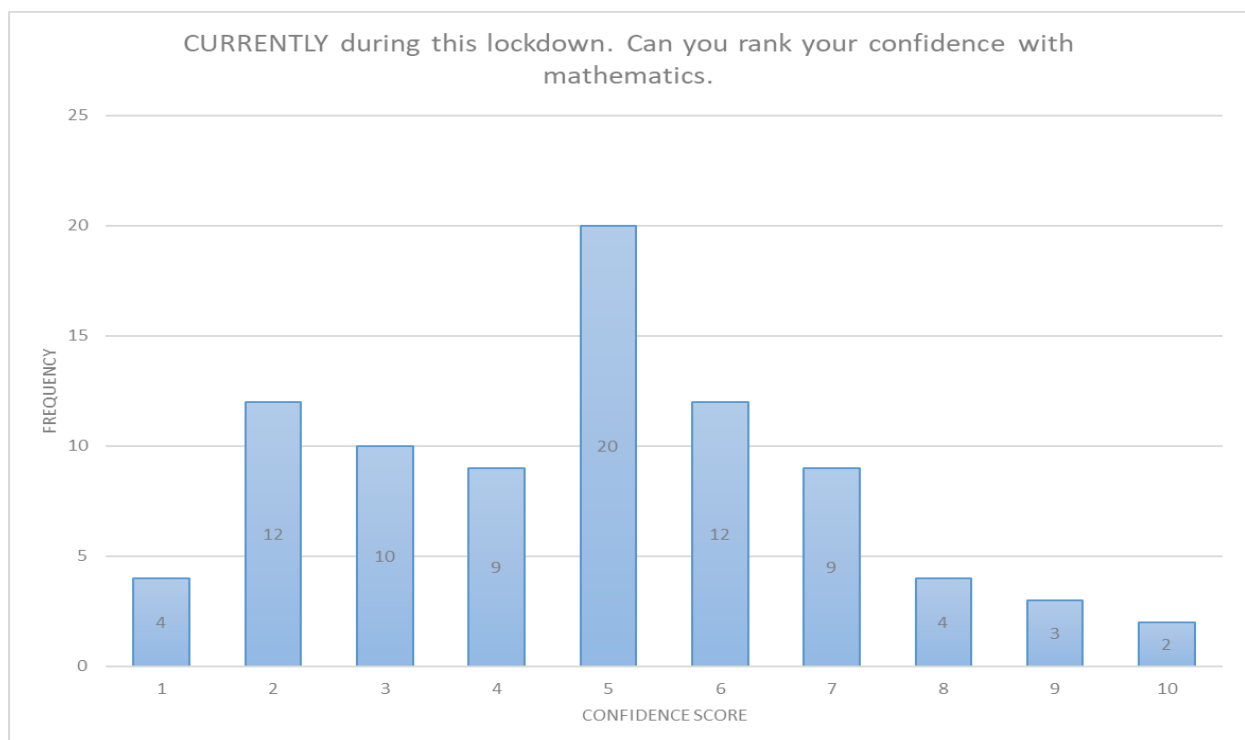


Figure 8: Student confidence score post-lockdown



The data reveals that the mean score for the students' pre lockdown was 5.27, this then dropped to 4.8. Overall, this is a drop of 0.47 in their perceived confidence. If we further delve into these figures (*Figure 9*), we can see that 29% of students had no change in their confidence levels. We can see a number of students confidence levels have increased during this period with a mean increase of 2.48 for these 23 students. Conversely, we can see the highest proportion of students felt their confidence has decreased. These students had an average decrease of 2.62 in their confidence levels; furthermore, 17 of these student confidence levels were half or more of their pre lockdown score.

Figure 9: Difference in student confidence scores

	Total of Students	% of total	Mean Change
Score increased	23	27%	2.48
No change	25	29%	0.00
Score decreased	37	44%	-2.62

We can further compare this with data from the staff survey. This will highlight some interesting results. Staff were asked to imagine a “typical” student and to rank their confidence with mathematics pre and post lockdown (*Figure 10*).

Figure 10: Difference in staff perception of student confidence scores

	Total of Staff	% of total	Mean Change
Score increased	1	10%	1.00
No change	2	20%	0.00
Score decreased	7	70%	-1.71

When considering the data from *Figure 10* from the staff survey we see that pre lockdown the average score for the “typical” student was 4.8, this then fell to 3.7. This is a far greater drop of 1.1 in perceived confidence from the teacher perspective. We can also see that both these scores are lower than the average student perception. Furthermore, we can also note a striking difference between the changes in each group. Students as a whole had a drop of 0.47 in their perceived confidence, whereas the staff had a perceived drop of 1.1. So staff imagining a typical student confidence level, is over twice the students perceived level. This either implies that the students were optimistic with their confidence ranking or the staff were pessimistic with their “typical” average student. Either way this is an interesting observed phenomenon.

If we consider the breakdown of student perceptions when compared to their academic progress throughout the year (*Figure 11*); it is apparent from the chart that a significant proportion of students feel their grades have suffered during the lockdown period. Interestingly 26% of students believe their progress has improved over this period. If we are to look further at this data and compare it against their preference of teaching styles (*Figure 12*) we see some interesting results.

Figure 11: Student perception of impact on progress.

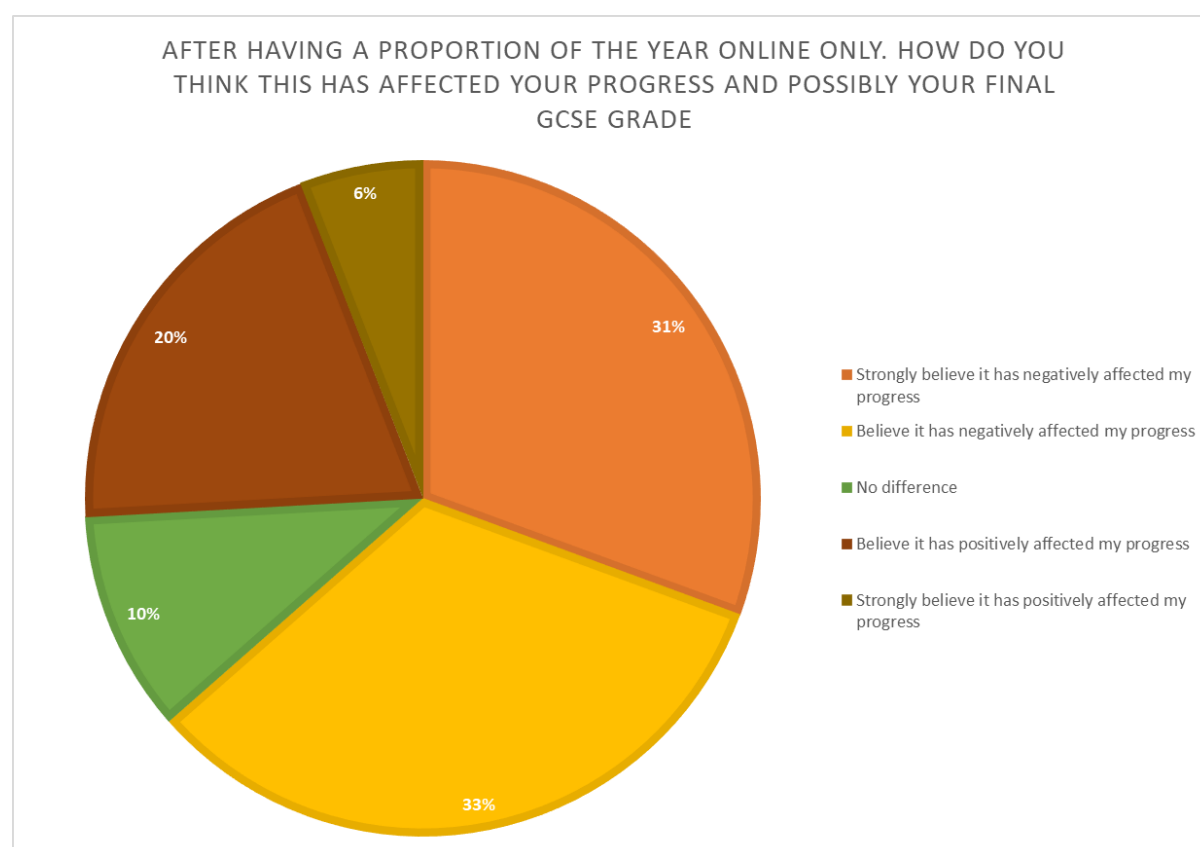


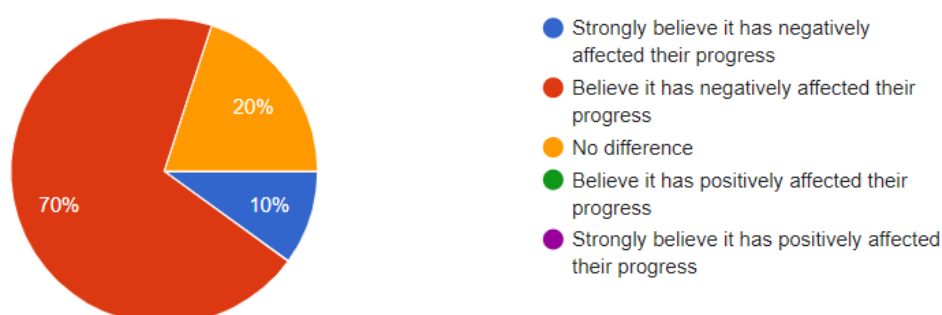
Figure 12: Student perception of impact on progress against preferred delivery style.

Row Labels	Total Number	%
Both are similar		
Strongly believe it has negatively affected my progress	1	9.09%
Believe it has negatively affected my progress	3	27.27%
No difference	3	27.27%
Believe it has positively affected my progress	4	36.36%
Face to Face is Better		
Strongly believe it has negatively affected my progress	24	40.00%
Believe it has negatively affected my progress	23	38.33%
No difference	3	5.00%
Believe it has positively affected my progress	7	11.67%
Strongly believe it has positively affected my progress	3	5.00%
Remote is better		
Strongly believe it has negatively affected my progress	1	7.14%
Believe it has negatively affected my progress	2	14.29%
No difference	3	21.43%
Believe it has positively affected my progress	6	42.86%
Strongly believe it has positively affected my progress	2	14.29%

As you would imagine we see that for those who prefer face-to-face delivery a significant 78.33% believe this has had a negative impact upon their progress this academic year. Conversely, for those who have thrived during the lockdown period who believe remote teaching is better we see that 57.15% of these have seen improvement with their progress. Interestingly, those who believe that face-to-face and remote delivery are similar we see that there is no discernible difference between their perceived progression. If we now look at the opinions of the teaching staff (*Figure 13*), we see the following.

Figure 13: Staff perception of impact on student progress

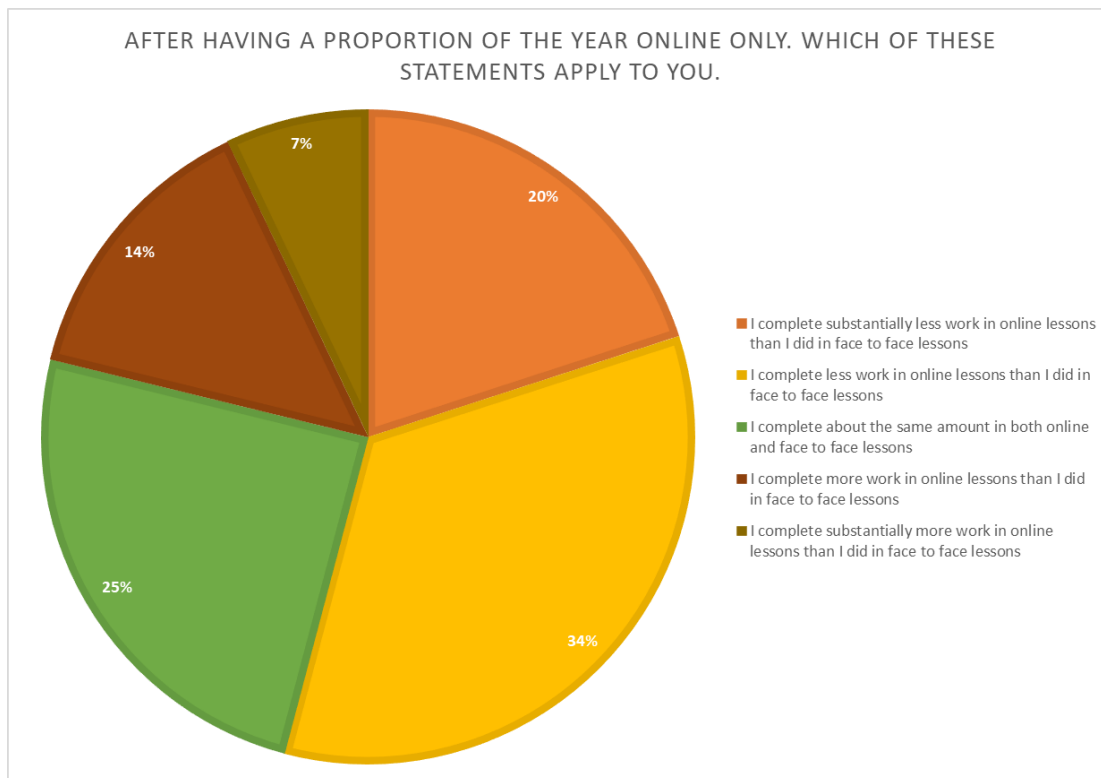
After having a proportion of the year online only. How do you think this has affected your students progress and possibly their final GCSE grade



80% of the staff surveyed felt that students' progress had suffered this year; this is of course very concerning. When asked further via an open-ended question staff elaborated their points. Staff felt it "infuriating" when students would not respond during a lesson and that there was no real way to see if they were actively taking part during this time. They felt that there was a strong inequality gap between the students. Not all had access to a personal computer or had a good learning environment to concentrate and learn remotely. Some had issues with sharing of Wi-Fi or technological devices due to the fact their entire household was streaming from home.

When considering the amount of work completed 54% of the students who were surveyed felt they completed less work at home than they would in a face-to-face lesson (*Figure 14*). Again, this is quite a shocking statistic. In terms of workload students were given arguably more work and support when they were remote however many still felt they completed less. We can conversely see that a good 21% had the reverse effect and that they felt they had completed more in this time. This again could be linked with the learning environment they had set up at home. The simple fact that they had fewer distractions than in a standard classroom environment, for example peers. However, it could be argued that they had more distractions at home.

Figure 14: Student perception on the amount of work completed.



We also see that teachers felt that students were often completing less work (*Figure 15*). 80% of those surveyed felt it was less than we would expect in a standard classroom lesson. This is worrying, not only do both students and staff feel like that they are making less progress remotely they also feel that the volume of work they are completing is also less than they would normally complete.

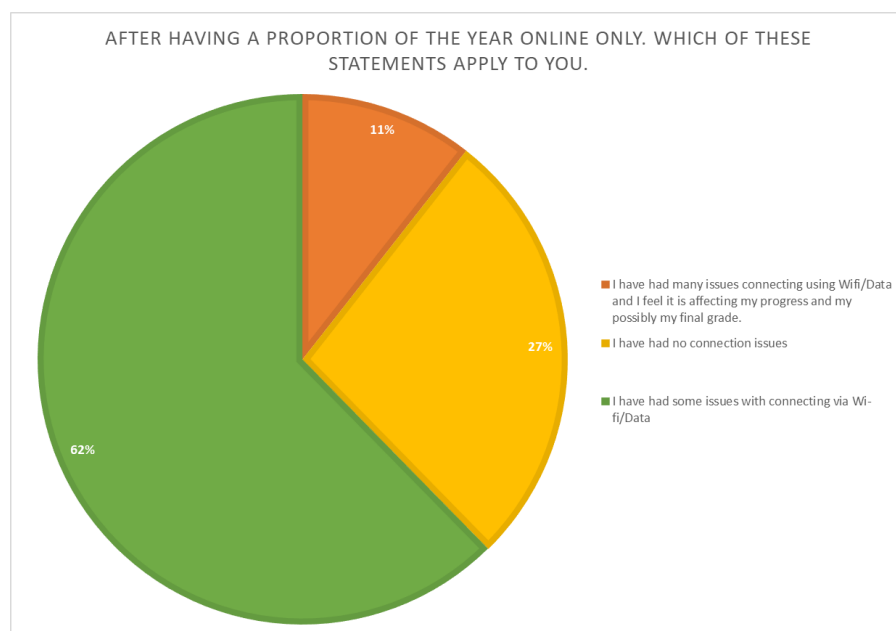
Figure 15: Teacher perception of amount of work completed by students

After having a proportion of the year online only. Which of these statements apply to your learners. Take this to be a "typical" student



In many ways, it is clear that this type of remote learning is unstable for long-term success. Here students were asked about issues connecting to lessons while at home. We see that 73% of students have had issues accessing material while remote, with a small proportion of these believing the issues have been so numerous that it will affect the progress and possibly their final grade (*Figure 16*).

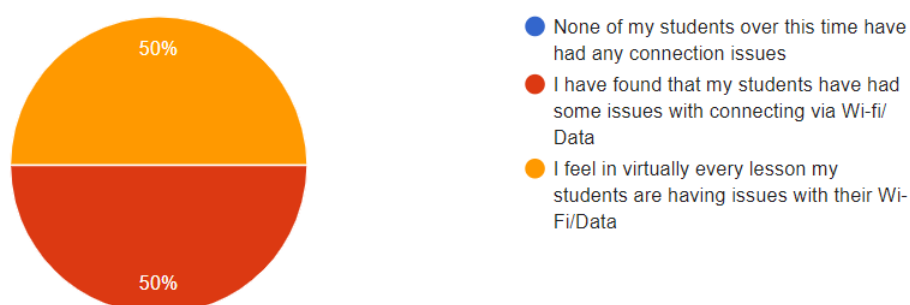
Figure 16: Student responses regarding connectivity.



Sadly, the situation presented from the teacher survey is no better. All teachers surveyed have had some issues with regard to student connection/Wi-Fi issues (*Figure 17*). It is clear that for blended learning to be successful, issues such as these must be considered. For 50% of staff to feel that in virtually every session there is at least one student with these issues must be addressed in any hopes of ensuring a successful implementation of blended learning. How could learning ever hope to take place if one could not even access the session or the materials? For those who suffer such issues it could cause frustration and despondency considering for most GCSE Maths is not their favourite subject.

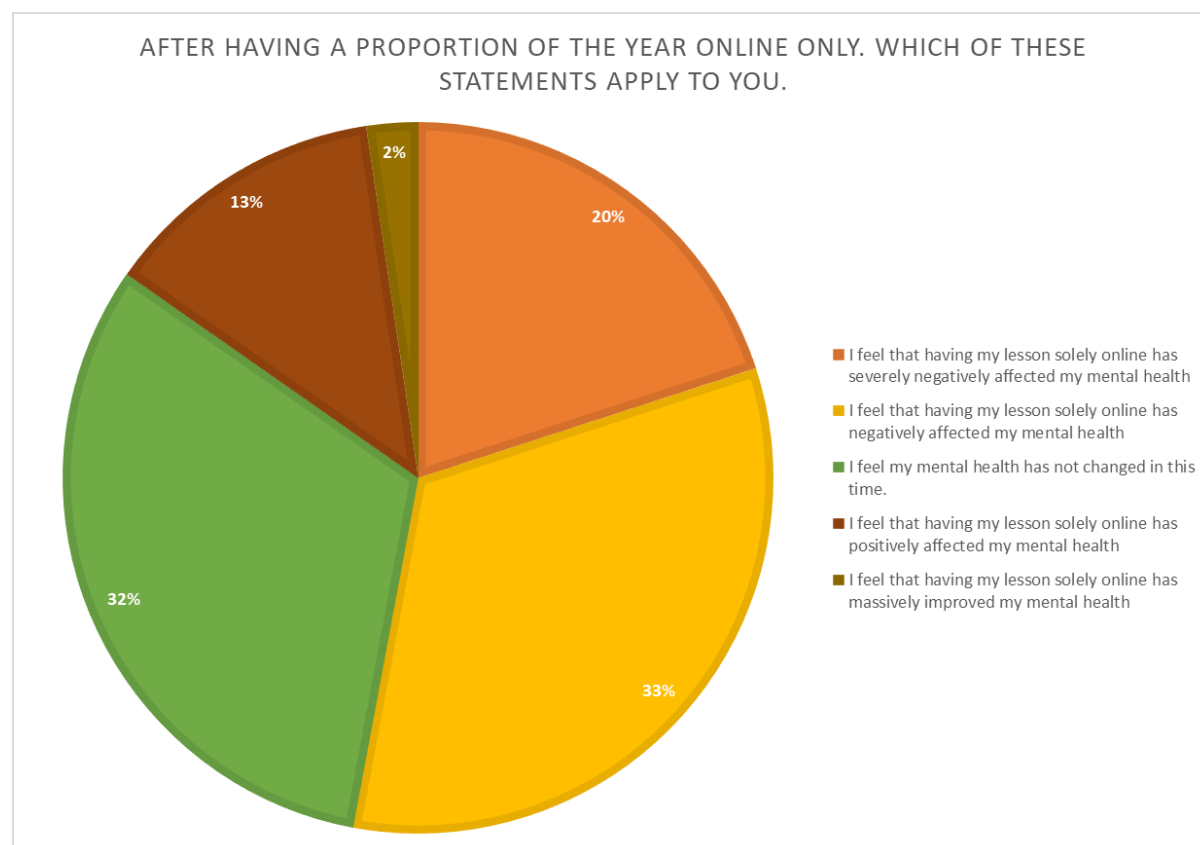
Figure 17: Staff responses regarding students' connectivity.

After having a proportion of the year online only. Which of these statements apply to you.



Many students have felt their mental health has been affected during this time, 53% have felt that when their lesson is solely online it has negatively affected their well-being (*Figure 18*). Conversely, we see 15% have felt a positive increase during this time with just under a third feeling no real difference. It is worrying to see that over a half have been negatively affected during this time with the isolation and the lack of social interaction.

Figure 18: Student perception of how their mental health has been affected by their delivery method.



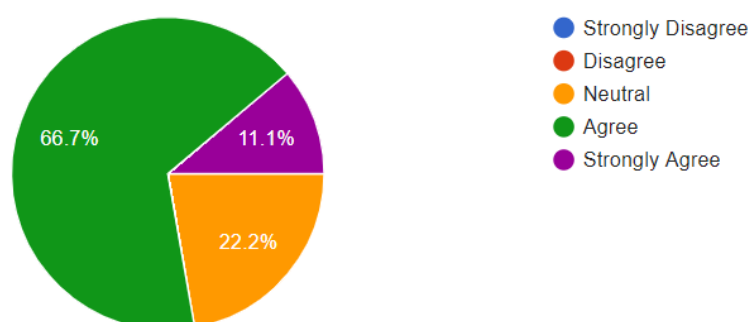
Sadly, it is not just the students who have suffered during this time. Teachers have been impacted, 50% of staff surveyed have admitted to a decrease in their mental health. It has been a very stressful and difficult time in education. Staff are spending longer planning and constructing lessons in order to meet the needs of their students in this unprecedented time. Staff who were surveyed have noted an increase in planning time with an average of 2.85 hours extra time per week in order to successfully deliver meaningful learning experiences. Furthermore, 80% of those surveyed have noted an increase in administrative tasks, to effectively track and monitor students work and progress during this time. Moreover, to successfully work from home staff have had to adapt their own homes to workspaces to deliver lessons. This requires specialist equipment to complete efficiently such as extra monitors, graphic tablets and headsets to name a few. From those who were surveyed all said they bought these items themselves. Staff have not only suffered with psychological issues but also physical, staff mentioned the paradigm shift to working from a desk. These include back and neck pain along with issues from staring at a screen all day long. This can also affect general energy levels. When asked to rank their energy levels (from 1 being lethargic to 10 being very energetic) during a typical day of lockdown teaching staff had an average score of 4.2 and have noted a significant change in energy levels and focus during

this time. Overall, it is clear teaching has been a very difficult and stressful experience. We see that of those surveyed 77% agreed (*Figure 19*) teaching this year has been one of the hardest academic years they have face during their teaching careers.

Figure 19: Staff responses to difficulty of teaching during the lockdown period.

How much do you agree with the statement. "Teaching this year has been one of the hardest academic years I have faced during my teaching career"

9 responses



Limitations

These findings are of course based upon a relatively small sample size of 85 students, which is an exceptionally small proportion of those completing GCSE Mathematics in a further education setting. It is also worth noting that not all of my GCSE students completed this survey. They were all presented with the opportunity and asked to complete it however there were many that did not complete the survey. This of course could wildly affect the data, the information collected, and the results presented. There is a similar issue with the staff survey and it is a limitation. Of those asked only 10 staff members completed they survey. Certainly for future study, a larger sample size must be taken to better represent the population. Further research into how the Covid-19 pandemic is also required as this is such an unprecedented time in the education setting. Previous literature on the effects of blended learning is often for willing participants, in our case students were abruptly forced into the many facets of blended learning. Although, the average student is comfortable with using technology, the act of streaming into a lesson and all it entails is foreign to them as this the first academic year they have completed this process.

Conclusions and Recommendations

This study set out to delve into student and staff opinions concerning blended learning with a particular emphasis on how the most recent lockdown has influenced their opinions. The study has shown that there are many issues that affect both staff and student alike when it comes to the utilisation of blended learning. The research has suggested that the majority of students perceive that they complete less work at home than they would in a face-to-face lesson. This is also concurrent with the teachers' perspective. We have also discussed that

the majority of students perceive that they are making less progress while solely online versus a face-to-face model. This is also reflected in their perceived mathematical confidence score. In general, therefore, it seems that both staff and student prefer a face-to-face model of the typical classroom. We have investigated teachers' views, which in this study have often been negative towards the efficacy of blended learning. This study has raised some interesting questions, which require further work. What is now needed is a cross-national study involving a much larger proportion of the GCSE mathematic students in further education along with the respective teachers of said subject. Considerably more work would need to be carried out to determine the efficacy and practicality of using a blended learning model with regard to GCSE resit students.

Mini Case Study 2

Why post-16, maths resit students struggle to seek help during an online lesson?

Victoria Tomlinson and Jennifer Hynes - Reaseheath College

Introduction

We wanted to delve further into the notion that some students are struggling to ask for help during their online maths lessons.

We felt compelled to investigate this, as FE maths teachers, we want to help young people progress and develop their maths skills. It's very worrying and quite upsetting that students might feel unable to ask for help in their lessons. Therefore, we wanted to investigate the influencing factors behind this issue and potential strategies to overcome it, which in turn, will hopefully improve student engagement and achievement in online lessons.

We decided to collect the data via an online survey. There were some changes from our original plan. We surveyed the students as planned, although we disseminated the survey across different teachers, rather than just our own classes. The rest of the plan changed due to time constraints, we were unable;

- to put strategies into place to improve the learning experience.
- to interview focus groups
- to re- survey

We realised that we actually had a considerable amount of data from the survey, and that the original plan to interview and re-survey was unrealistic given the time constraints.

Literature Review

There is considerable research which investigates into why students won't ask for help when it is needed. Educators need to understand the factors surrounding this issue, why do some students prefer to sit quietly - silently struggling, waiting for the response of another student's question, rather than putting their own hand up? Understanding this mindset enables teachers to overcome these problems resulting in a more positive learning environment (Sparks, 2014).

According to Weimer (2009) students have fears of 'bothering' their teacher, and are worried about what help seeking will say about their ability. She argues that the teacher needs to continuously review the importance of asking for help and also stipulates that asking for help is an expectation of the course.

This argument is supported by Lammers (2017) who investigated the factors which encouraged and discouraged students from asking for help. He found that student's fears of intimidation and appearing stupid were reasons why students won't ask for help. Additionally, he argues that the student's perceptions of their teacher to also be an

influencing factor. He suggested teachers need to regularly reveal their willingness to provide help as a method to overcome these barriers.

This report investigates these factors further, but also considering these issues in an online environment, as much of the research is based on help seeking in a classroom environment.

Methods

A survey was created, using Microsoft Forms, in order to identify student's perceptions about seeking help in online lessons. We also included questions on camera usage and questioning techniques online, however during the analysis stage it was decided this was too broad and so we focussed more specifically on help seeking.

The survey was disseminated to 189 post-16, GCSE resit students studying both GCSE Maths and Functional skills Entry level 3. These students were studying towards a variety of main qualifications, including construction, agriculture, food technology and public services.

The results of the survey were then analysed and conclusions were drawn.

Results

189 students completed the online survey. For the purposes of this report, we only analysed responses that linked directly to 'seeking help.'

Of the 189 students who took part, 27% admitted that they had never asked their teacher for help during an online lesson and 16% of students stated that they would not consider asking – even if they were struggling with their work. We asked the students whether they felt comfortable or uncomfortable asking for help in their online lessons. Of the 189 students surveyed, 49% stated that they felt uncomfortable. Of the 93 students who said that they felt uncomfortable in seeking support, two main themes emerged in terms of reasons. Firstly, students felt they would look silly in front of their peers and secondly that they don't like other people hearing them ask for help online. These responses were backed up later in the survey with many students suggesting that they would prefer private contact with their teacher away from the online lesson.

When asked if and what their teacher could do to *encourage* them to seek help, most students answered 'no' or 'nothing'. However, of those 51 whom provided an open response, 35% felt that regular reminders that support was available would be helpful and 27% felt that the teacher private messaging them to directly ask if they needed help would work for them. A small minority of students suggested that the offer of help should be genuine and that the teacher should actually help them on request. This would then give them confidence to ask for help again.

A later question of the survey asked how can the teacher *actually* help them during an online lesson, 57% of the 65 students that responded mentioned private avenues of support. This included 23% suggesting follow up support after the lesson on a 1:1 basis, 20% of students suggested private messages and 14% mentioned that they think having the option of a breakout room would be of benefit in providing them with the support that they need ($\frac{2}{3}$ the 189 students surveyed said that they would use a break out room). Another common

theme in response to this question, was in relation to pace. A total of 12% of students suggested that they would find lessons easier if they were to be slowed down, with less content covered and more opportunity to recap their learning.

Limitations

Some issues were recognised during the analysis stage, which may have impeded the results slightly:

- Some of the questions in the survey had an “other” option, it was believed this would open up a text box and the students would have to enter their own reasons. However, this was not the case, so some students ticked “other” and we have no knowledge of what these reasons may have been.
- Question 12 (*Do you have any suggestions about how we can help students who are struggling in online lessons?*) was poorly worded and it seems it mis-led some students. The question may have led students to think that “struggling in online lessons” meant that they have anxiety in online situations, as opposed to struggling with the particular topic, and may need help on this topic.

If this investigation was repeated, we would re-word the questions, and ensure students had to provide a reason in a text box.

In addition to this, if we were to re-survey, we would focus the questions more on help seeking as this was ultimately the focus of the investigation. Although we were unaware of this when devising the survey at the beginning.

Conclusions

Our results support the claims of Lammers (2017) who suggested fears of appearing stupid influenced whether a student asked for help or not. We found students felt uncomfortable asking for help, and many said they would not ask for help, the reasons for this were linked to appearing silly in front of their peers.

Additionally, we found that many students felt regular reminders about asking for help, or a private message from their teacher would be a strategy to encourage them to ask for help. This supports both Weimer (2009) and Lammers (2017), who stated the teacher needs to continuously express their desire to help the students. Furthermore, this supports our own claims, that student’s actions in asking for help is for many, influenced by the way that they will be perceived by others and therefore they prefer a private method of support.

Further support for these claims comes from our own results; students suggested 1:1 support, private message or breakout rooms would be a beneficial strategy to help them during the lesson. These methods of support, suggest students do not want to access help in front of the whole class, perhaps due to their perceptions of feeling stupid. Or, it could be argued, they don’t want to interrupt the lesson, or ‘bother’ the teacher during the main part of the lesson, which would provide support for Weimer (2009). However, we didn’t find any support for the claims made by Lammers (2017) that student’s perceptions of their teacher were an influencing factor, although this could be due to the fact that Lammers (2017) study was based on HE students. In FE, it is essential to build strong relationships with the

students, to enable their progression and development. It could be argued at HE, this is less important, and so would go towards explaining why we didn't notice evidence of this in our results.

Therefore, from this investigation, we have made various recommendations for our future teaching and learning.

Recommendations

- Consider ways to maximise the opportunity for teachers to deliver their face to face lessons and online lessons to the same class as this will enable stronger relationships to be developed. Where this is not possible, encourage online teachers to visit the group's face to face lesson to develop rapport and build working relationships early on.
- Explore ways to develop a 'safe space' within online lessons where students can go to seek support away from the main class. (Break out rooms/support class session)
- Source some CPD for staff with relation to 'effective ways to provide students with meaningful support in an online lesson context'. (Manageable with the other pressures of online learning)
- Consider including less content (aims) in online lessons so that we can slow the pace and provide more opportunity for students to 'repeat' the skills they are learning, thus building their confidence throughout the lesson.
- Keep lesson delivery to 1 hour with the last half hour being independent work (set by the teacher to follow on from the lesson) but have the last 30 minutes of the session specifically dedicated to providing 1:1 support to students who felt that they needed it during the lesson.

Mini Case Study 3

Investigating learner perception with regards to the loss of visual contact during maths sessions

Laura Butt - Telford College

Introduction

The initial stages of planning included exploring the impact on student engagement and motivation in remote learning sessions, in which camera usage was mandatory. Rapidly changing models of delivery during the course of the national lockdown meant that this focus would no longer be possible.

Student perception with regards to the loss of visual contact during maths sessions became the primary focus. In the survey learners identified social and anxiety issues as being a deterrent to camera usage during remote lessons, but overwhelmingly agreed that this would positively impact their progress in maths. We understand the reasons that learners are reluctant to access cameras, through wider reading which was confirmed by initial surveys and in order to understand this further, it seemed important that learners consider how this might impact relationships, those between peers and those between the student and teacher and, as a direct impact, their progression and attitudes towards their studies in maths.

Literature Review

Initial thoughts centred around capturing the many and varied reasons that students may be reluctant to access remote learning with a camera, and then move onto decipher strategies to overcome this barrier and to measure the impacts specifically on engagement. Results from the initial survey of this cohort supported completely the findings of Castelli and Saravary,(2020) through a study conducted on a cohort of Higher Education learners who identified concerns about personal appearance, activity in the home and network issues as the prominent deterrents for accessing remote learning with a two-way camera. This line of enquiry had been thoroughly explored by others and so the focus of this deep dive required some amendment.

McInnerney and Roberts (2004,pp. 73-81) discusses in depth the 'importance of a proper appreciation of the learners'. Social context is stressed, as is the concept of the 'virtual self', that individual learners may choose to portray during online communication which reaffirmed a desire to understand the social impact that remote and blended learning might have on learners. McInnerney and Roberts (2004) talk of the methods which as practitioners we understand to be best practice, using a mixture of synchronous and asynchronous activities and ensuring a 'fit for purpose' online learning environment (such as Blackboard) and talk of the importance of learners developing their 'sense of self'. This became an interesting line of enquiry, particularly whilst considering a wider research objective which focusses on relationships.

Reich, J et al (2020 p. 8) states 'I really think it's just not seeing my students. We worked so hard in building that community and now nobody has that classroom community. I don't have the community of my students. My students don't have the community of their peers or their resource teachers. So I think it's just knowing that everybody is missing that community and school culture piece, and I can do as much as I can, but nothing is going to simulate that virtually'. This quote, on the replication of a physical classroom in a digital forum, pessimistically introduced the findings of Reich et al, at which it could be easy to believe that a sense of community in an online classroom could be never be achieved and posed questions as to the opinions of our GCSE resit students and their own perceptions as to the social impacts of remote learning, whilst also being able to incorporate the original focus.

The potential 'ostracisation' of learners due to blended/online delivery, Holt,J (2019) attributed to either a disparity in the required skills set of students and access to appropriate hardware and connectivity. It reminds us of the danger in considering digital confidence correlates with age prompts us to question that although our cohort of resit students are largely 'residents' of social media they are likely 'visitors' to professional online platforms.

Methods

An initial survey was sent to 114 students across a range of levels of study (Functional Skills Entry Level 3 to GCSE) and from a variety of vocational areas and levels, to ascertain their feelings towards the use of two-way video during online lessons. A total of 33 students gave responses. This was an attempt to highlight any barriers and/or other suggestions which may positively impact remote learning, whilst also ensuring that all learners who were willing to share their thoughts had been actively considered prior to enforcing a 'camera on' rule in online classes in order to assess the impact of this on engagement.

This research would have provided a useful comparison between studies into the impact of the tutor sending private messages to students at the beginning of each lesson, however due to the change in national lockdown restriction, it transpired that camera usage would not be a viable research angle and so, on consideration, it was decided that a retrospective exploration into how learners felt that remote learning had impacted relationships might then lay the foundations for further research into the impact of camera usage, should there be a similar situation, in which all learning was forcibly remote, in the future.

Students were invited to take part from 3 GCSE Groups (42 students from mixed vocational areas/age groups/gender). On cross referencing responses from the initial survey and the cohort of GCSE learners, invitations were sent to take part in focus group discussions and 9 students volunteered.

Results

Initial Survey

We found in the group Learner Survey 62% of students said they preferred not to have their camera on during live online lessons. From the 114 students surveyed following this, 16 students were happy to put their camera on and 16 were not and 1 gave no response, where 24 were technically able to, 8 were not due to hardware issues with 1 giving no response.

When asked 'What prevents you from putting the camera on?', 6 gave hardware issues, 9 said social anxiety, feeling awkward and uncomfortable, 4 gave home distractions and 1 cited safeguarding issues. When asked 'What do you think the positive impacts of having a camera switched on might have on your learning' an overwhelming 26 learners all said they it would have a very positive impact on their learning with only 2 no's, 2 'I don't know' and 2 no responses. Students stated, 'I would find it a lot easier to learn knowing everyone was learning with me, it would feel more like a college classroom and it would make me more motivated'; 'The teacher can see you and knows that your doing work and you are in the room'. Therefore, the visual contact is recognised as very important to a student's learning, despite their reasons for not turning the cameras on. Can this aspect of the classroom dynamic in face to face learning be successfully replicated in live online learning?

Focus Group

All students involved in the focus groups were between the ages of 16-18, a total of 6 females and 3 males, with one student in the first year of their study programme, 4 students in the second year of their study programme and 4 students in the first year whose vocational programmes were Health & Social Care and Automotive. This group of students were dominated by those who were in the third year of their programme and this particular cohort of learners had had large proportions of their programmes delivered entirely remotely for the majority of the academic year, with the exception of English & Maths.

Contrary to McInerney & Roberts' (2004), it would seem that learners are already confident with the development of their online 'sense of self'. It emerged that in addition to best practice provision of an appropriate virtual learning environment, that the second group students interviewed opted to create a shared online learning environment in which they would have control; setting up private message partners and groups in which skills and approaches were shared. This was in many ways encouraging, but presented further concerns as to how misconceptions can be appropriately addressed whilst a tutor is unable to monitor or supervise conversations.

Limitations

- Some comparisons were drawn between experiences on vocational courses, whilst every effort was made to relate this discussion to studies in maths, it is important to be mindful of the fact that learners' responses may not have exclusively referred to this.
- Every effort was made to ensure a suitable sample, however a group of 4 learners who had initially agreed to share their experiences refused to take part in the days leading up to our focus group meetings, which limited the amount of learner voice captured.

Conclusions and Recommendations

Lack of visual contact

Following Lin and Gao (2020) I had expected that the focus group interview may confirm that students had felt a decrease in their sense of community and that there would be an overwhelming agreement that students had felt that their relationships had been negatively affected as an impact of remote learning without camera usage. In contrast 4 students were quite indifferent about the impact and said that there had been none at all on their peer on peer relationships, whilst the others reported negative impacts.

Whilst talking of their relationships with tutors it became quite clear that learners value the ability to be able to discretely ask questions during class time, something which is not easily achieved whilst in a group call which involves all members.

Further exploration into the management of learner's group messages.

The opportunity to so seamlessly connect peer learning, which can also take place whilst independent of a tutor, is an exciting prospect as this may prove to be a mechanism to overcome some of the findings explored during wider reading, taking the experience of a formal classroom into a more informal digital setting, the cross over between the 'resident' and 'professional' online environment. Particularly, however, within the subject of maths in which long standing conceptual misunderstanding, (a particular concern whilst supporting 16-19-year-old resit learners) can prove severely detrimental to a learner's progress, their ability to transfer and apply skills and to solve problems and may be amplified without appropriate 'supervision', particularly whilst considering student understanding of the underpinning skills.

The points above prompt the question as to how more private, small scale spaces can be implemented and managed well to ensure engagement and progress for all, whilst simulating the classroom dynamic, in more informal (although managed) digital space- potentially with a focus on analysing the impact of streamed, smaller instant messaging groups which foster peer support whilst also allowing the tutor adequate oversight.

I would be particularly interested as to how a curriculum with embedded 'feed forward', supervised although not taught tasks, might impact the sense of community, relationships between student and teacher and ultimately learner progression.

Mini Case Study 4

Investigation to improve the engagement of maths resit learners with digital Independent Study

Louise Bentley - Buxton and Leek College

Introduction

The initial cross-college student survey showed that many students had issues with independent study. They felt it took up too much time (84), they missed the social aspect (116) and that they felt unable ask for help (177), and a smaller minority (45) didn't have the workspace. In the context where I teach, the students are timetabled a blended learning program for Mathematics as follows: 1 hour in a synchronous setting and 1 hour allocated for independent study. Many struggle to work alone despite being given careful instructions and thus my hypothesis was that by providing a more guided way of completing their work, the students would feel more motivated and confident in completing their second hour of study. Desmos was chosen to be utilised as the independent study lesson, allowing the students to follow the planned learning step by step. It has interactive templates that allow for multimedia input, multiple choice answers, comments, constructions, sketching and others.

This develops our Action Research objectives of exploring the impact of instant feedback within the blended learning model to support motivational engagement of the learners, analysing the differences in effectiveness by utilising technology to help with blended learning models and exploring the effectiveness of a blended model to engage students who might usually struggle to access maths learning due to anxiety issues.

Literature Review

Digital learning is rapidly progressing and even 'deconstructing the notion of the classroom'. (Borba et.al.,2016 p. 605) however there are clearly issues as to how this knowledge is organised and also how humans interact with this knowledge and with each other. Mobile phones and devices form an integral part of our lives and that of our students, and are here to stay. Affective studies in one case showed that the use of a students' own mobile device promoted 'positive emotions in students towards the study of mathematics, such as enjoyment, comfort, pleasure, enthusiasm, interest, feeling of time passing, and curiosity' (Borba et.al.,2016 p. 592). In our initial survey, 70% said they did not mind, preferred or strongly preferred technology for independent study, so this gives reason to trial the intended resource.

Across research there is also a positive picture painted regarding the usefulness of the gamification of maths both during synchronous and asynchronous activities. (Buckley et.al., 2016). This is the process of 'incorporating gaming elements into a non-game framework...not a complete upheaval or transformation of how/what we learn at our academic institutions but the addition of the bells and whistles (found in any good game) that targets a very human but vital part of us required for effective learning – our motivation' (StudyPug, 2015).

A trial into using Kahoot! in learning trigonometry during the Covid-19 pandemic showed an increase in motivation and a positive response to learning (Akhsani et.al., 2021). By varying the online learning and including elements such as this should provide benefits for both the student and teacher alike.

Methods

Students across all colleges within the Action Research Group were surveyed beforehand using Google forms and then results collated. Once the intervention had been trialled, along with teacher observation, the students within a specific college where Desmos was used were surveyed again. Of the 42 students assigned the tasks, 16 responded to the second survey.

A Desmos activity was set each week across a period of 4 weeks as the independent study session (1hr maximum); in each there would be a finite set of slides to work through within the chosen resource. Within Desmos there are many activities available to use freely and adapt, including a community of educators on a social media group. The activities used were further adapted to include extra slides including a starter screen entitled 'Getting to know you' (Figure 21) and a (Figure 22) 'Check on Learning' screen at the end (<https://teacher.desmos.com/activitybuilder/custom/6036a9919a6dfc394e82f629>). Other activities were developed including card sorting activities, puzzles, challenges, sketching, allowing for instant feedback on their solutions and sharing results with their classmates. (Figure 20)

Figure 20: Screenshot Activity

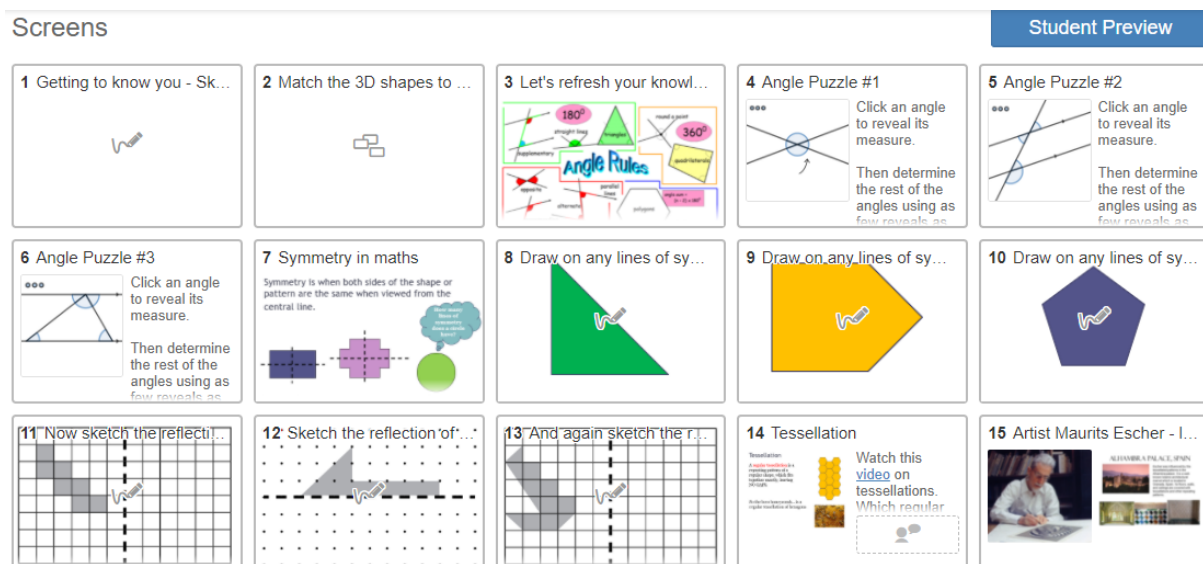


Figure 21: Screenshot Activity 1

Example of 'Getting to know you' slide (names blanked out for anonymity)

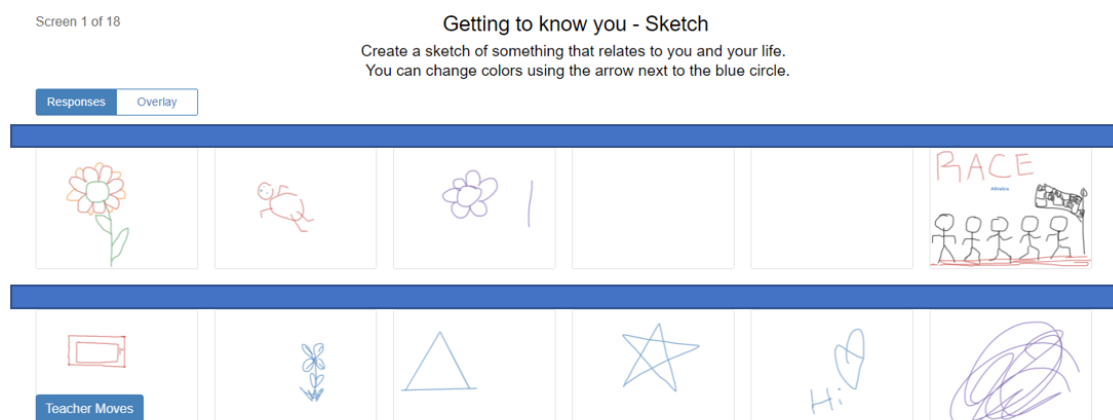
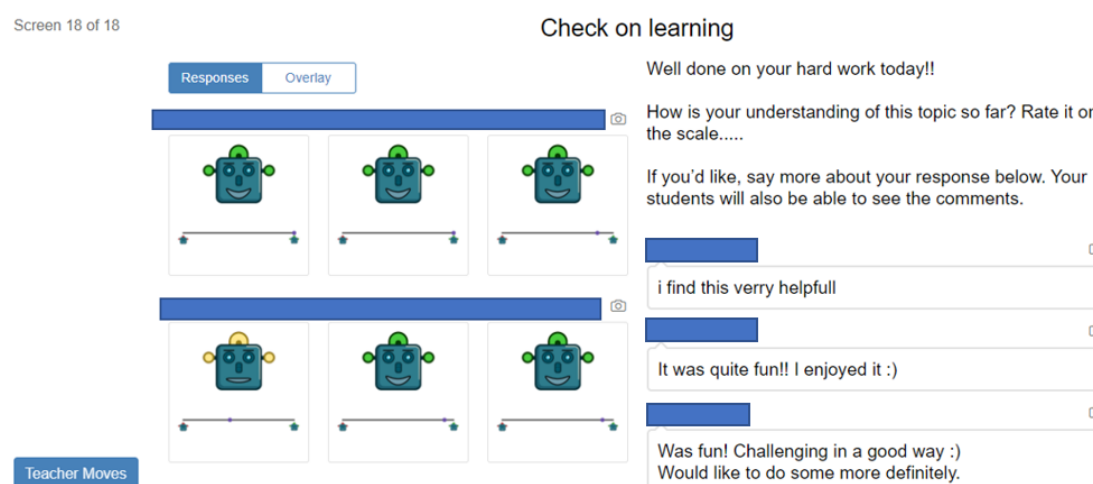


Figure 22: Screenshot Activity 1

Example of 'Check on learning' slide:



Results

Teacher Observation:

Only 27 out of the 42 students (64%) allocated the task attempted it and only 13 (31%) completed the activity, although the majority completed a good proportion. In general, the verbal feedback from the students on the next face-to-face session was that they had enjoyed the activity and were happy to be set another activity for the following week. The teacher mode within Desmos allows access to each of the students' work individually, and to see the class progress as a whole. It also gives opportunities for discussion in the following lessons, and with permission from the students, misconceptions or interesting methods can

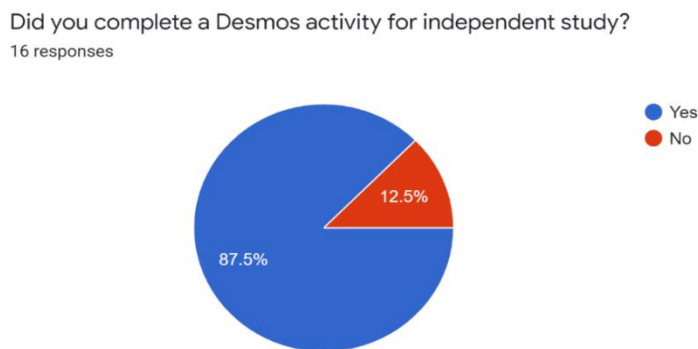
be shared with the class as a whole from the screenshots saved. The students particularly enjoyed seeing each other's work in the 'getting to know you' slides and created an enjoyable, relaxed atmosphere within the following lesson. Another aspect to Desmos is the 'gamification' of maths can be a source of motivation, and various activities were tested which created a great sense of competition to the point that the students almost forgot they were doing maths. One activity they enjoyed was 'Mini Golf Marbleslides' when practicing co-ordinates, some students were extremely inventive when it came to the methods used to enable them to pot the balls in the hole and win a star

(<https://teacher.desmos.com/activitybuilder/custom/589e5e51e9baeda305df5cf3>).

Survey Results:

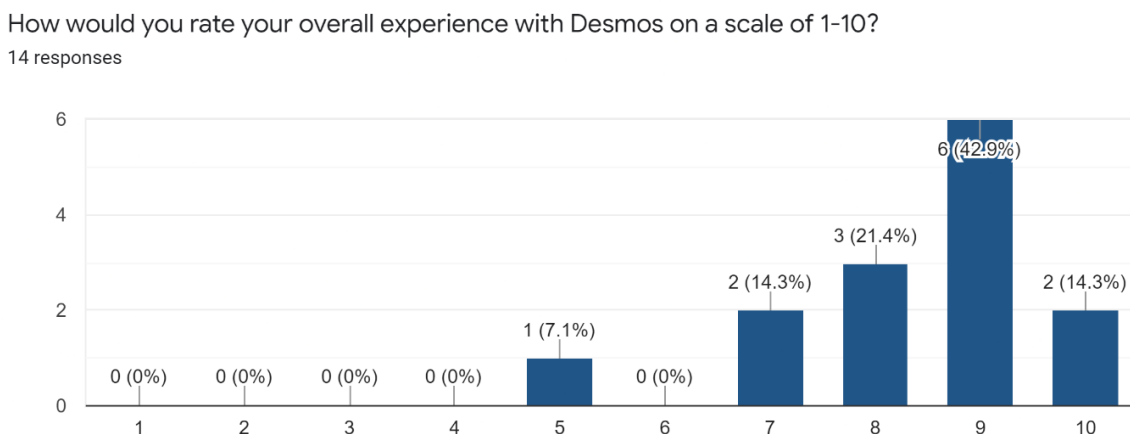
Of the 16 responses, 14 students had attempted the activity whereas 2 preferred not to. (Figure 23)

Figure 23: Student response regarding use of Desmos for independent study



Of the 14, 11 of the students rated Desmos at an 8 or above on a scale on a scale of 1-10, where 10 was the best. (Figure 24)

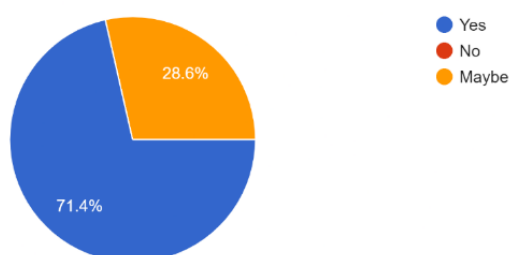
Figure 24: Student rating of Desmos



10 said that they would be happy to use Desmos again and 4 commented maybe they would, with no one saying they did not want to continue. Of the two who said that they did not attempt the activity, they gave the reason as being that they prefer working more traditionally with worksheets. (Figure 25)

Figure 25: Student responses regarding future use of Desmos

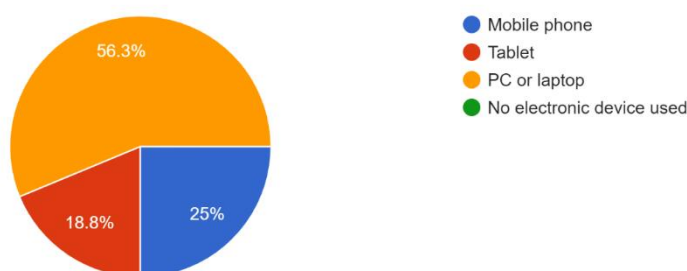
Would you like to continue to use Desmos in the future (for lessons and/or independent study)?
14 responses



25% accessed the activity on their mobile phone which did not give as good an experience as on a PC or tablet, as commented on later in the survey. (Figure 26)

Figure 26: Types of device used for independent study

What is your main device used for your independent study?
16 responses

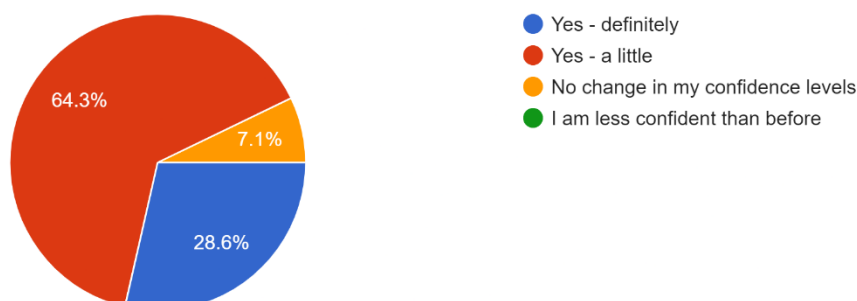


On confidence levels there was an overwhelming response from 4 saying it had definitely boosted their confidence in working with maths and 9 saying that somewhat it had improved their confidence. No student said it had affected their confidence detrimentally. (Figure 27)

Figure 27: Student perception of confidence after using Desmos

Do you feel that using the Desmos activities has boosted your confidence in maths?

14 responses

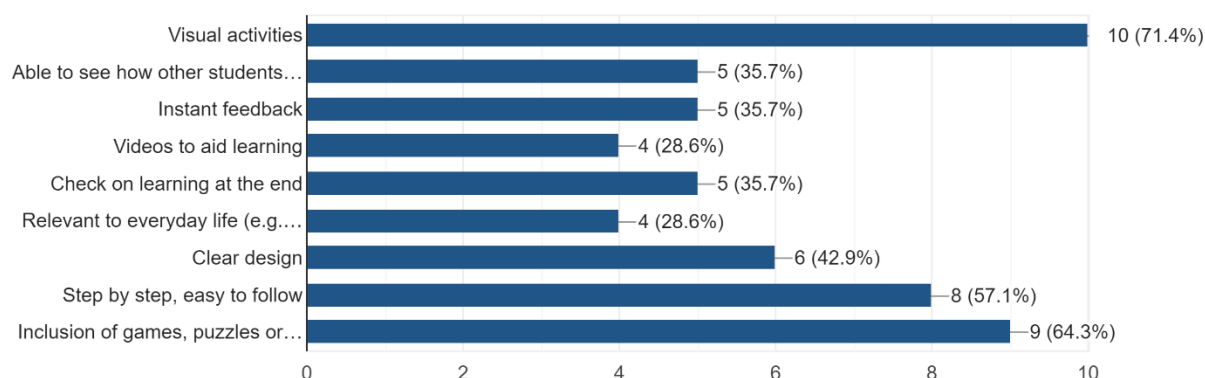


It is always good to provide multiple representations of mathematics where possible and 10 of the students found the visual activities enjoyable and/or motivating. Addressing the issue of students needing guidance with their independent learning 8 enjoyed the step-by-step guidance through the task. The inclusion of puzzles and challenges relating to the gamification aspect of teaching mathematics appealed to 9 and 5 found the check on learning and the instant feedback useful. (Figure 28)

Figure 28: Students responses regarding Desmos features

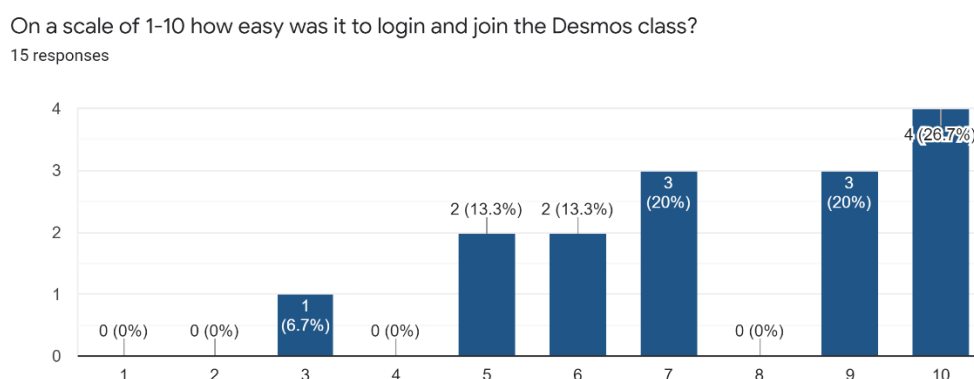
What features of Desmos did you particularly find enjoyable and/or motivating? Tick all that apply:

14 responses



The main obstacle has appeared to be the login process, with only seven students rating this at 9 or 10 on ease of login and eight rating it between 3 and 7, suggesting approximately half found this easy and slightly over half had some difficulty. (Figure 29)

Figure 29: Student perception of ease of access to Desmos



Conclusions and Recommendations

Borba et.al (2016, p. 599) stated that the advantages of multimedia approaches can be disadvantaged by what some feel as a reduction of student-student and student-teacher interaction. One of the issues that students mentioned in the initial survey was that they felt unable to reach out to the teacher when they needed help, however the Desmos activity structure allowed for connections to be made while participating and thus enabling the students to feel more part of the class as a whole, being able to see other students' answers (where the teacher designates) with options like 'see what your classmates have said'. It allows the teacher to gain a better understanding of their individual students, their progress, and the learning taking place during this independent study time as answers are clear and the student can reach out to the teacher whilst they are working, not necessarily afterwards when they might perhaps forget, or have to connect to another platform to do so. It also gives the teacher an overall view of the class progress as a whole, providing opportunity for addressing misconceptions, and creating opportunities for further discussion. The added gamification changed the learning process in that the exercises were presented differently without the repetitive nature of practicing questions in a more traditional manner. I would certainly recommend from a teacher point of view and the students' own point of view to continue with Desmos, whether it be in a flipped learning model, blended learning or in the classroom.

Mini Case Study 5

Investigating if flipped learning can improve the engagement of maths resit learners with digital Independent Study?

Joseph Thursby – Macclesfield College

Introduction

From the initial learner survey conducted by all colleagues amongst the Action Research Group one of the key areas of interest was surrounding independent study. This was a particular area of interest this year as due to the Covid-19 pandemic, more learners have been studying at home without the support of their teacher in the classroom. This is in large part due to the national lockdown and the alternative forms of delivery colleges have offered this year. At Macclesfield College the delivery model was different depending on the learners' main course, some students were in the classroom for both maths lessons each week, whereas other learners were only in for one lesson face-to-face and then using pre-recorded videos made by staff and tasks set on the Virtual Learning Environment (VLE). This became a problem for students that lacked motivation and did not engage with the work set through the VLE. In combination with this, from the survey it was found that a lot of students do not engage with independent study because they cannot ask anyone for help. It was decided then to look for platforms that offer a possible solution to this problem.

The online application 'Desmos' was explored as a possible solution to the problem by undertaking a flipped learning style approach. Flipped learning is an alternative delivery method, whereby learners conduct asynchronous activities away from the classroom, before learners then arrive for the synchronous aspect of the lesson with the teacher. This delivery style allows more time in class for questions or to deepen learning (Awidi, 2019). By using 'Desmos' the independent study asynchronous activities were derived from using the pre-recorded videos of lessons teachers had created due to the pandemic in preparation for the delivery method for the academic year. The videos ranged in length from 3-15 minutes depending on the topic, including worked examples. These videos are embedded into the programme such that students can watch at their own pace and pause where necessary to make notes. The videos were then accompanied with questions which were inputted into Desmos. Learners answered 5 questions ranging in difficulty for each topic they covered. These were diagnostic problems, used to determine how much the learner understands on that particular topic. From that point, in the following lesson the teacher was able to plan the necessary material for each individual learner. This is a similar process described by Barton, (2018) in the process of applying diagnostic questioning to inform practice.

By using a flipped learning approach in the future, learners are given the possibility to catch-up on any work that has been missed due to illness or isolation due to Covid-19 (Dorn, 2020). By utilising the material available, learners can emulate a similar classroom experience to help stop the gaps of knowledge widening and to help facilitate the learning of students away from the classroom.

Literature Review

The Flipped Learning Network defines the term 'flipped learning' as "a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter." (Flipped Learning Network, 2014). This does not transpire to what people may believe as what was done in the class, is now completed at home and vice-versa. It allows the opportunity for the classroom to become an environment of rich discussion and questions to be asked to deepen further understanding in an engaging environment, rather than a classroom which is teacher-led from start to finish with additional homework completed outside of the classroom.

The different learning styles of learner is highlighted in Keast, (1999). Learners have different ways of approaching mathematics content and this needs to be led by teachers in the classroom to support each learner's individual needs. As analysed by Altmueler, (2017) a flipped learning approach can cater to individual learners' needs whilst increasing their motivation in the mathematics classroom. This is particularly interesting in how this relates to learners with Special Educational Needs and Disabilities (SEND). There is minimal research into the affect that a flipped learning approach has for SEND learners and how this could impact on their progress.

Much of the research around flipped learning is surrounding learners in secondary mathematics settings and at undergraduate levels. There is very little evidence showing the impact a flipped classroom can have on learners studying GCSE mathematics resits in Further Education settings. As seen by Lopez Belmonte, (2019) students used a flipped learning approach in a secondary mathematics classroom. The results show that a flipped learning approach had a positive impact on the motivation and engagement of learners which was strongly linked towards the use of the 'flipped learning' method of delivery. As the learners studying maths in Further Education are learners which have failed the GCSE mathematics course previously, there is a low engagement amongst students in this area and teachers are looking at ways in which to improve the engagement and motivation of learners undertaking their GCSE mathematics course alongside their main body of work. Learners in this setting may require an alternative delivery model in the form of flipped learning demonstrated by Marshall, (2017). Here learners were provided with a flipped learning curriculum and found that their feelings towards maths had been greatly improved using this delivery model amongst mature learners. This is in-line with learners in a 16-19 setting as they have completed their mainstream education but have failed to achieve a passing grade for their maths GCSE, similar to the situation of the mature learners in Marshall's study.

To be able to deliver a flipped learning delivery model, teachers and learners need to be comfortable with the use of technology (Lameras and Moumoutzis, 2015). If teachers are not comfortable and fluent in the use of the prescribed technology, this can lead to learners becoming disinterested with the programmes due to lack of education on the required programme. Learners must be fully aware and knowledgeable of the protocol of using the appropriate technology for the required activities, leading to more successful outcomes. In previous years the younger generation has been described as 'Digital Natives' (Prensky,

2001). However, as time has progressed, this term has been found to be lacking as the progress of people not classed as 'Digital Natives', also known as 'Digital Immigrants' have become more fluent in the use of technology and the two are not as distinguishable as they once were. Prensky, (2009) refers to this and describes that it is now a level of 'Digital Wisdom' that needs to be taught and the enhancements that the use of technology can bring. Learners classed as 'Digital Natives' are more exposed to modern technologies but are not necessarily as capable at implementing the use of technology as others. This 'Digital Wisdom' needs to be installed in learners to help develop their use of technology in relation to the classroom to help support blended/flipped learning approaches.

For digital technologies to be successfully used in the classroom they must be intuitive in nature (Freeman, 2012). Intuitive technologies allow for users to access material easily and allow for successful completion of work leading to increased motivation and engagement with the work. This is confirmed by Howard, (2018) exploring the effectiveness Desmos has on the progress of mathematics learners. The learners that used the Desmos programme made more progress than those using handheld graphing calculators. The significance of the results and the intuitiveness of the Desmos programme led to its use as a personalised learning environment for the undertaking of the flipped learning activities at Macclesfield College.

Methods

The experiment was conducted over the course of a half term in which learners were asked to complete an independent study task in preparation for their next lesson. The tasks were set to 7 teaching groups which equates to approximately 100 students, not including students who were frequently absent to lessons.

In Desmos, one of the functions of the site is to track the progress of learners as they progress through the set work. Using this function, the teacher is able to assess the areas the learner has progressed well on and the areas the learner needs to improve on. The observations of the learner's progress are then documented. The teacher then uses this information to plan the next lesson for each individual learner. Notes are then made from classroom observations on how the student has progressed given the targeted work.

At the end of the set of independent study tasks, all learners were invited to take part in a survey. The survey was used to identify the number of learners that had engaged with the set independent study tasks. From this information the survey split into two sections, one section asked learners that completed the independent study tasks and the other section focused on the learners that did not engage with the work.

The survey was used to discover what benefits or drawbacks learners found to doing the independent study survey and whether or not the learner had felt they were more confident coming into the face-to-face lesson after having completed the set work. The survey also was used to discover whether learners felt they had made more progress having completed work outside of the lesson without a teacher present.

For the students that did not complete the set independent study tasks, the survey was used to identify the reasoning behind not completing the set work. This then led to asking for the

learner's opinion on what could be done to help ensure that the learner completed the set work in the future.

The results of the survey were a mix of both qualitative and quantitative data. The quantitative and qualitative data was analysed using Excel with the qualitative data being analysed using a thematic process to ensure clear and concise data.

Results

In total, 37 students responded to the independent study survey. Of these 37 learners, approximately 68% of learners are given at least one independent study task a week. This is explained since Macclesfield College is a Vocational College, the majority of students are on BTEC level awards which require assignments to be handed in to complete their course.

In total, there were only 17 out of the 37 students surveyed that engaged with the independent study tasks. This reflects the data found using the teacher Desmos links to assess the number of students that had engaged away from the maths classroom. At this point, the survey splits into two different avenues, one for the students that completed the work and one for the students that didn't.

To measure the accessibility of the programme, the learners were asked on a scale of 1-10 how easy the website was to access. No learners awarded less than a 6 with 10 learners awarding it a score of 10, showing that for the learners that used the programme they found it easy to access.

Learners also rated their overall experience with the website very positively, with 65% of learners awarding it 10 out of 10, with only one student scoring it a 4. Feedback was then collated on this and the main reason for its popularity is the ease of access to the content on the website. This can either be done using an account the learner has created, or a one-time only sign in. The drawback found to this was one learner completed the work using a mobile device and found the functionality of the software limiting when using a mobile phone.

On average 94% of learners took less than an hour completing each independent study task. Each task was designed to be approximately 30-60 minutes long. These results show that the length of each task was in-line with the expected outcome.

Learners were able to give multiple reasons of the areas they found most enjoyable or engaging about the Desmos programme. The majority of learners favoured the clear and easy to follow layout of the website. A large portion of learners also engaged with the feedback function of the website. Using the computational layer code, learners can receive quick feedback on whether or not their answer is correct. This instantaneous feedback makes learners aware of their progress immediately, as opposed to progressing using the wrong technique and finding out towards the end of the work. This allows learners to correct mistakes early on to help make continued progress.

Out of the 17 learners, 10 of them stated that they did not watch the videos to help with their independent study task. The videos were used to demonstrate a flipped learning approach which had been explained to the learners before completing the work. The videos were part of the tasks, this would indicate that the learners did not feel that the videos were necessary in supporting their learning.

Of the students that completed the independent study task, none reported a decrease in their confident levels, with 82% of learners reporting some increase in their confidence levels coming into the face-to-face lesson after completing the independent study tasks.

The learners were asked on a scale of 1-10 how much more progress had been made after completing the set work with a score of 1 as no less progress than normal and 10 being significantly more progress than normal. The highest score was a 5 showing that learner's felt that they had made a good amount of progress by using the programme where the rest of the results show varying degrees of progress with scores of 1-10. The question should be reviewed to state options for if the learner felt that completing the task had been detrimental to their progress. However, with the majority of learners scoring a 3 or higher then this would suggest that a large portion of learners feel that the programme has had some benefit to their learning.

Given the observations of learners that completed the independent study tasks it is also important to observe the attitudes of the learners that did not complete the set work. From feedback the learners overwhelming reason for not completing the work is due to other work commitments, whether that is in relation to jobs outside of college or assignment commitments from their main course. Several learners responded that they were unaware or had forgotten about the set work. This led to the following question on the process's learners would need to help ensure they complete the set tasks. 50% of learners responded that they needed regular reminders of any outstanding tasks. This has led to a review on communication with learners and how we can ensure learners are alerted or aware of any assignments or tasks are due for maths outside of college.

Limitations

For the independent study task to be complete, this required a digital device and an internet connection. In the survey, learners were asked if they had access to a digital device outside of the classroom in which the majority of learners responded with yes. This did not consider whether learners had a strong internet connection outside of college as well. If learners only have access to mobile phones with no Wi-Fi, learners may be reluctant to use their data to complete work outside of college, this would result in fewer learners completing the set work.

With the Covid-19 pandemic this has had restrictions on classes at the college. This has resulted in teachers not being able to cover material with the same fluency as in previous years and hence a higher demand has been set on teachers this year to complete course material with the necessary assignments putting increased pressure on learners. This increased pressure from their main course may have resulted in learners focusing on their main course and not spending as much time on studying maths outside of their timetabled lessons.

Flipped classrooms can pose problems for learners. Learners can be resistant to change. Learners in FE have been experienced in a traditional style of learning format from primary school up until their GCSE studies in secondary schools. The sudden change in format can cause learners to be resistant and less likely to engage.

Conclusions and Recommendations

From the results the majority of learners that completed the independent study tasks had a positive experience. As learners reported having more confidence by completing the independent study tasks, this is encouraging as it may incentivise more learners to take part in the set work leading to a positive impact on their mathematical studies. However, several learners reported not utilising the videos when undertaking the set tasks. This could be due to the learner feeling confident in the topic and did not feel they needed to watch the video to gain further understanding. Or the learners may have felt the videos were too long, moving forward this would be of interest to explore in more detail what the advantages and disadvantages of the videos were to their learning and how they can be improved upon.

Due to only a certain number of learners completing the set work in each class, the material had to be covered again for the learners that did not complete the work. This meant that learners that had completed the independent study tasks were forced to be taught again in the classroom the same topic. This could have two effects, on one hand, learners may benefit from the in-class teaching of the topic again to refresh their memories if the independent study task was completed at some earlier time in the past, or, the learner becomes disengaged with the approach as they are then aware that the material will have to be repeated again for learners that did not complete the work. Therefore, this would lead me to believe that the best way a flipped learning classroom can work using the independent study tasks is if all learners are engaged. This could be achieved by implementing the strategy early in the year and by setting high expectations of learners with consequences for incomplete work. Learners responded that a timetable would be an effective measure of completing independent study work as they are then aware of what needs to be completed and by a specific date, this could then encourage and promote a flipped classroom style of teaching and learning.

Having used the programme 'Desmos' as a tool for independent learning, it would be interesting to discover how 'Desmos' can be implemented into the everyday classroom experience. Do learners prefer to receive work in class on pen and paper or do they prefer to work digitally? How is the learner's progress and attainment affected by using digital programmes in the classroom and does this have a positive impact?

Mini Case Study 6

What are maths resistant and low/non-attenders views on Blended Learning?

Lynsey Jordan - City of Wolverhampton College

Introduction

I chose this mini deep dive as I wanted to explore one of the conclusions from our first survey which was that overwhelmingly face to face lessons were the favourite. At the time it was lockdown and I was aware that I had some students attend my lessons for the first time online, whom I had not seen at all this year. I was interested in the reasons why and, talking to other teachers, it appeared that some were having the odd first-time student appear in their lessons, which goes against the trend of engagement dropping overall. I was interested in the reasons for this, and I was also aware that our survey only reflected the views of the attending students and that the students that do not attend or attend infrequently might have another viewpoint to share.

Literature Review

Attard, C and Holmes, K, (2020) looked at 4 secondary schools that have taught maths in Australia using a variety of blended learning models. The teachers were identified as innovators and although this was done before the Covid-19 pandemic, draws conclusions from its results relating to online lessons and engagement during and after the pandemic. The ability to differentiate and try out new digital models met with varying success dependent on student access to technology. I found it useful as the study describes how teachers have been forced to rely on technology for their teaching and learning resources due to the pandemic regardless of their existing technological skills or beliefs before and how the direction of maths educators could be permanently changed as a result of this for both blended and online teaching. Although the study was done before the Covid-19 pandemic, the strategies used by the teachers in this study reveal a variety of pedagogical pathways through which blended learning can be adapted for improved student learning.

The study further states that 'online learning environments provide affordances that allow mathematics teachers to redefine practices as they currently occur in mathematics classrooms, disrupting traditional methods and how students have related to this and how their learner experience can be improved as a result of these innovations, engaging students that may previously not be interested' Attard, C and Holmes, K, (2020)

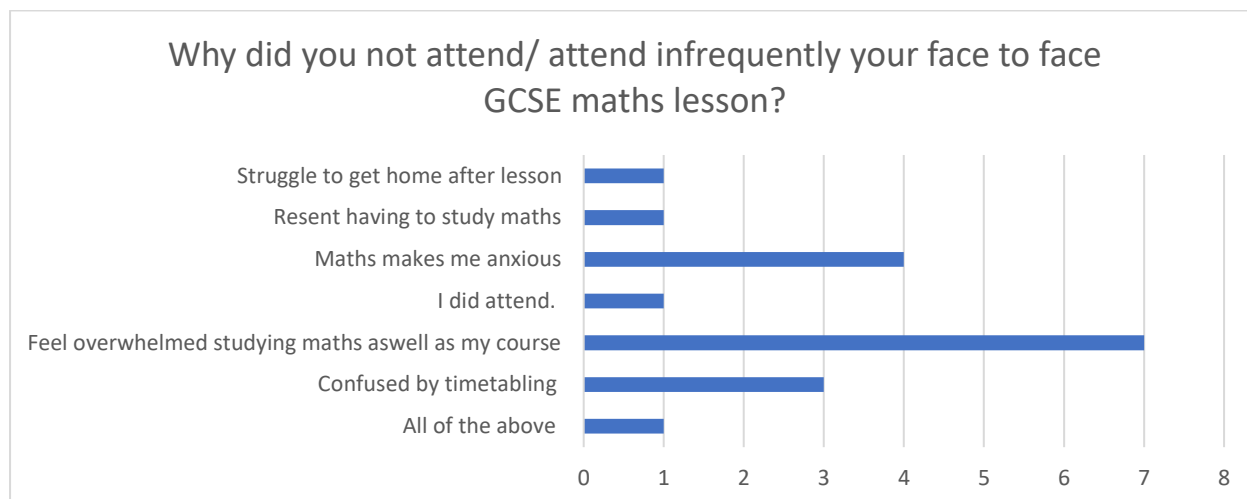
Methods

A survey was written with similar questions to our original group survey but targeted at students whose views would not have been captured in the first survey, the low or non-attending students, digging into reasons for low levels of engagement and asking for honest viewpoints. The invitation to complete the survey was sent to 95 students who were identified as having an attendance of 25% or below for their maths lessons within college. A total of 18 students completed the survey.

Results

The first part of the survey dealt with face-to-face attendance before lockdown. Students were asked how often they attended and why this was the case. Of the 18 responding students, 9 students responded 'sometimes', 4 'occasionally' and 5 'never'. There was a myriad of reasons, as shown below. (Figure 30)

Figure 30: Student response regarding attendance to lesson



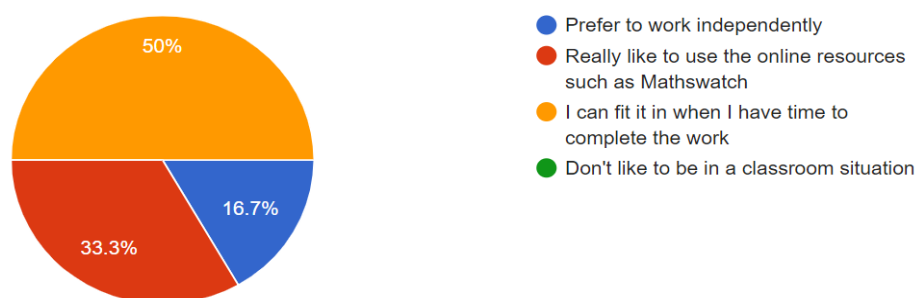
The highest responses were 'Feel overwhelmed by having to study maths as well as my course' (38.9%) and 'Maths makes me anxious' (16.7%).

The survey then asked if students had completed independent study before lockdown. The model at my college is that the students have one face-to-face lesson and one independent study per week with work set on Google Classroom and MathsWatch. The results were that 1 out of 3 of students said that they completed independent study and 2 out of 3 said they did not or did not know that they had independent study work. Of those students that completed the independent study work 5 out of 6 said they preferred a combination of independent study and face-to-face lessons and the reasons for this were that they can fit the independent study work in their own time and that they enjoyed the online resources. (Figure 31)

Figure 31: Student responses in relation to enjoyment of independent study

Why do you prefer the independent study work?

6 responses

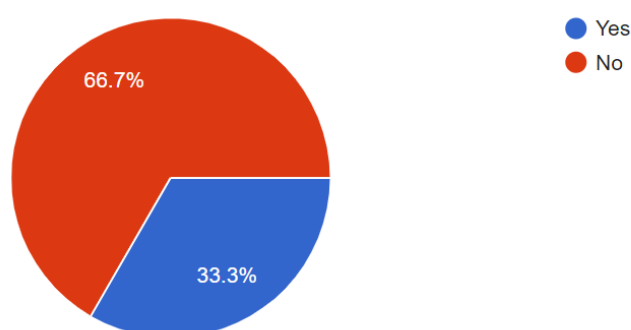


The final question in this section asked the students, 'If you were given the option to study entirely independently do you feel you would be more likely to achieve your goals?' and only 2 out of 6 students said that they would. (*Figure 32*)

Figure 32: Student responses regarding independent study

If you were given the option to study entirely independently do you feel you would be more likely to achieve your goals?

6 responses

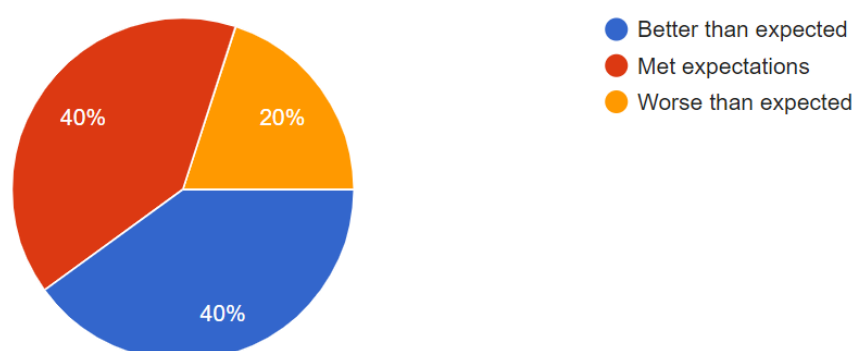


Next, students were asked if they had attended a GCSE maths online lesson since lockdown and how they had found the online lessons. 8 out of the 10 that had attended a lesson said the lessons were as expected or better than expected. (*Figure 33*)

Figure 33: Student perception of online maths lessons

How have you found any online maths lessons you attended?

10 responses



The reasons for this were varied; the teacher was the main reason for enjoying the lesson but other reasons were given that students enjoyed being anonymous and not having to be in the classroom.

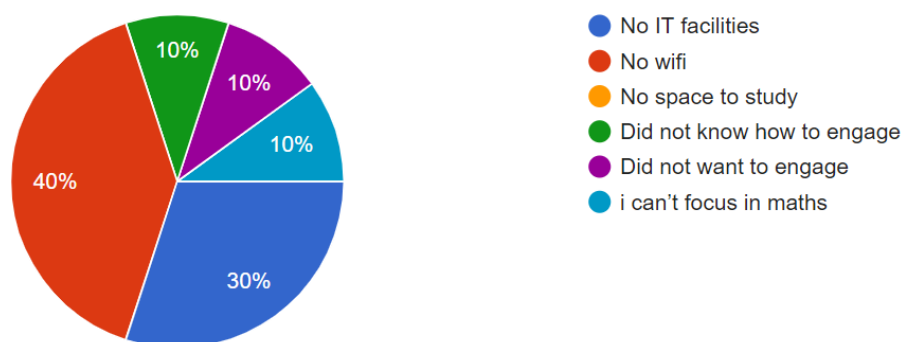
Of the students that found the lockdown lessons positive, 7 out of 8 said they would attend face-to-face lessons when they returned to college.

The survey asked the students who said they had not attended any lockdown lessons why they had not engaged. Of the 10 students who responded 7 said it was due to 'No IT facilities' or 'No Wi-Fi', 2, 'Did not want to engage' or 'Did not know how to engage' and 1 student said they 'Couldn't focus in maths'. (Figure 34)

Figure 34: Student responses about lockdown lessons

Why have you not engaged in lockdown lessons?

10 responses



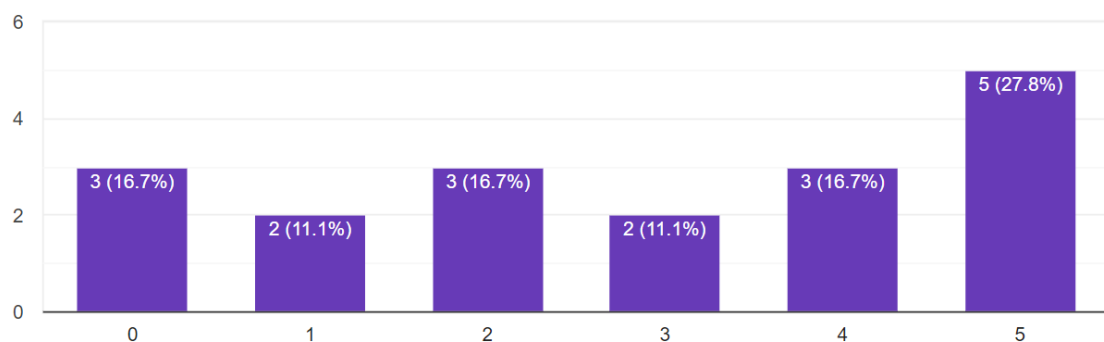
The final question asked, 'If you had been given the opportunity to study GCSE maths online from September, would you have attended more lessons?' The results were on a scale of 0-5, 8 out of 18 students answered with a higher indication that they would have attended more lessons if given the opportunity, which I have interpreted from the students rating the answer as 4 or 5. (Figure 35)

Figure 35: Student responses about studying online

If you had been given the opportunity to study GCSE maths online from September would you have attended more lessons?



18 responses



Limitations

The number of students that completed the survey gave us a small sample size, 18 out of 95. This was to be expected as only students with an attendance of less than 25% were targeted. These students were known to be resistant to studying maths despite repeated attempts to get them to engage. This survey has also been completed during the Covid-19 pandemic. Normally the blended learning programme would be a choice but due to the situation it has been forced.

Conclusions and Recommendations

The majority of students when asked why they didn't attend maths or attended infrequently cited feeling overwhelmed or anxious about studying maths. Furthermore, 7 students said they did attend their face-to-face maths lessons. The students were not sent the survey unless they were identified as attending less than 25%. This is interesting in the disparity of teacher versus student's perception on attendance.

Students that did attend the lockdown online lessons found it a positive experience and it gave them confidence to plan to attend in person once back in college. Over 70% of the students that did not attend lockdown lessons did not do so due to lack of IT facilities or Wi-Fi issues.

Almost half of the students said that they would have attended more lessons if given the opportunity to study GCSE maths online from September. This is in contrast to only a third of students saying that they would like to study entirely independently. In addition, there were 5 students identified by myself and other staff that attended online during lockdown who had not previously attended a face-to-face lesson. These students have not attended a lesson since the lessons have been taught in college. As a college we have been considering offering online lessons to those students that do not engage in face-to-face lessons. All of these reasons provide evidence to support giving the option of online lessons with a digital independent element to students to improve engagement next year.

This is also in disagreement with the question asked in our ARG group survey when the students felt that mode of preferred delivery was overwhelmingly that face-to-face lessons were a more effective model of delivery.

Although the sample size was small it was a higher proportion of responses than initially expected. Normally these students' voices are not heard, and their opinions are dismissed. I feel that we have given these students a chance to have their say through this survey.

Mini Case Study 7

Investigating learners digital training needs for online maths GCSE resit lessons

Dave Clifton and Tania Latif – Stafford College

Introduction

A section of the Action Research Group Learner Survey looked at understanding digital learning amongst post-16 learners working towards a GCSE or Functional Skills maths qualification. 30% of students suggested that the College could help them further by providing training guides/videos for new software, with approximately 20% of the all students surveyed stated that they are unhappy or very unhappy with using new software to complete learning. 14.4% of students surveyed stated they found it difficult or very difficult to access digital learning.

In our experience as maths teachers, we noticed a significantly higher proportion of students passed the online assessment, when compared to the paper version of the assessment. We decided to investigate this by considering how the assessment format, online or paper based, had an effect on the learner's performance. Using this we then considered the reasons for the difference (if any) and focussed on the limitations of the user interface of the software/application used with the intention of discovering whether unfamiliarity of the software package impeded performance.

This research will also take a closer look into software training currently offered within the college and determine if there is scope for the possibility of introducing bespoke software training for all students within the college.

Methods

We took results from two of the assessments the students have completed at the beginning of the year. Before the lockdown in January, we managed to complete one paper assessment with the learners and during the following lockdown period, they completed one time-constrained online assessment. 110 learners' results were observed over both assessments. They are all 16-19 GCSE maths resit learners from different curriculum areas with some learners having exam access arranged. 29 female, 3 non-binary and 78 male learners' results were collected. Both of the assessments were exam board set past papers. A recorded link was sent to the learners who needed a reader.

We then did a survey using the Microsoft Form package to create a questionnaire that focused on the different aspects of digital learning. The questionnaire was split into 2 main sections, one for first year students, and one section for returning students (2nd Year and onwards). The questionnaire aimed to establish if any training had been given, if so, what was given and by who and if they had received no training had the students received training previously or had they pursued their own learning. Finally, the last section of the questionnaire was aimed at understanding the software needs of the college student.

Results

Online Assessment vs. Paper Based Assessment

The tables below show the difference of the results from the online assessment against the paper based assessment. *Figure 36* shows how many students either increased, stayed the same or decreased their grade when they took the online assessment against the paper based assessment. *Figure 37* shows the grades broken down by how much the grades increased or decreased.

Figure 36: Change in grade for students between online and paper assessment

Increased grade	Same grade	Decreased grade	Total
64	31	15	110
58%	28%	14%	

Figure 37: Breakdown of grade change

Increased 1 grade	Increased 2 grade	Increased 3+ grade	Total
40	17	7	64
	Decreased 1 grade	Decreased 2 grades	Total
	14	1	15

From the data we can see 86% of students either stayed the same or performed better in the online assessment when compared to the paper based assessment. 14% of students decreased but however the majority was only by 1 grade (14 out of 15, *Figure 37*).

Learner perception and preference between the both assessments have been considered. 20 Learners whose grades were different from their first assessments' were spoken to. These learners were mixture of different genders and learners with exam access arrangements. One common theme that came across was the reduction in exam stress they felt when completing the online assessment. Use of their own devices and doing the assessment in their own time gave them an increased sense of confidence.

The type of question, constructed response or extended response was evaluated for a possible effect on the learner's performance. For one question the answer space was not familiar with the learners. The assessment software, does not accept the answer if spelt incorrectly or in a certain way, in some cases this was a disadvantage to the learner.

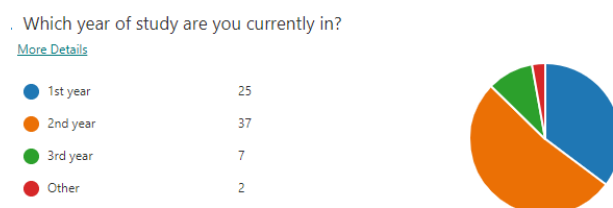
Although a recorded link was provided for the learners who needed a reader however for some learners felt this was not enough, and they needed someone to prompt them and keep them on track.

These results informed our survey questions for the focussed questionnaire on whether there was any impact on the ease of use of assessment software and maths software in general.

Ease of use of digital based software

Overall 70 students from a range of vocational courses participated in the survey (*Figure 38*) with a breakdown of year of study used to help to analyse the responses to later questions.

Figure 38: Student year of study



1st Year Students

25 first year students from a range of vocational courses reported their skill level when using an electronic device and software. Students reported 6.04 out of 10 on the self-rating scale of their skill in using computer software packages. (*Figure 39*)

Figure 39: 1st year students' self-assessment of skill level using software packages

Before you started College in September 2020, how would you rate your own skills on a Laptop/PC/Tablet when using software packages such as Word, Excel, PowerPoint, and i-site?

[More Details](#)



Of the 25 students, 14 reported they had received no training at the start of their college course. 12 of these students reported that they could not recall receiving any training at all since joining the college and two reported they had received training at some point since starting.

Five of the twelve students reported that they conducted their own training and development, stating that this training gave them a confidence rating of 6.2/10 after the training.

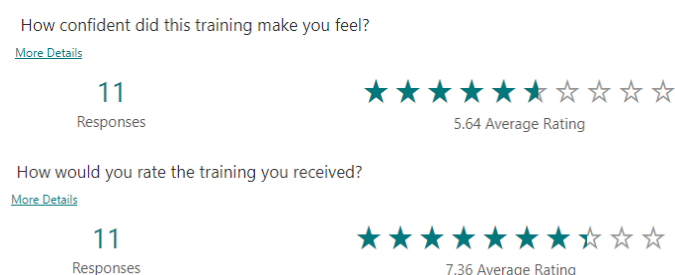
Out of seven of the students that did not conduct their own training, only 1 reported that they felt they did not need training, with five reporting that they were unsure on how to conduct they own training, 1 student did not comment.

The two students who reported receiving training during their time at the college, stated that training lasted up to 30 minutes and was conducted once by the course tutor and twice by the Maths Tutor. Training was focused primarily around the MathsWatch software package and MS Teams.

The other eleven 1st Year Students reported that they had received training at the start of their vocational course, with much of the training being conducted by their Tutor (9), with some additional training provided by the Course Leader (2) or Maths Tutor (3). The time allocated for training varied across the different students.

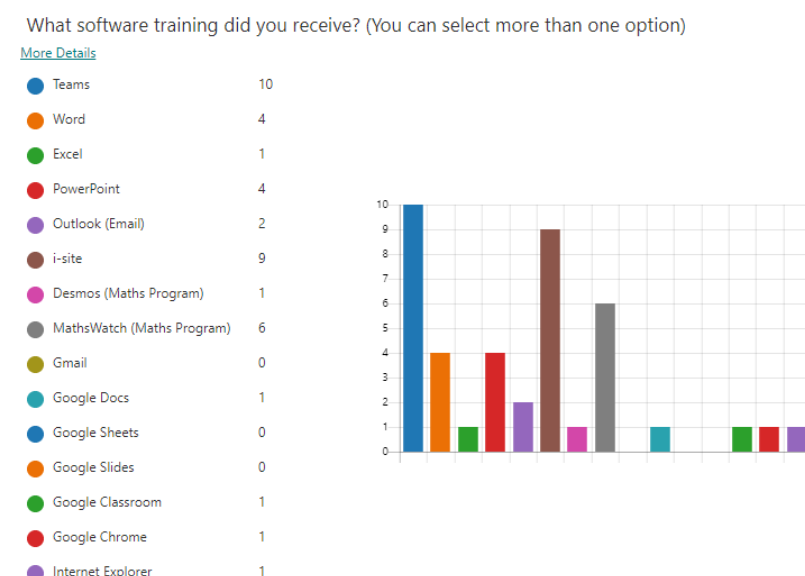
However, while the 11 students have reported receiving some form of training, the overall rating for their confidence levels after this training was indicated at 5.64/10. Interestingly, the students who received training rated the training quite highly, when compared to the confidence they felt the training gave them. (*Figure 40*)

Figure 40: 1st Year student responses in relation to confidence and quality of training received



The training that was received was focused on a variety of software packages needed within the college environment. (*Figure 41*)

Figure 41: 1st Year student responses highlighting software training received



2nd, 3rd and Other Year Groups

46 students from either the 2nd Year, 3rd Year or other (year groups) answered the survey. Students from a range of vocational courses reported their skill levels when using an electronic device and software. Students reported 7.28 out of 10 the self-rating scale on their skill in using computer software packages (*Figure 42*).

Figure 42: 2nd/3rd/Other year students' self-assessment of skill level using software packages

2. How would you rate your own skills on a Laptop/PC/Tablet when using software packages such as Word, Excel, PowerPoint, and i-site?

[More Details](#)



Of the 46 students, 17 reported they had received no training at the start of their college course, 8 reported not conducting any of their own training on software packages, stating reasons such as the ability to 'Google It', "Because the basic functions of the software are simple to understand.", and "I just progressively used it throughout secondary school and it became like second nature since nowadays we spend so much time using those sort of softwares."

9 of the 17 students reported that they conducted their own training and development, stating that this training gave them a confidence rating of 6.89/10 after the training (*Figure 43*).

Figure 43: 2nd/3rd/Other year student responses in relation to confidence and quality of training received

. Please rate how confident your own training has made you feel about working with different software packages?

[More Details](#)



29 Students stated they had received some training on software packages from a variety of tutors as outlined in the table below in Figure 44.

Figure 44: Responses outlining deliverer of training

4. Who provided the training?

[More Details](#)

Tutor	25
Course Leader	8
Maths Tutor	10
English Tutor	2
Other	3

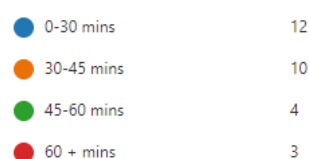


Students reported the modal training time for sessions as 0 – 30 minutes (41%), with 30 – 45 minutes reported by 35%. (*Figure 45*)

Figure 45: Amount of training time students received.

. How much training did you receive?

[More Details](#)



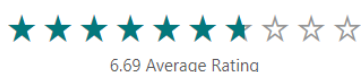
The confidence rate given by the students does not appear to reflect the level of training received with the confidence score being 6.69. (Figure 46)

Figure 46: 2nd/3rd/Other year student responses in relation to confidence and quality of training received

}. How confident did this training make you feel?

[More Details](#)

29
Responses



}. How would you rate the training you received?

[More Details](#)

29
Responses

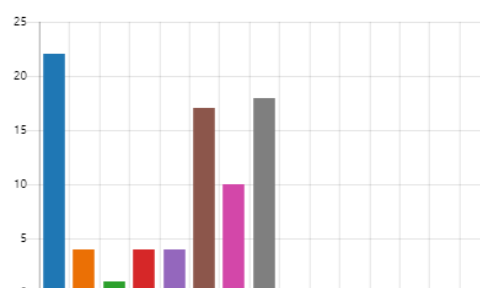
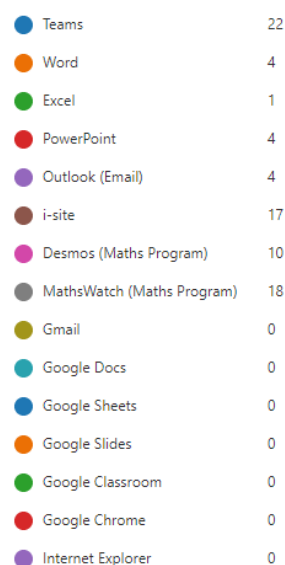


Students received training on a variety of software packages, with the training focused on the main software programmes used within the college environment. (Figure 47)

Figure 47: Software packages students received training on.

. What software training did you receive? (You can select more than one option)

[More Details](#)



Understanding the needs of the College student

In the final section of the survey, students were asked a series of questions around their needs, for the college to provide dedicated training sessions focused on software packages.

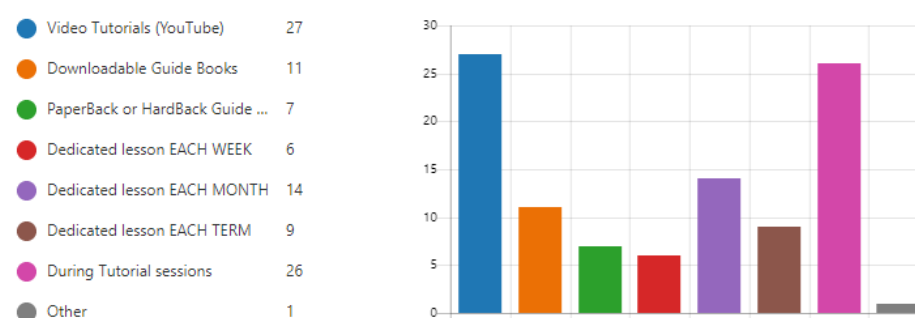
14 students stated that the college should not provide a dedicated software classes. The responses given for not wanting that training were that they already knew how to use the software or felt that only a light touch of training was needed rather than dedicated sessions.

However, 57 students reported that they would like to see some sort of dedicated training provided by the college. 27 students reported that YouTube videos would be useful, with 26 students preferring training during the tutorial sessions. Students indicated that they would prefer to receive the training monthly, with not much difference for it being offered weekly or on a termly basis. One student suggested that the training could be an optional course, with posters around college or bulletins on i-Site. (Figure 48)

Figure 48: Student responses indicating the training students perceive should be offered

What sort of training or resources do you think the College should offer to students when thinking about the different software packages?

[More Details](#)



When thinking about how much time should be dedicated to these training sessions, the survey indicated between 0 – 30 minutes was the preferred option (56%), with 30 – 45 minutes supported by 35%. 28 students responded to the survey giving a wide range of suggestions for the different software packages used for their college courses.

Finally, we had one suggestion requesting training on how to use a computer, before the training on the software packages.

Limitations

It is worth noting, for the software usage questionnaire that some of the responses were from students on ICT courses and therefore students will have differing levels of confidence and experience when using software packages.

Conclusions and Recommendations

The results for the online assessments versus the paper assessments show that more students increased their grade in the online assessments than decreased their grade. We believe this was down to 2 main factors;

- Firstly, the fact that the online assessment gave the students more prompts when completing certain question types, for example a question asking the student to complete a graph would have text boxes available for the student to enter the title, axis title and so on, whereas the paper version did not have this.
- Secondly, the students sitting the online assessment had received training, support and website/software orientation when completing practice versions of the online version of the assessment.

One of the most challenging aspects of conducting remote online assessment is to ensure learners are not using the internet or other resources to their advantage. During the lockdown period, online assessment was a great way of maintaining momentum and to ensure the learning process did not stop. Online assessment is an efficient way to manage formative assessment.

Therefore if used efforts must be made to ensure learner performance on an online assessment is a correct indicator of competency. The increased and consistent use of computers for learners' classwork and independent study could allow the learner to be as comfortable with an online assessment a paper-based one.

The software usage survey has certainly indicated a need for training on software packages with 80% of the students in favour of some form of training, with a strong support for YouTube videos. I would like to set up a number of resources and research the different modes of training and test whether they benefit the student in a positive way, and make them more confident with software used in maths's lessons.

The other point to note is the quality and regularity of the training must be appropriate for the complexity and importance of the software needed as students' confidence in using the software varied when considering the impact of the training.

I would be interested in looking at different vocational course student's competency with computers and computer software, for example do IT and Business students have more of a handle on Excel than Health and Social Care students?

Summary - Conclusions

Conclusions

The use of Blended Learning in GCSE maths resit learning is a complex issue and it is hoped that each Mini Case Study has given insight, along with the particular recommendations from each investigation.

The wider reading noted that research into Blended Learning in Further Education notwithstanding GCSE maths resits in Further Education, is quite thin and where there is research on studying Blended Learning and/or GCSE maths this tends to focus on secondary education or undergraduate/higher education. Also, all the majority of previous research on Blended Learning, due to the timing, relates to 'willing participants', whereas the impact of the pandemic meant that the aspects of Blended Learning of live online teaching and increasingly digital independent learning were abruptly forced onto the learner who had hitherto only experienced traditional classroom based education. This has been an incredibly challenging time for teachers and learners in addition to having groups of first year learners that had not yet built up a face-to-face relationship with their tutor and being taught a subject which is not their main programme at College, where students came under increased pressure from their main course.

Whilst the studies have each been completed separately by the teachers in their own College setting there have certainly been common findings among the reports.

Learners have been viewed as 'residents' or 'Digital Natives' (Prensky, 2001) when considering their digital skills having being exposed to modern technology, whereas they are more likely to be 'visitors' to professional platforms and needing to develop 'Digital Wisdom' (Prensky, 2009). In essence caution is needed when assuming all students are fully comfortable using different technology and software.

The studies identified the need for software to be 'intuitive', and they found that interactive software (Desmos) can address the gap in giving students help whilst utilising digital independent study. It was found Desmos allows for either corrections to be made whilst participating or to track progress and identifies areas that need to be worked on for the next session, which addresses the issue of students not being able to ask for help. Learner's confidence was increased by 82% and 92.2% respectively by using the interactive and 'gamification' Desmos software.

It was found that when struggling to ask for help online learners asked for breakout rooms and smaller and more private channels of communication, which if supervised to avoid misconceptions forming, could be beneficial.

The majority of learner's preferred face to face teaching and this was compounded by the pandemic where forced remote learning was an unfamiliar environment and resulted in unequal learning due to digital poverty (lack of reliable Wi-Fi and access to a private learning environment). Whilst the majority of learners say they are happy with use of software and access to IT digital learning, this by no means applies to all and this results in an unequal access to GCSE maths resit learning, which was very concerning to FE teachers.

However there was a smaller portion who did prefer live online learning which was away from the distractions of their peer group, and helped to reduce anxiety and allowed learners to progress at their own pace with digital independent learning.

The study shows that for resistant learners online and/or digital independent study could provide an alternative way to engage.

The studies have enabled the researchers with an increased appetite for further investigations as to how a considered Blended Learning approach can increase students motivation and engagement in GCSE resit maths in an educational environment that adapts to the current educational landscape and the consequential effects of the pandemic.

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Appendices

All supporting documents, evidence and associated resources can be found at

<https://padlet.com/lucyhancock/xb6dowjifvswugii>