Developing and implementing a strategy for effective differentiation

Naseem Muhammad

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Contents

PLANNING AND IMPLEMENTING DIFFERENTIATION STRATEGIES IN MIXED ABILITY CLASS in Derbyshire

Abstract:
This study explores what differentiation strategies teachers used in school in Derbyshire and the effectiveness of these strategies from both teacher and student perspectives in a secondary school setting. Teacher interviews teased out concurrent differentiation strategies, and teachers selected the three most common methods for the intervention: seating plans, progress-tracking sheets, and tailoring worksheets. Post-intervention student questionnaires and teacher interviews suggest that the three strategies increased student engagement, achievement and reduced disruptive behaviour. The practical implication of this study is to share the research findings with the broader network of teachers using the School's CPD programme and suggest that each department explores how they could use seating plans, progress-tracking sheets and tailor worksheets to offer differentiation.

Introduction

Differentiation as teaching tool

Differentiation is necessary in secondary school education because this practice recognises that every child has their own pace and approach to learning (Claxton & Lucas, 2013; Skilling & Stylianides, 2015) stemming from how they have made sense of the world through their lived experiences so far (Vygotsky, 1988). Some children learn best by a hands-on approach and trial-and-error, whereas other children can cope with learning scientific concepts even if they are abstract (Nicholls, 1978; Schwab, 1981). There are unlimited ways that children learn, so teachers must be careful not to deploy a universal teaching approach, which is where offering differentiation becomes essential (Claxton & Lucas, 2013).

So, what is differentiation? Differentiation flexes the pedagogy to cater to each student, considering how students learn best (Claxton & Lucas, 2013; Skilling & Stylianides, 2015). Differentiation requires teachers and learning support staff members to get to know each student acutely, including any special educational needs, within the context of the student's learning environment (Doyle & Rosemartin, 2012). The teacher must be willing to be flexible with their pedagogy and curriculum content in order to facilitate each student to attain as high as possible during class (Skilling & Stylianides, 2015; Doyle, 2015).

There are various teaching techniques for differentiation, but they all aim to observe how students interact and learn individually (Bruner, 1999). Teachers should then use this evidence to plan lesson tasks and resources to meet students' needs (Bruner, 1999; Doyle, 2015). Teachers must be clear before grouping students into the ways students are similar and different (Bruner, 1999; Doyle, 2015).

Keeley (2008) emphasised that offering students differentiation is essential and just a minor tweak in how the learning instructions helped students engage and achieve more. When teachers gave students options to learn new concepts in ways with which students were most comfortable or familiar, it led to extended periods of student engagement (Keeley, 2008). Doyle (2015) supported this view, suggesting that when students can learn in ways they are familiar with, they show a greater level of involvement, which produces a deeper understanding of the content. Vygotsky (1988) persuades his readers that children thrive in environments that encourage learning at their level. In other words, learning support must be pitched at an appropriate level to be helpful (Vygotsky, 1988).

Having to adapt pedagogy need not mean having to tailor the curriculum to every single student (Claxton & Lucas, 2013). Instead, it asks the teachers to remain flexible and adaptable and observe attentively what tasks each student excels at (Nicholls, 1978; Schwab, 1981; Claxton & Lucas, 2013). The goal is to widen participation by making learning accessible (Bruner, 1999; Keeley, 2008; Doyle & Rosemartin, 2012).

Contextualising the study

Why does differentiation matter when teaching STEM subjects in school context of this study? The research aimed to help teachers in School in Derbyshire improve how they offer differentiation in these departments and perhaps for other departments. The research aimed to identify what differentiation strategies teachers used in the mathematics and science departments and out of those strategies, which they agreed would be most effective. The intervention and post-intervention feedback aimed to gauge if such strategies were, in fact, perceived as effective in widening learner participation by making learning more accessible.

The school in which this study was conducted is a state secondary comprehensive with a student population of about 2000 in an area that is categorised by the local authority to be of a socioeconomic disadvantage with low level of progression to higher education. This statement was echoed in the school's latest Ofsted report in 2019. This recent Ofsted reported highlighted the need for the school to widen learner participation for all subjects to ensure even the most disadvantaged students can meet the pass mark for their GCSE exams.

The science and maths departments who took part in this study assumed many students to have a poor home learning environment, including a lack of internet access, digital devices, and a quiet place to study, and that private tuition would not be possible. Thus, gaps in the learning for the most disadvantaged children were assumed to widen over time. This would be due to the home learning environment, the poverty level experienced at home, and having no access to extra tuition.

Many teachers in the mathematics and science department expressed in prior CPD training sessions and our joint departmental meetings that differentiation may be a critical method to widening learner participation and achievement. However, there was no explicit agreement as to what differentiation methods the teachers would use and how we would go about making our practice consistent and coherent. My impetus for this practitioner research came as a response to hearing concerns from many teachers in the two departments regarding an in-house report in 2020. This report strongly suggested that there has been a decrease in student engagement and achievement year on year for more than three years in mathematics and science. What was alarming for some teachers was that this statistic included students perceived to be our high-attaining students. The science and maths departments welcomed my practitioner research and perceived it as a method to improve current differentiation strategies, thus a route to increasing student engagement and achievement.

Literature Review

Differentiation defined

Bruner (1999) concluded that differentiation describes how instructors give instructions in various ways to allow multiple pathways of understanding the same information so that students of varying academic backgrounds can equally access the instruction and thus complete a task. Differentiation then requires teachers to anticipate the learners' varying needs to access information (Bruner, 1999). Teachers need to tweak and tailor instructions in line with the anticipated needs of the learner (Claxton and Lucas, 2013). Varying the instructions increases learner participation because it avoids learners feeling frustrated or overwhelmed and thus not even giving learning a try (Claxton and Lucas, 2013).

Differentiation strategies

Differentiation strategies allude to the various methods of varying teacher instruction or learning tasks so that all learners can access instruction and complete tasks (Bruner, 1999; Claxton and Lucas, 2013). Differentiation strategy most often involves learners gathered in a group which could be by attainment or using other categories (Keeley, 2008). Each learner brings the activity their strengths but also their weaknesses, but overall, the shared benefits would allow all learners in the group to experience a level of success (Nicholls, 1978; Schwab, 1981; Keeley, 2008). Differentiation can be more effective if the teacher takes into account each learner's interests as well as the learner's prior learning (Skilling and Stylianides, 2015).

Seating plans

There appears to be a strong case for schoolteachers to perceive the classroom layout to improve learner participation and attainment (Doyle, 1983; Cordingley, 2004; Skilling et al., 2016; Fullan and Hargreaves, 1992; Timperley, 2010; Williams, 2002; Williams, 2018; Worth et al., 2017). Doyle (1983) explored this perception and reported that school teachers believed the classroom layout had a major impact on students' behaviour whilst learning. Doyle (1983) concluded that it should be a common and essential practice for schoolteachers to draw up a classroom layout which would mean the teacher carefully planning how the tables would be arranged, where the teacher would stand, which students would sit where, how would students transition into group work, and how would students move around the class.

Despite their varying subject expertise, Cordingley (2004) found that many disparate groups of teachers shared the same view that seating plans improve learner participation in class. Teachers appear to advocate strongly for the use of seating plans after completing a systematic intervention (Cordingley, 2004) for the purpose of increasing learner participation.

We could argue that many secondary school students perceive seating plans as helpful (Doyle, 1983; Fullan and Hargreaves, 1992; Timperley, 2010; Skilling et al., 2016; Worth et al., 2017). Students perceived a direct link between a well-thought-out seating plan with improved classroom behaviour (Doyle, 1983; Skilling et al., 2016; Worth et al., 2017), improvements in students' engagement with their learning (Fullan and Hargreaves, 1992), and improved self-confidence (Fullan and Hargreaves, 1992; Timperley, 2010).

It is possible for teachers to positively shift their students' attitudes to learning using an effective seating plan (Wiliams, 2002; Wiliams, 2018). Wiliams (2002; 2018) reported on both occasions that teachers who carefully planned which students sit where, considering students' accessibility to teacher support, led to students experiencing a far greater positive learning experience in class. Teachers compared their experiences having taught with and without a seating plan (Wiliams, 2002). Teachers reported that more students prioritised friendships and peer pressure issues over learning during class without an effective seating plan, and in extreme cases, students focusing on peer pressure issues escalated disruptive student behaviours (Wiliams, 2002).

Teachers expressed a mixed view as to whether the students should sit in mixed attainment or according to their attainment category, which meant that the lower-attaining students were seated together close to the class teacher, for example (Wiliams, 2002; Wiliams, 2018).

Regardless of their stage of education, primary or secondary school education, many students championed streamed seating plans, perceiving that they are more effective than mixed seating plans (Temperely, 2010; Skilling et al., 2016).

Williams (2002; 2018) could not conclusively suggest that seating plans had a direct link to raising academic attainment, nonetheless acknowledged that many teachers perceived it possible to improve students' attainment using effective seating plans. Many teachers reported that as students' attitudes to learning shift positively, they display a deeper engagement with their learning, and as a result, attainment is most likely to rise over time (Wiliams, 2002; Wiliams, 2018). However, this view has since been vigorously challenged by other researchers (Timperley, 2010; Worth et al., 2017), who reported in their studies that teachers had mixed views on whether seating plans had a direct link, or indeed any link, with raising attainment. Teachers reported that there was no concrete evidence to suggest that where students had sat directly affected students attaining higher grades or demonstrating a greater depth of knowledge, and in most cases, there was no detectable rise in attainment (Timperley, 2010; Worth et al., 2017).

Williams (2002; 2018) alluded that improved learner participation would lead to improved learner attainment over a long period of time. A careful seating plan would allow students a safer and more productive environment for them to learn (Williams, 2002), helping them escape peer pressure or friendship issues whilst learning and growing their self-esteem (Williams, 2002;

Williams, 2018). The rise in self-esteem would likely develop their self-regulation skills, and it is the self-regulation skills that Wiliams (2018) suggest has a direct link to raising academic attainment as well as sustaining that attainment level.
Doyle (1983) suggests a practical and methodical approach to arranging classroom layout and where students sit. For example, teachers should consider what they want their classroom layout to look like depending on whether they seek their students to collaborate in small groups, discuss as a whole class or work independently to complete their learning tasks. Doyle (1983) highlighted the obvious such as splitting the students who often display conflict and avoiding pairing talkative groups together to control noise levels by preventing low-level disruptions.

Skilling et al. (2016) advised that to construct a collaborative classroom try clustering tables or a horseshoe shape. Whereas if the teachers are looking for independent learning, try having students sitting in rows all facing the front (Skilling et al., 2016). Grouping students make it easier for students to chatter and turn away from the board, whereas rows ensure students' eyes are on the teacher (Skilling et al., 2016).

Doyle (1983) advised teachers to plan their movements in the class and first reflect on whether they predominantly teach from the front of the class or move through the room. Health and safety are also essential, so teachers must consider leaving enough walking room in the classroom to prevent students from falling on hazards and not obstructing fire exits (Doyle, 1983; Worth et al., 2017).

Fullan and Hargreaves (1992) explained that students' academic and medical home information should be considered when teachers plan seating plans. For example, does the student need to sit near the exit or other specific places to support their medical conditions? Teachers described students with varying medical needs, for example, those who were partially sighted and needed to sit close to the board or those who suffered from a bowel condition and who needed to discreetly leave the room to visit the toilets without disrupting the lesson (Fullan and Hargreaves, 1992).

Timperley (2010) recommends that students' personalities be considered when teachers construct seating plans. For example, if a student is timid hence the aim is to foster their self-esteem, then the teacher should consider situating the student next to a student who is both academic and encouraging so they can support their peer. Timperley (2010) also highlighted that seating plans would need to be amended throughout the academic year to reflect students' changing relationships, attitudes and other personal needs, such as their medical conditions, which will all impact how students interact with the teacher, their peers and with their learning.

Progress-tracking

Learners who can exercise self-regulation can further their academic progress (Weiner, 1986; Doyle, 2015) because these learners can track their learning better (Claxton, 2007), identify gaps

in their knowledge (Weiner, 1986; Cowie and Bell, 1999; Claxton, 2007), and be proactive about closing gaps in their knowledge (Weiner, 1986; Claxton, 2007).

Weiner (1986) was one of the earliest education researchers to report that many educators, such as teachers, perceived it possible for all learners, independent of their current academic attainment level, to foster self-regulation habits. Weiner (1986) suggested that learners be given a performance tracking sheet that lists either the tasks that must be completed to acquire learning (lesson tasks) or demonstrate that the learner had mastered the learning (assessment) (Doyle, 2015). Doyle (2015) strongly recommends that educators offer learners a method of monitoring learning in the form of a written record, arguing that it is a powerful act for a learner to 'see' their act of learning. This written record would reveal what is often a hidden learning process; learning now becomes visible to the eye, thereby revealing to the learner where the gaps are in their knowledge (Doyle, 2015). Claxton (2007) perhaps gave the most straightforward guidance in learners tracking progress, suggesting that teachers design 'progress-tracking' sheets where students record what they have completed. This progress-tracking sheet should have a simple layout, easy to navigate and complete, each task should take no more than 15 minutes to complete, and the desired learning outcome should be clearly visible to ensure learners are crystal clear about what learning they are trying to master (Claxton, 2007).

EEF (2017) reported that students tracking their academic progress made during their lessons and in their end-of-topic test felt that the tracking had increasingly helped them access their learning. EEF (2017) also argues that students who track their learning, despite the tasks they had completed in the lesson or results obtained in end-of-topic tests, can improve learner participation. Students who can visualise their progress or experience the joy of ticking off their completed tasks (Doyle, 2015) will stay on-task for longer (EEF, 2017).

Claxton (2007) argued that students monitoring their academic progress develops their self-autonomy, which in turn, will grow their self-confidence or, in some instances, self-motivation to attain higher. Many teachers reported that students who recorded their progress using a written form during class over a significant period of time, for example, for the entire duration of covering a topic, led their students into a healthy cycle of rising self-confidence which led to improved self-regulation; this cycle then continued (Hattie and Temperley, 2007).

There may be a case to argue for a direct link between self-regulation and improved performance (Weiner, 1986; Cowie and Bell, 1999; Claxton, 2007), not just in the education arena but also in others, such as the sporting arena (Weiner, 1986). Cowie and Bell (1999) reported that many teachers shared a shared belief that learners tracking their daily performance led them to attain higher academic grades than their counterparts who did not track their performance.

A class full of students tracking their own learning would reduce, if not prevent, disruptive classroom behaviour (Claxton, 2007; Hattie and Temperley, 2007; Doyle, 2015). Many teachers saw students deeply engaged in tracking their performance (Claxton, 2007; Hattie and Temperley, 2007), but it was often necessary for students to experience some form of success before beginning their tracking (Hattie and Temperley, 2007). Doyle (2015) said educators reported that most learners, once they were used to tracking their learning progress, showed impatience as if desperation to achieve progress no matter how small. Even the most disruptive learners held back from interrupting teacher talk or disrupting other learners to hold on to their glimmer of hope that they may be able to continue completing their learning tasks (Doyle, 2015), therefore strongly suggesting that teachers persevere in getting their students to record their learning progress.

Many teachers worldwide tend to divide large or complex learning concepts into smaller, more digestible learning pieces (Claxton, 2007; Hattie and Temperley, 2007; Doyle, 2015). This is another tactic to aid learners in staying on-task for longer (Claxton, 2007; Hattie and Temperley, 2007) and reduce disruptive classroom behaviour by making learning more accessible for all learners (Doyle, 2015). Using progress tracking sheets can be a powerful tool for students to stay on-task for longer (Claxton, 2007; Hattie and Temperley, 2007; Doyle, 2015), with Doyle (2015) strongly suggesting a direct link between self-regulation and self-motivation and even concentration. Claxton (2007) highlighted that when teachers described students 'staying on-task', this included the students recording their progress on a sheet, thus suggesting teachers must allow time beyond completing the learning task but also for students to record their progress and even better if they have time to ponder about the progress they had so far made.

Tailoring classroom work

Learners learn best if the educator pitches learning at a level that is accessible to them (Carlson, 1990). Many education researchers appear to strongly support this claim (Margayan et al., 2004; Childs and McNicholl, 2007; Doyle and Rosemartin, 2012; Edwards, 2014; Edwards, 2015; Wiliam, 2011; Wiliam and Leahy, 2015). Most teachers appear to strongly agree with the suggestion that teachers should provide a range of worksheets to improve accessibility and participation in learning (Wiliam, 2011; Wiliam and Leahy, 2015). However, some researchers report that many teachers also hold an opposing view that one worksheet can be offered for all, which would relieve some learners from the embarrassment that they have to have the 'dumb' version and in such case, it may be that the learner only completes part and not all of the worksheet (Edwards, 2014; Edwards, 2015).

Edwards' (2014; 2015) suggests a strong link between the act of teachers or lecturers pitching learning at a more accessible point to the act of the learners showing extended time spent on their learning. Edwards (2015) reported that many teachers shared a strong belief that tailoring class worksheets led their students to stay concentrated for longer, work independently for longer, and stay on-task to complete the task for longer. Childs and McNicholl (2007) highlighted the need for

teachers to check students' prior knowledge as well as students' lived experience to catch misconceptions, then use this information to tailor the learning, be it tasks or sequence of tasks, if the teacher is to improve learner participation and accessibility. Improved accessibility to learning helps to improve students' self-confidence (Wiliam, 2011; Wiliam and Leahy, 2015).

Margayan et al. (2004) reported that many students perceived worksheets as tailored to their academic needs; for example, having a word bank available to reduce the anxiety of misspelling or having the worksheet printed on a specific-coloured paper aided them in accessing their learning. Doyle and Rosemartin (2012) reported how students perceived 'best teachers' to be the ones that pitch learning at an accessible academic level to them, thus holding a strong belief that the teacher *'knows them well'* or *'cares about'* them. Furthermore, teachers should offer students tasks that they can solve using their prior learning to allow a successful starting point, one which allows students to experience some level of success (Childs and McNicholl, 2007; Wiliam, 2011; s, 2015; Wiliam and Leahy, 2015).

Doyle and Rosemartin (2012) advocated for teachers to tailor worksheets for their students to ensure learning is pitched at an accessible level, further arguing that this would see students sustaining their academic attainment if not raising attainment. Edwards (2014; 2015) alludes to a similar view arguing that with increased access to learning by way of tailoring classroom tasks to fit with individual students, teachers witnessed their students sustaining their academic attainment consistently at their higher end of the spectrum. Also, giving students tailored worksheets can eradicate disruptive classroom behaviour (Doyle and Rosemartin, 2012). Doyle and Rosemartin (2012) suggested a strong link between tailoring class work and reduced awful student behaviour in class, reporting that teachers who pitched learning after carefully considering each student's prior knowledge had; drastically reduced classroom disruptions; improved access to learning; and shifted attitudes to learning positively.

There is a mixed view from teachers' perspectives as to whether tailoring worksheets to suit individual learners is time well spent for busy teachers (Wiliam, 2011; Wiliam and Leahy, 2015). Considering how busy the teachers are generally, time spent tailoring worksheets may not be a sustainable practice, for they are often a time-consuming exercise (Wiliam, 2011; Wiliam and Leahy, 2015). However, many teachers, as well as students and their parents, perceive that students receiving worksheets tailored for them is paramount, if not essential, for students to fulfil their learning potential (Wiliam, 2011; Wiliam and Leahy, 2015).

Repeat instructions.

It is usually seen in the classroom that giving information to the pupils more than once is very important in the teaching and learning environment. Because the repletion of the sentencing and paraphrasing of the important elements of the lesson can make a huge difference for many pupils.

Occasionally, pupils' attention can wander and it is very important to give them more than one opportunity to understand what is their task in short pupil should be reminded more than one time about their activities in their classroom. Repetition of the instruction need to be done by paraphrasing and using different words which will be helpful for those pupils who have the tendency to time to time. Moreover, it is recommended that while repeating the instructions it needs to be represented in a different mode such as when saying it it need to be written on the board as well because the teacher may repeat the same way which will be not useful to any pupils. Therefore it is very important that repletion of instruction is very useful to differentiate learning but needs to be done effectively(EL KEMMA, 2019)

Guided Videos

Video has been used in variety of ways for number of years to support pupils in all aspects of education .However recently the introduction of Google, YouTube ,Teacher Tube etc and free access to all pupils made it easier to access a substantial amount of learning materials online.(Mitra *et al.*, 2010).

In the past to teach our subject matter using of properly put together audio-visual learning materials could increase the effectiveness teaching in all environments (Dale 1969, 140). When used in proper manner it has the ability to bring the learning themes to life and can increase the pupils interest in the learning topic (O'Hagan 2001). It is

generally understood that main and very important use of the video clip is to introduce students some novel information in such way which can make the pupil taking interest and getting engaged actively in that topic. The learning videos can arouse the interest and get concentrated in the learning in the classroom. that one key use of video is to present new information to students. It also helps student getting engaged in learning activities which can help in promoting deep learning. The visual images play a huge role. It has been proven that memory of the images is much better than any verbal communication (Bashman and Treadwell 1995). Video has got both audio and visual processing, leading to more engagement with the learning material when used properly.

However, researchers have stressed that there is a lot more to video than just

being used a series of visual images. Video can also be used to encourage learning by

making students to relate pictures from video material to wider situations. Cherrett et al. (2009) developed a very useful interactive video material for undergraduate civil engineering students who were studying workers health and safety on building sites. Students were required to

get involved individually with the learning material , and they were to identifying different hazards and finding the ways to minimise the impact. Cherrett et al. (2009) concluded that when students are asked to engage directly with problems and they have to apply, and implement, their

learning then this provides deep learning. It is argued that video support contextual and

emotional information. These types of communication could also facilitate deeper learning in such a way that it makes it easier

to achieve in the classroom or seminar room (Craik and Lockhart 1972). White,

Easton and Anderson (2000, 174) also clearly stated in that

'The rich contextual background provided by video', which helps to an increased and deep learning environment. In this way, video can provide deeper learning any kind of space.
It is very importance to have a blended approach for learning is used. Video should being used alongside other type of teaching materials. Sherwoodet al. (1987) suggested that new information is more likely to be understood as important by pupils when given to them on video in as well as with text.
Beard, Wilson and McCarter's (2007, 10) survey of postgraduate students studying hospitality, leisure and tourism suggested that 'the integration of video and text did have a positive effect on learning'.
. The various and individual needs of the learners have also been a very important factor in the classroom Hussein (2005, 18) stated that as different learners learn in different ways therefore , effective learning resources should provide the learning in a various ways to facilitate a variety of learning styles.' Coffield et al. (2004, 3) referred to teachers developing a type of 'pedagogic sheep dip' to be inclusive of different learning styles. Therefore, Video and other materials needs to synchronise to be effective.
As well as considering why video can be an effective tool, there has also been discussion about how it should be used. This is part of a wider debate about the use of technology in education. Nichols (2003, 4) has indicated that 'inaccurate implementation of technology must reflect poorly implemented pedagogy. Ineffective use of video can show result from a lack of consideration about its purpose and use in the teaching environment.
O'Hagan (2001) indicated that video must be used in short segments to increase pupil's concentration, because it is more useful than playing long videos in their entirety. Hussein's (2005) guide to tutors designing their own e-learning materials stress on that teachers have to make sure why and how the learning materials are being used, so that they can clearly explain the reason of the video material.

Chunking.

Chunking is used as a strategy by using a of process by the help of which one can easily efficiently increase the amount of information that could be stored in some one's short term memory by understanding the information in a useful way, or by finding a particular pattern within a set of items which could be remembered(HJ Wahid and A. Thais, 2020)
. Chunking is considered one of the most useful and effective ways to maximise the amount of information that can be stored in memory. Miller (1956) This is a process of putting together or organizing input information into many small meaningful units or chunk. The storage capacity of information in immediate memory is limited to approximately seven items, therefore, putting materials together in such a way which will allow them to be more easily accessible will effectively maximise the amount of material that can be stored.
A chunk can be considered a collection of information or learning material that have strong connection with one another, but weak connection with materials belonging to other chunks. Chunks, which can

be of different sizes, are used by memory systems and more generally by the cognitive system. Che Lah et al in Afflerbach et al, (2008). Chunking strategy is a cognitive strategy applied to improve mental performance. It is the understanding of bulk material into variety of smaller chunks avoiding any addition or subtracting of the the quantity of new information being introduced. Reorganization of information occurs at the pattern-finding level within the set of items to be stored in STM.

Che Lah et al in Afterbath et al, (2008) Chunking is a very important learning strategy due to overcoming Short Term Memory (STM) limitations. Miller (1956) indicated chunking as a process of putting together the different elements into a meaningful biger unit that provide those elements the storage in STM. The chunking strategy minimises cognitive burden, therefore, maximising the learner's mental storage ability. For example, in learning how to spell meaning of 'HORSE' to the animal itself, he or she would only need one storage unit. The strategy moves up to a higher assistive rank if the learner conjures up a schema, or associates the word with background knowledge of the animal(HJ Wahid and A. Thais, 2020)

Writing frames.

Wray and Lewis (1997) indicated that the use of writing frames, can develop the understanding expressed in non-fiction writing, and put forward the proposition that this is because at least partially due to the fact that writing frames facilitate a drive for learning as a social process (Lave and Wenger 1991, Light and Littleton 1999). Wright (1999) express that the need of writing can usually be seen as more challenging than the needs of speaking, as dialogue provided by spoken prompts, gesticulations, pointing to specific objects and a larger acceptance of informal language and incomplete sentence composition. A writing frame gives opportunity to revisit the balance for the learner who would like to make efforts to express themselves through writing. It provides a structure to support writing comprised of a template of 'sentence starters, connective words and sentence modifiers which provide pupils a framework which they can concentrate on expressing what they want to write whilst supporting them in the use of a specific generic form' (Wray and Lewis 1997: 122).

Research Questions

The following research questions were composed in light of the literature review.

RQ1: What differentiation strategies did teachers perceive as effective?
RQ2: What were pupils' perspectives of the effectiveness of the intervention?
RQ3: What were teachers' perspectives of the effectiveness of the intervention?

Methodology

An Overview

To conduct this research a baseline study and main research study were carried out. The purpose baseline study was to establish, what differentiating strategies were used by the experience

teachers in the school X. And what they perceived were the most effective strategies for differentiation in their classrooms.
This section describes how the research was conducted, and data were analysed. Table 1 outlines the research questions, data collection methods and their corresponding limitations.

Table 1: Data collection methods

Research Question	**Data Collection Methods**	**Limitations**
(Study A) 1 -What differentiation strategies did teachers perceive as effective?	Semi-structured teacher interviews. Audio recorded. n=8 teachers.	Researcher interpretation. Researcher presence. Cumulative dialogue. Unequal teacher voice.
(Study B)- 2-What were pupils' perspectives of the effectiveness of the intervention?	Student questionnaire. n=60 students.	Too many options on Likert Scale. Comment boxes gave no prompts.
(Study B) 3-What were teachers' perspectives of the effectiveness of the intervention?	Semi-structured interviews. Audio recorded. n=8 teachers.	Too many options on Likert Scale. Comment boxes gave no prompts.

A) Baseline Study

The sampling for the intervention consisted of eight teachers from either mathematics and science department including those who participated for the entire eight weeks of the intervention.

The participants were invited for discussion workshop for the duration of an hour in the school conference room. The semi- structure interviews (8-12minutes of duration each) were audio recorded and analysed

The audio recording was repeatedly heard and compared for the popular differentiating strategies...

The aim of the baseline study was to investigate the most popular differentiations strategies among the participants.

Teachers responded to a semi-structured interview for the first research question:

- RQ 1 *What differentiation strategies did teachers perceive as effective?*

Findings

Teachers described several differentiation strategies they had used, and they are listed in the order of the most repeated.

1. Seating plans

2. Tailored worksheets
3. Progress-tracking sheet
4. One-to-one support
5. Dual coding
6. Repeat instructions
7. Guided videos
8. Chunking
9. Flowcharts
10. Writing frames

All teachers who participated agreed that the seating plans engaged pupils effectively. Most teachers said their high-attainment students sat at the back of the class while the low-attainment students sat at the front near the teacher. Those teachers said that the high-attainment students worked independently, providing teachers the time to support low-attainment students. Some teachers said that they sat the mid-attainment students strategically. For example, the mid-attainment students sat near the low-attainment students so they could overhear the teacher's instructions and other prompts, hence able to pursue their tasks and simultaneously retain their independence.

[1] "Seating plans are priority for every teacher."
[2] "I used seating plans to help with differentiation."
[3] "I use seating plans for differentiation."
[4] "I always have a seating plan."
[5] "I sit the low-attaining students at the front near me. I sit the mid-attainers near them [low-attaining students] so they can hear my prompts and further explanations. It helps the mid-attainers to get started and stay independent. The top-attainers sit at the back and they work independently."
[6] "I sat the low-attainment students near me so I can provide extra guidance. They [low-attainment students] need scaffolding to achieve. I sat the mid-attainment students near me or the lower group to ensure they overhear my guidance."
[7] "I think seating plans are essential for effective differentiation."
[8] "Seating plan plays an important role in achieving this [differentiation]."

Four teachers said they amended seating plans to reflect the demands of each task. For example, some tasks benefitted from a mixed-attainment seating plan. Teachers argued that mixed-attainment seating plans were just as valuable for engaging students for prolonged periods and completing tasks. One teacher said students inspired and helped each other to achieve the various tasks. Two teachers indicated that the seating plan was a critical tool to help them manage classroom behaviour, minimising if not stopping classroom disruption caused by low-attainment students who failed to engage.

[4] "To get an effective seating plan for your class is a very challenging job but necessary to engage pupils for a prolonged period."
[5] "I amended my seating plans from a tiered one to a mixed-attainment depending on the task. The latter [mixed-attainment seating plan] was just as valuable because students inspired and helped each other to complete tasks."
[7] "Classroom disruptions were led on by students who failed to engage and my best seating plans reduced classroom disruptions because students were on-task for longer."

[8] "My best seating plans helped students to complete more tasks."

Teachers reflected on the effectiveness of using tailored worksheets for students to complete tasks during class. Seven out of eight teachers expressed that the tailored worksheets were effective in helping students to complete tasks and, as a result, students experienced a form of success.

[1] "I tailored my worksheets according to pupils' current level of attainment for that topic. The worksheets ensured all pupils completed tasks during class."
[3] "I found tailoring my worksheets very helpful. This way, all students completed their tasks therefore experienced some form of success!"
[4] "The tailored worksheets were effective in helping my students achieve."

Six out of eight teachers said they tailored their worksheets to three levels to reflect the three-tier attainment levels that the school uses: low, mid and high-attainment levels. Some teachers said they kept the title of the worksheet the same.

[5] "The school, certainly our department, has a three-tiered attainment system which is low, mid and high. So, I tailor my worksheets three ways. I keep the title the same though. So, the students don't feel embarrassed by being given the easier worksheet."
[6] "I customise my worksheets to the lower, middle and higher attainers."
[8] "I tailor the worksheets but always keep the title the same."

Two teachers said high-attainment students benefitted from tailored worksheets because the more challenging questions extended their learning.

[5] "My high-attainment students can extend their learning through more challenging tasks I set in their worksheets."
[6] "The extension questions appear in the high-attainers' worksheets."

Most teachers said the tailored worksheets minimised classroom disruption by prolonging students' engagement.

[4] "The tailored worksheets engaged all pupils, independent of their attainment, for a prolonged period. This reduced classroom disruption."
[5] "I find the worksheets were valuable because students completed more if not all tasks. This reduced bad behaviour in class."
[8] "It's [using tailored worksheets] another clever way of stopping bad behaviour."

Teachers said tailored worksheets encourage task completion and, over time, it appeared that many students climbed up their level of attainment.

[1] "The tailored worksheets had all students completing tasks, and, over time, most students achieved their expected level of progress and some climbed higher."
[8] "I think customised worksheets helped students to complete more tasks. Many students manage to climb up their attainment level over the year."

Teachers said the practice of tailoring worksheets required a significant amount of time. They expressed concerns about not having enough time to tailor worksheets.

[2] "I'm so worried about the time it takes to tailor worksheets considering each and every lesson."

[6] "It takes a lot of my time to tailor worksheets when I don't have a lot of time to give."

Some teachers said they used a progress-tracking sheet to keep students on-task. These teachers described the design of their progress-tracking sheet, and the common features included having the lesson objectives and a list of classroom tasks. The tracking sheet presented the classroom tasks in even more simple steps for the low-attainment students. In contrast, the high-attainment students had additional tasks to make their learning more challenging.

[1] "I use a tracker [progress-tracking] sheet to keep students on task. They [the sheets] have the lesson objectives and the tasks on them."
[2] "I made a monitoring [progress-tracking] sheet with tasks on. Students ticked off tasks as they completed them. They [the sheets] showed the learning objectives."
[5] "I used tracking sheets to track students' progress. The low-attaining students had tasks broken into several, simpler, steps. Whereas the high-attainers had additional tasks or more complex tasks to extend their learning."

Some teachers said the progress-tracking sheet allowed them to gauge if they were differentiating effectively. For example, if all students have accessed learning at their appropriate levels.

[5] "The low-attaining students had tasks broken into several, simpler, steps. Whereas the high-attainers had additional tasks or more complex tasks to extend their learning. The [progress-tracking] sheets showed me if students were completing their differentiated tasks."
[7] "I gauge if I am making learning accessible or too easy by browsing the tracking [progress-tracking] sheets throughout my lessons."

Most teachers said their progress-tracking sheet had a column labelled 'Completed' where students ticked off their completed tasks. Some teachers said that the progress-tracking sheet helped students to visualise their progress thereby experience a sense of achievement. Teachers said that as a result, students sustained their motivation and completed more tasks.

[1] "The [progress-tracking] sheets had a column where students ticked off tasks as they completed them. I think this motivated my students because it helped them feel a sense of achievement. They [students] accomplish more [tasks] when [their] progress is seen."
[2] "I browse the tracking [progress-tracking] sheets to gauge motivation. The more ticks [tasks completed], the more focused they [students] are."
[3] 'I have an additional column where they [students] tick off what they've done. I think it helps them [students] visualise the progress they are making. It's a powerful motivation tool."
[5] 'I certainly think students complete more tasks with a monitoring sheet. I think it [the 'completed' column on the progress-tracking sheet] forces them to reflect and so experience a level of success and so motivates them [students]."

Some teachers said one-to-one support was effective. However, the same teachers suggested that this method was unsustainable because it was time-consuming.

[8] 'One-to-one support makes a huge difference, of course! Trouble is, it is far too time consuming to keep doing it [giving one-to-one support]."

Some teachers said it was helpful to have a full-time learning support assistant dedicated to aiding students diagnosed with a severe learning disability. However, the same teachers said many other students with complex learning needs do not have such dedicated support because their conditions were not severe enough to attain funding. Some teachers highlighted the need for collaboration between the teacher and support assistants to widen access to learning support in class.

[4] "It is helpful to have a full time LSA [learning support assistant] for those [students] with severe learning disabilities but we have lots more [students] who could do with a similar support but failed to win funding. I try and spread out LSA support beyond their one to one support so more students can benefit from having two adults in the classroom."

[7] "Some students have a dedicated support staff for learning but many don't because their learning conditions were not severe enough to win funding. I worked with my teaching assistants to widen access to learning support in class."

Two teachers said dual coding was an effective differentiation strategy, particularly for the low-attainment students. Teachers said the dual coding practice involved offering an illustrative picture while speaking or handing out written or spoken information or instruction.

[3] "I used dual coding where I showed a picture. The picture accompanied my spoken or written information or sometimes instructions. It was an excellent way to differentiate, particularly for the low-attaining students."

[7] "I use dual coding for mine [students] for the low-attaining students mainly. So I offer pictures or diagrams to illustrate the point I am making."

One teacher said repeating teacher instruction in several different ways and using more straightforward language was very effective.

[2] "To differentiate, I repeat my instructions in several different ways using more straightforward language."

One teacher used the guided-video method to differentiate where the teacher would pause a video at various times and guide students to write notes. The teacher said this method was effective during the Covid-19 lockdown when students learned remotely online. The teacher taught all scientific practical using this method.

[7] "To differentiate, I also used the guided-video method. I would pause the video at various points and guide them [students] to make notes. This [method] was effective during the lockdown, [students] having to learn remotely online. I taught all my practicals like this [using guided-video method]."

One teacher said the chunking method was very effective for the low-attaining students. The teacher explained how they used the chunking method. For example, a task was divided into many smaller chunks to reduce the cognitive load. The teacher said he used the chunking method to aid students in prolonging engagement and increasing motivation. Two teachers followed this comment suggesting strongly, perhaps insisting, that this was similar or another form of progress-tracking because they both involve dividing learning into smaller tasks. It should be noted that these two teachers were domineering in their personalities, spoke with great confidence and they held senior teaching positions.

[7] "I just taught neutralisation to KS3 and used chunking for that [lesson]. I broke down the LO [learning objectives] down to five smaller tasks. For example, 'What is an acid' task; 'What is an alkali' task; 'What happens when you mix acid and alkali together' task; 'How would you know if the neutralisation has happened' task; and 'what colour on the pH scale shows neutralisation?' task."

[2] "Chunking is just another way of doing progress-tracking isn't it? All you are doing is dividing learning into smaller tasks, chunks as you say."

One teacher used the flowchart method to differentiate when teaching a scientific sequencing process. The teacher said this method broke down a complex concept into smaller and simpler processes using diagrams and arrows to convey a process. One teacher strongly suggested that this was similar to progress-tracking because this involved dividing learning into smaller tasks. It should be noted that this teacher had a domineering personality and held a senior teaching position.

[6] "I used flowcharts for differentiation when I taught the circulatory system, the carbon cycle and the water cycle. It worked well when teaching scientific processes with definitive sequences. Flowcharts helped to break down a complex concept into smaller and simpler bits using pictures and arrows."

[2] "Again, this is just another way of doing progress-tracking. Dividing complex sequences into smaller processes – so you mean dividing learning into smaller tasks, basically."

One teacher used the writing-frame method to differentiate where students received a skeletal framework designed to scaffold their answers. The teacher gave a bank of keywords, a model answer and a few sentence starters to assist low-attaining students.

[4] "I used the writing-frames to differentiate. To scaffold the low-attainers, students received a skeletal framework with a bank of keywords, a model answer, a few sentence starters."

B) Main research study

Sample

The sampling for the intervention consisted of eight teachers from either mathematics and science department and sixty students from two Year 8 mixed-attainment classes including only those who participated for the entire eight weeks of the intervention.

The Intervention

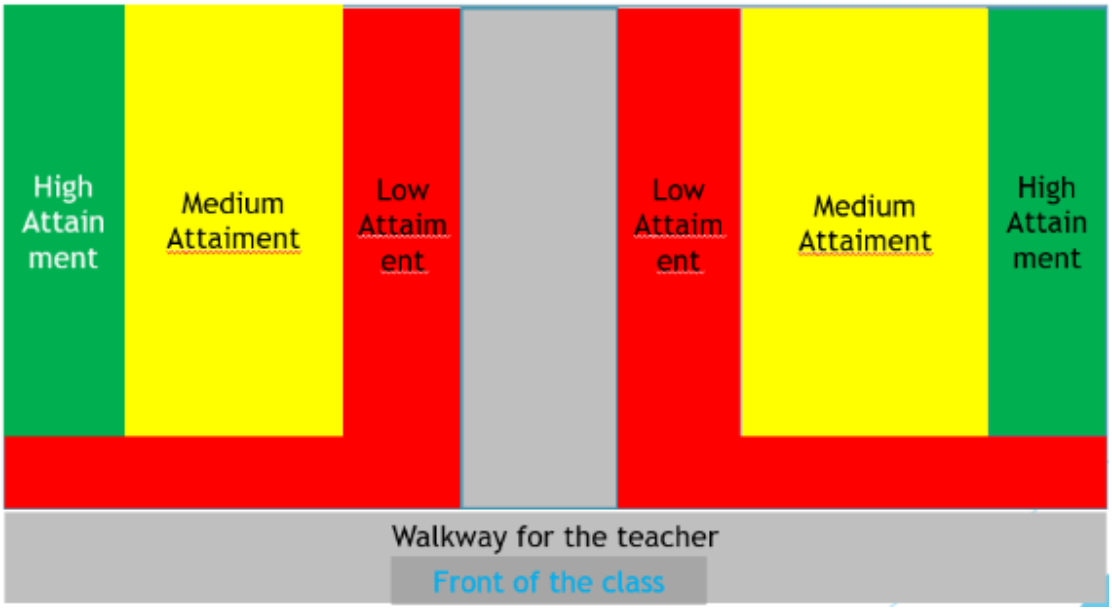
The intervention involved teachers conducting three specific differentiation strategies with their Year 8 class.

Seating Plan

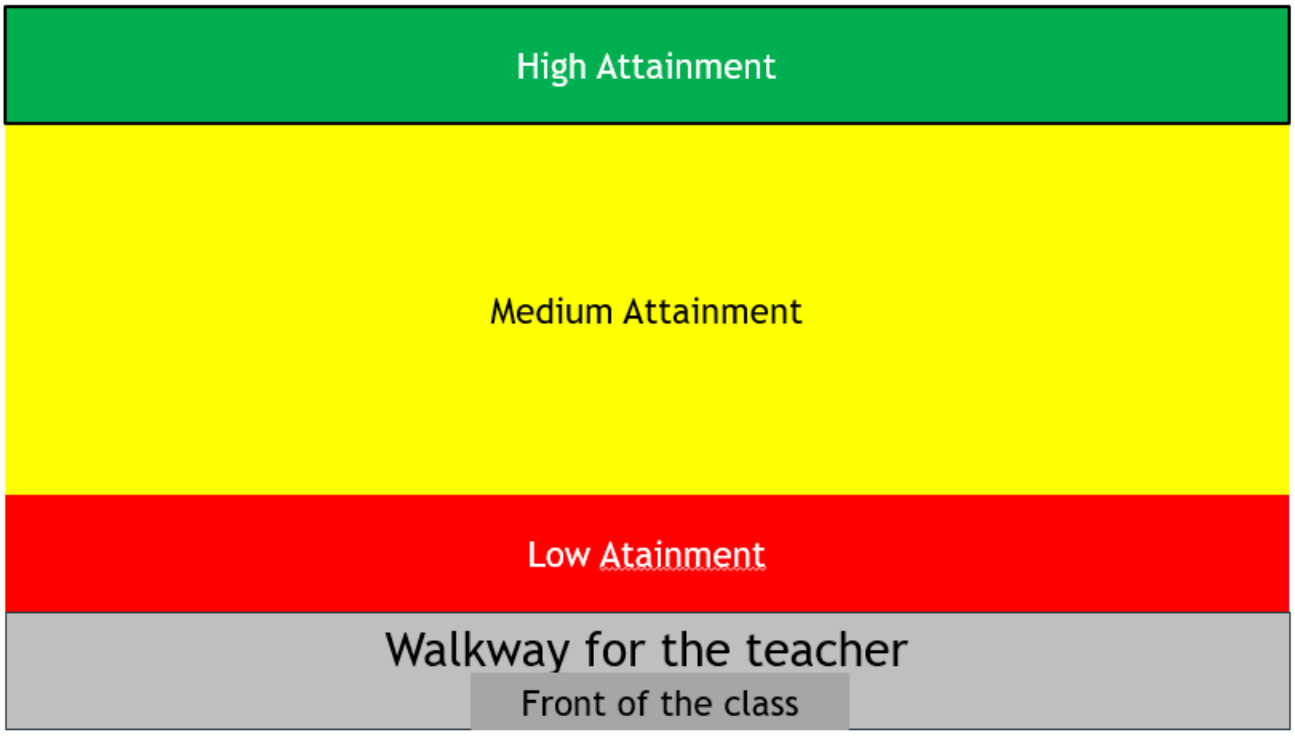
The first differentiation strategy deployed a seating plan according to pupils' current level of attainment. The teachers had complete freedom to arrange tables in any shape, gather similar attainment students or not, and sit lower-attaining students near the teacher or not. However, it is

curious how the semi-structured interviews revealed that the majority of teachers share a view of sitting the lower-attaining students at the front of the class and the higher-attaining students at the back of the class

Picture 1-Seating plan Low attainment pupils are allocated in L-shaped setting for easy access for scaffolding.



Picture 2-Seating plan Low attainment pupils are allocated in the front for easy access for scaffolding.



Progress tracking sheet

The second differentiation strategy deployed a progress-tracking sheet created by the teacher before the lesson or a group of lessons. These sheets were completed by their students throughout the lesson. In response to the literature review, the teachers were advised to keep the design of their progress tracking sheet simple for example, the design was kept minimal for the sheet to be simple to complete, and the tasks were broken down into smaller 5-10mins tasks. Some teachers outlined the learning outcomes to help students gauge for themselves if they had understood the material correctly. All teachers provided on the sheet columns to which students indicated if they have completed a task and, under some teachers' provision, also students' learning outcomes.

Picture 3- Tracking sheet used by science teacher for very low attainment pupil for "Neutralization topic

Scaffolding tracking

Task Number	Task description	Start Time	Finish Time	Completed Y/N	Type of scaffolding used
1	Write down in your book what is an acid	02:05	02:13	y	Chunking
2	Write down in you book what is and alkali	02:15	02:23	y	Chunking/discussion
3	Write down in your book what is pH scale	02:23	02:40	y	Dual coding
4	Write down in your book what happens when acid and alkali are put together and what is called	02:40	02:55	y	Dual coding/flowchart

Tailored worksheet

The third differentiation strategy asked teachers to tailor worksheets. The teachers were advised to carefully consider students' level of attainment to gauge where learning should begin for the student. The aim was to ensure all students could access learning even if their prior understanding was basic, incorrect, or filled with misconceptions.

Collaboration

An introductory meeting was held the day after the focus group interview. We used the school's main meeting hall to hold a meeting on a late Friday afternoon for about 45 minutes. At this meeting, I introduced the intervention explaining the aim and the three strategies for the teachers to try. I checked if teachers were happy to extend their consent to take part in the intervention for the next eight consecutive weeks, making it clear it is possible to withdraw consent at any time and that no data that belonged to a teacher could be published without their strict consent. This discussion was essential to establish an ethical practice. I wanted to show teachers that I was committed to protecting their confidentiality and ensuring their data was used with care. I also expressed that I was grateful that teachers were about to spare their limited time to help construct and conduct this education research.

There were many benefits to teacher collaboration (Lohr, 2008; Singer, 2008); for instance Singer (2008) argued that when teachers felt safe to try out new practices without the fear of being judged for the outcome of that practice, it appeared to produce an increase in student engagement. Lohr (2008) found that teacher collaboration appeared to have led to increased student attainment and decreased disruptive classroom behaviour. Following Singer's (2008) suggestion that every participant needed access to the same information, I emailed every teacher, who consented and volunteered to take part in, a critical document that clearly outlined the research objectives, key dates, the three differentiation strategies to try and how to do so, and what additional support was available and when for the teachers. The document explained what actions would follow when the intervention ended. For example, a semi-structured interview would be held on the Friday of the last intervention week for the teachers. I reminded them that their interviews would be voluntary and anonymous, and they could withdraw their consent anytime, even after the interview. The teachers' comments were then analysed, and the findings were reported at the next CPD training session.

I emailed all the participants a small bank of resources to give an example of how a seating plan or progress tracking sheet could be implemented. Collaboration was vital, so I held teacher support meetings throughout the intervention period, and we met every Friday during break time. On average, the Friday meetings were sparsely attended, with about three participants attending each time. I emailed the minutes to all participants after each meeting to share what issues surfaced and how we agreed to go forward in order to maintain a coherent and consistent practice. For example, teachers compared the design of their progress tracking sheets at one of these support meetings. As a team of three, we agreed on what it should look like and shared this information with other teachers to minimise their missing out on these support meetings. The meeting notes also revealed how teachers' perspectives wax and waned as they tried and tested the strategies each week, regarding how effective they perceived each differentiation strategy was in increasing student engagement and attainment.

It was advantageous to share the research outcome, and it was unavoidable to quote some teacher comments. Hence the challenge was to share findings and quotes while respecting participants' anonymity and confidentiality (BERA, 2018). There was a deliberate attempt to protect teachers and students from their comments in order to avoid any embarrassment or, in the worst-case scenario, disciplinary action if the comment was somehow perceived to be an accusation of some kind (BERA, 2018). Hence, the utmost care was taken to ensure the teacher quotes could not identify which teacher had shared such a view when it came to sharing the research findings in July 2022.

Semi-structured Interviews

The semi-structured interviews were used to collect data from teachers to answer two of the research questions concerning teachers' perspectives. The sampling for the interview consisted of eight teachers who had volunteered to take part. The interviews were conducted every Friday for the first research question, *'What differentiation strategies did teachers perceive as effective?'*. The interviews were conducted on the Friday after the final day of the intervention for the last research question, *'What were teachers' perspectives of the effectiveness of the intervention?'.*

Teachers had limited time to spare during lessons, meetings, and lesson planning. Therefore, the Friday interviews were kept to 10 minutes at a minimum and 25 minutes at a maximum. A voice recording device was used to record the whole discussion. Most teachers said they preferred the voice recording over the video recording option. For anonymity, teachers were assigned a number they mentioned before having their say in the discussion. I used voice recordings and wrote some notes during the interview to capture as accurately as possible what the teachers said and did.

The second limitation came from my presence in the interview room. The researcher's presence could have influenced what teachers said or did (Richards, 2014; BERA, 2018). Teachers could deliberately say what they believe the researcher may be looking to hear to protect their self-image (Richards, 2014). Alternatively, a teacher may have held back from being honest and agreeing with their peers to avoid confrontation, which is another form of protecting their self-image (Richards, 2014). This would have led to a cumulative dialogue where a false suggestion could have snowballed and appeared to be a strong suggestion. Another limitation came from the power that may have been at play, considering participants' personalities. Teachers with more power or dominant personalities could have steered the discussion or hindered other teachers from having an equal say (Richards, 2014). To respond to this issue, talk data was collected to identify the relationship between talk and power. For example, as illustrated in the next chapter, it was noted that teachers in senior positions or with stronger personalities dominated the discussion over their peers. These limitations could have prevented the actual realities from arising. Also, as the coding in this thematic analysis relied on repeated words, there was the danger that any short and brief answers would have narrowed the coding range and may have led to a false conclusion (Tracy, 2013).

Student questionnaires

The student questionnaire consisted of example statements to support the EAL (English as an Additional Language) students expressing their opinion because for the two Year 8 classes that took part in the intervention, about a third of the class were categorised in school as EAL students. The questionnaire aimed to gather students' perspectives on how effective they had thought each of the three differentiation strategies over the past eight weeks in helping them access learning.

Table 2: Questions in the Student Questionnaire

Questions in the Student Questionnaire
1-My classroom seating plan was effective in helping you access your learning.
2-The Progress-Tracking Sheets were effective in helping you access your learning.
3-My worksheets, explicitly designed for you, were effective in helping you access your learning.

There were several limitations considering the student questionnaire. The Likert scale had no comment boxes, therefore, additional or in-depth feedback was not encouraged. In retrospect, it was lucky that some students asked for paper copies of the questionnaire and on these students wrote additional comments.. Especially if the students did not understand or value the impact of their feedback (Lohr, 2008). There is a risk then that students' responses may have been inaccurate, and without further written feedback, it is not easy to triangulate data to confirm that what they had indicated on the Likert scale was, in fact, honest (Tracy, 2013).

Ethical Considerations

The CUREC 1A from the University of Oxford was submitted before the research began. When the university granted the CUREC, I sought permission from the Head of Science and Head of Maths to begin my research at school. I sent letters describing the research and emailed a copy to all participating teachers. In this document I explained the research aims and precisely what was expected by the teachers to take part. Teachers' consent was sought, and it was highlighted that participants had the right to opt-out at any time.

Richards (2014) warned in his research that practitioner research could affect teachers' self-confidence. Therefore, additional consent was sought to quote their speech in the research. Following the BERA guidelines (2018), the questionnaire and interview questions were designed and the data was stored in a way that would protect teacher and student personal data.

Approaches to Data Analysis

Table 6 outlines the approaches to data analysis for each research question. Qualitative data were coded to create themes (Tracy, 2013). The student responses to the Likert scale questions were plotted on a chart. The analysis captured students' and teachers' perspectives on whether the three

specific differentiation strategies used throughout the intervention period had widened the learners' participation.

Table 3: Approaches to data analysis

Research Question	Approaches to Data Analysis
What differentiation strategies did teachers perceive effective?	Qualitative data coded and themed
What were pupils' perspectives of the effectiveness of the intervention?	Quantitative analysis using a bar chart
What were teachers' perspectives of the effectiveness of the intervention?	Qualitative data coded and themed

There were many limitations attached to the thematic analysis. For example, after the literature review, I may cast my own speculations (Richards, 2014). Stemming from my belief that the three differentiation strategies must be successful from what I had read in the literature review, I had to be careful not to suspect teachers of having misused or not to have explored the differentiation strategies to their full potential when in fact, the strategies did not work. Albeit unintentionally, I may have looked to prove that the three differentiation strategies were effective while interpreting talk data (Richards, 2014). I was careful to separate facts and my interpretations to avoid my opinion emerging rather than what teachers and students actually said (Singer, 2008). I coded as much data as possible to avoid researcher bias (Tracy, 2013). This allowed room for statements opposing my belief to surface. The next chapter reveals findings and discusses how the findings support or oppose the various arguments drawn from the literature review (Richards, 2014).

Findings

This section unpacks what teachers and pupils said during the semi-structured interviews and questionnaires to draw out the findings.

Table 4: Research questions and corresponding data collection methods.

Research Question	Data Collection Methods
(Study A) 1-What differentiation strategies did teachers perceive as effective?	Semi-structured interviews. Audio recorded. n=8 teachers.
(Study B) 2-What were pupils' perspectives of the effectiveness of the intervention?	Questionnaire. n=60 students.
(Study B)3-What were teachers' perspectives of the effectiveness of the intervention?	Semi-structured interviews. Audio recorded. n=8 teachers.

Findings for RQ2

When the intervention had ended, the pupils responded to a questionnaire in writing utilising a Likert scale. The questionnaire strived to find out:

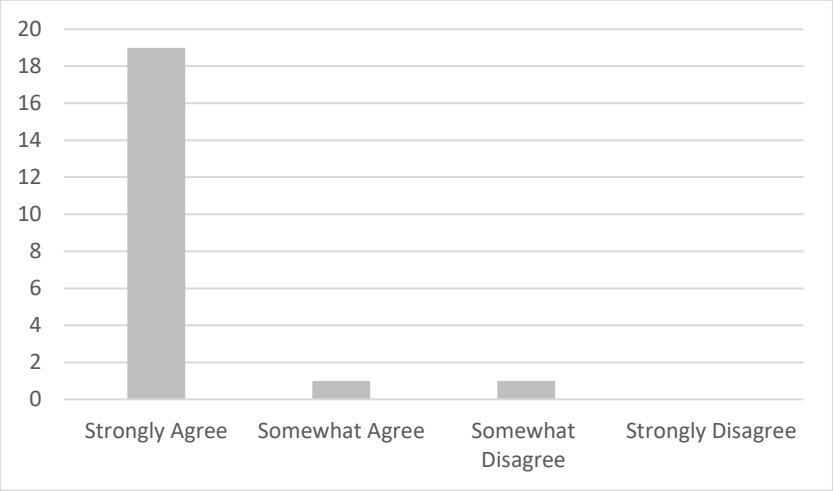
- *What were the pupils' perspectives of the effectiveness of the intervention?*

First, the pupils answered the following question:

- *To what extent do you agree that your classroom seating plan was effective in helping you access your learning?*

An overwhelming majority of pupils strongly agreed that where they sat in the classroom in relation to other students, and the teacher helped them access their learning. This perspective could argue that a seating plan is a compelling differentiation strategy, for example, the lower the pupil's attainment, the closer the pupil's proximity to the teacher.

Figure 1: The pupils' response to the question, 'To what extent do you agree that your classroom seating plan was effective in helping you access your learning?'



One student wrote additional comments underneath the Likert scale expressing that they could concentrate for longer, felt more cared for in their new place because their learning was less interrupted by the few students who usually misbehave, and had a clearer understanding of the tasks to complete.

One student wrote that they now had more opportunities to approach the teacher and the teacher offered more time. As a result, this student could engage in tasks and complete more tasks.

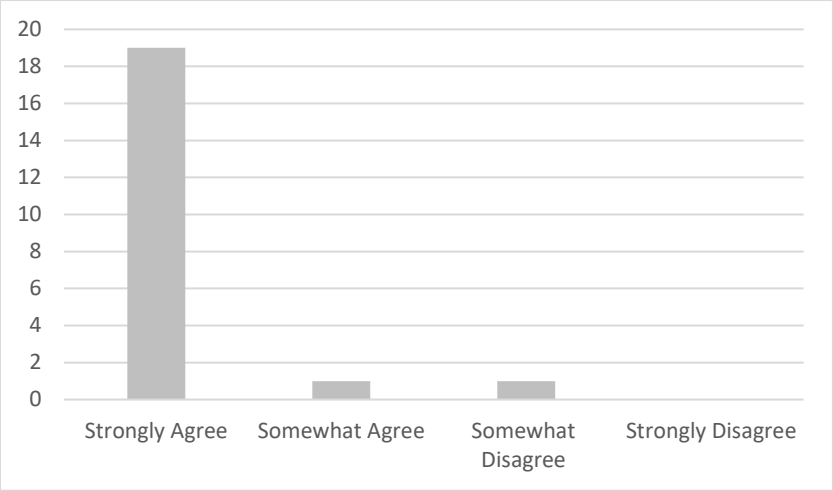
One student could not contain their enthusiasm for the seating plan, saying they could not complete more extension tasks! The student commented that they now had '*independence'* and '*freedom'*. They said they no longer had to help the person sitting next to them, which indicates that this student favours a streamed seating plan and does not favour a mixed-attainment seating plan.

The pupils answered the second question:

- *To what extent do you agree that the Progress-Tracking Sheets were effective in helping you access your learning?*

An overwhelming majority of pupils strongly agreed that the progress-tracking sheets were effective in helping them learn, suggesting that the progress-tracking sheet served as a compelling differentiation strategy.

Figure 2: The pupils' response to the question, 'To what extent do you agree that the Progress-Tracking Sheets were effective in helping you access your learning?'



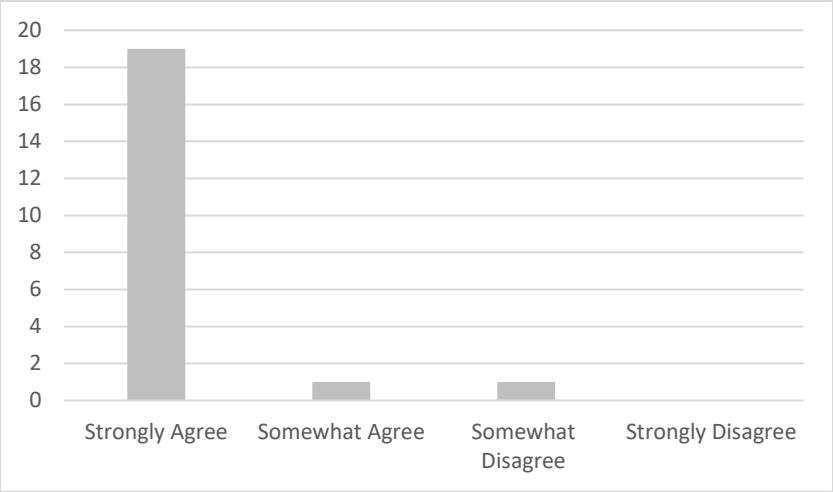
Just as before, some students wrote additional comments underneath the Likert scale. The comments expressed a range of views which were all positive. For example, pupils commented that the progress-tracking sheet helped them see their progress in action, engage for longer, complete more tasks and shift their attitude from negative to positive regarding their learning.

The pupils answered the final question:

- *To what extent do you agree that your worksheets, explicitly designed for you, were effective in helping you access your learning?*

Most pupils strongly agreed that their tailored worksheets effectively aided them in accessing learning. This perspective suggests that tailoring worksheets to suit pupils' current level of attainment was an effective differentiation strategy.

Figure 3: The pupils' response to the question, 'To what extent do you agree that your worksheets, explicitly designed for you, were effective in helping you access your learning?'



Once again, some students further commented. Again, their comments expressed a range of views which were all positive. One student said their worksheets had *'more tasks'* and *'difficult tasks'*, which was *'a good thing'*, suggesting that these tasks kept them occupied the whole lesson. They felt they had achieved more than they would have done without these worksheets. One student said their worksheet had *'larger letters, colours, and pictures'* and '*shorter questions... and tasks explained more simply'*. They said they *'felt sure'* they could complete most if not all tasks in their lessons. This student indicated that their attitude to learning had shifted from *'bad to hopeful'* because they began to experience a sense of accomplishment.

Findings for RQ3

The teachers also responded after the intervention had ended. The teachers gathered for a semi-structured interview. The questionnaire strived to find out:

- *What were the teachers' perspectives of the effectiveness of the intervention?*

First, the teachers answered the following question:

- *To what extent do you agree that your classroom seating plan was effective in helping your students access learning?*

Most teachers agreed that deploying a seating plan was an effective differentiation strategy. One teacher expressed their firm belief that the seating plans significantly improved classroom behaviour.

> [3] "I think deploying a seating plan for each class was a powerful differentiation

strategy."

[7] "For me, I think my seating plans helped with the differentiation."

[8] "I agree. I think the seating plans worked well. I very firmly believe that my carefully created seating plans have reduced bad behaviour in class."

Two teachers linked seating plans with their perceived increase in student engagement. One teacher had noticed that increasingly, their high-attainment students were achieving more tasks and engaging for longer in each lesson. The teacher linked this observation with improved classroom behaviour, led by the seating plan. Another teacher had noticed that increasingly, their low-attainment students were showing similar learning behaviours, such as engaging with their tasks for an extended period and completing more tasks in each lesson. This teacher linked their observation to the low-attainment students' proximity to the teacher. The teacher also said they could give out sanctions for disruptive behaviours more readily; due to the students misbehaving sitting close to them, the teachers could spot and give sanctions straightaway or prevent negative behaviours from escalating by offering help early.

[1] "I noticed more and more that my high-attainers were engaged for longer and achieved more tasks per lesson. I think it is to do with fewer classroom disruptions due to a good seating plan."

[3] "I observed something similar but for my low-attainment students, like spending more time on tasks and completing more tasks. I think it's because these kids were sitting closer to me. They [students sitting near the teacher] would be the ones that misbehave. Having them close by meant I gave out sanctions more promptly or help them early to prevent bad behaviours from escalating."

Most teachers agreed that deploying the progress-tracking sheets was an effective differentiation strategy.

[2] "I think the progress-tracking sheets were excellent too. Again, it proved to be powerful differentiation strategy."

[4] "Yes. The trackers helped a lot with the differentiation. The trackers were particularly good for the low-attainers."

Two teachers expressed that using progress-tracking sheets helped to build students' confidence. The first teacher said that the progress-tracking sheet had effectively supported their low-attainment students, although they did not explain why or how. The second teacher noticed that all students, regardless of their level of attainment, increasingly shifted their attitude to learning *'from negative or neutral to positive, if not eager'*. The teacher linked this observation to students monitoring their progress. For example, students crossed off the completed tasks before moving on to the next task. The teacher seemed very pleased with this outcome.

[4] "Yes. The trackers helped a lot with the differentiation. The trackers were particularly good for the low-attainers."

[7] "I agree. I think the tracking sheets worked well. I believe that these sheets helped build them [students'] confidence as they [students] crossed off their completed tasks before moving on to

the next one. All students, and more and more so as the intervention went on, shifted their attitude to learn from negative or neutral to positive, if not eager. Which was fantastic!"

Two teachers said the progress-tracking sheet exposed which tasks students achieved or struggled with the most, or repeatedly failed to complete. One teacher who previously stated that the progress-tracking sheets were helpful to the low-attainment students stated that these students most frequently and successfully completed the gap-fill activities with a word bank.

[4] "The trackers were particularly good for the low-attainers... the tracker showed me which tasks kids completed or wrestled with the most. Without fail, my low-attainers completed the gap-fill activities with a word bank, almost always completing them [gap-fill activities] correctly."

[2] "I think the progress-tracking sheets were excellent too. Again, it proved to be powerful differentiation strategy. It was an efficient way to find out what tasks they [students] repeatedly failed to complete."

Most teachers agreed that tailoring worksheets were an effective differentiation strategy.

[1] "I think tailoring worksheets was an excellent way to differentiate learning."

Two teachers explained that they tailored the worksheets to three levels of attainment to reflect the whole school's approach to categorising attainment. The three types of attainment levels were lower, middle, and higher.

[5] "I think so too [tailoring worksheets was an effective differentiation strategy]. Students almost always completed their worksheets because they [worksheets] were pitched better. I tailored mine to the lower, middle, and higher attainment because that's how the school categorises student attainment, to these three levels."

[6] "I experienced something similar. Tailoring the worksheets meant almost all of them [students] accessed learning. I also differentiated mine to low, middle and high-attainment levels."

Three teachers said the act of tailoring worksheets was very time-consuming. One teacher expressed their worry that it was not sustainable to tailor worksheets. However, one teacher intensely championed the need to continue this practice. This teacher argued that the tailored worksheets made marking books more meaningful as students achieved more, saving time in the long term.

[1] "I think tailoring worksheets was an excellent way to differentiate learning. It took much time to produce them [worksheets], though."

[5] "Yes. Rephrasing questions and giving hints to suit each level of attainment took time. So, I worry that this [tailoring worksheets] is not sustainable."

[6] "Yes, I agree that it takes time, but I really think we must continue to tailor our worksheets. Like I said before, tailoring the worksheets meant almost all of them [students] accessed learning. It made marking books more meaningful because my students achieved more. I think it [tailoring worksheets] would actually save us time in the long run."

One teacher linked the worksheets to improved classroom behaviour.

> [8] "It may be that the reduced classroom disruption is linked to the worksheets. I guess students engaged rather than played-up because the learning was accessible."

One teacher linked the worksheets to a general shift in students' attitudes to learning from negative to positive. They said this, in turn, shifted the teacher's attitude from '*despair to hope'*.

> [1] "I noticed that using them [tailored worksheets] shifted their [students] attitude towards their science lessons from negative to positive. And that, in turn, shifted my perspective from despair to hope. My attitude towards teaching them [students] become positive too."

Discussion

This section discusses the themes emerging from what teachers and pupils said.

Table 5: Research questions and corresponding themes emerging from the findings.

Research Question	Themes emerging from the findings
What differentiation strategies did teachers say were effective?	Teachers most commonly identified with three differentiation strategies.

What were pupils' perspectives of the effectiveness of the intervention?	Seating plans helped them access their learning. Progress tracking sheets helped them access their learning. Tailored worksheets helped them access their learning. Students reported their attitude to learning had shifted positively. Students reported a growth in self-confidence. Students positively responded to streamed seating plans.
What were teachers' perspectives of the effectiveness of the intervention?	Seating plans increased student engagement. A mixed review on seating plans reflecting student attainment. Seating plans fostered students' self-confidence. Progress tracking improved academic attainment. Progress tracking reduced disruptive classroom behaviour. Progress tracking led students to stay on-task for longer. Progress tracking led students to complete more tasks. Progress tracking allowed students to see their accomplishments, building their self-confidence. Tailored worksheets sustained academic progress, raising academic attainment. Tailored worksheets reduced disruptive classroom behaviour. Tailored worksheets led students to concentrate for longer. Tailored worksheets led students to stay on-task for longer. Tailored worksheets led students to work independently. Tailored worksheets stamped out misconceptions. Tailored worksheets improved students' self-confidence. Tailored worksheets may not be a sustainable practice because it is too time consuming. Mixed review whether it is worth spending the time to tailor worksheets considering the student benefits.

When teachers were asked what differentiation strategies, they perceived to be reliably effective, they most commonly identified with the following three strategies:

- Seating plans
- Tailored worksheets
- Progress-tracking sheet

Much education research supports this teacher perception (Doyle, 1983; Cordingley, 2004; Skilling et al., 2016; Fullan and Hargreaves, 1992; Timperley, 2010; Williams, 2002; Williams, 2018; Worth et al., 2017). For example, Cordingley (2004) found in their research that many disparate groups of teachers argued a strong case for using seating plans. This was despite their varying subject expertise. Teachers advocated for the use of seating plans after an evidence-based intervention suggesting that the seating plans successfully increased learners' participation. For example, Doyle (1983) reported as early as 1983 that many school teachers perceived classroom layout to have a paramount influence on students' behaviour and attainment, therefore, suggesting that teachers perceive seating plans as an essential tool to teach successfully.

Much education research, including research specifically reviewing science education in schools, reported that most teachers advocated for students to receive classroom work that was pitched to

their attainment level, particularly suggesting that teachers tailor students' worksheets rather than providing one worksheet for all (Carlson, 1990; Margayan et al., 2004; Childs and McNicholl, 2007; Doyle and Rosemartin, 2012; Edwards, 2014; Edwards, 2015; Wiliam, 2011; Wiliam and Leahy, 2015).

Much education research reported that teachers perceived a significant attainment increase for all students regardless of students' current level of academic attainment when students tracked their academic progress during the class, which involved using a tracking sheet (Claxton, 2007; Cowie and Bell, 1999); Doyle, 2015; EEF, 2017; Hattie and Temperley, 2007; Weiner, 1986).

The following themes emerged after evaluating students' perspectives of the effectiveness of the intervention strategies:

- Seating plans helped them access their learning.
- Progress tracking sheets helped them access their learning.
- Tailored worksheets helped them access their learning.
- Students reported their attitude to learning had shifted positively.
- Students reported a growth in self-confidence.
- Students positively responded to streamed seating plans.

Most students reported that the seating plans that were used for the consecutive eight weeks during the intervention helped them access their learning. This finding is not surprising considering much education research over many decades supporting this view (Doyle, 1983; Cordingley, 2004; Skilling et al., 2016; Fullan and Hargreaves, 1992; Timperley, 2010; Williams, 2002; Williams, 2018; Worth et al., 2017).

Most students reported that the progress tracking sheets used during the intervention helped them access their learning. Again, this is not surprising because much education research strongly argues that students being able to visualise the progress they are making or the satisfaction of ticking off tasks as they complete them motivates students to begin or continue with their learning (Weiner, 1986; Cowie and Bell, 1999; Claxton, 2007; Hattie and Temperley, 2007; Doyle, 2015; EEF, 2017).

Most students reported that the worksheets that were tailored to their attainment helped them access their learning. This is not surprising considering much education research that strongly advocates for the need for students to be offered tasks or questions that they can solve using their prior knowledge in order to begin or continue with their learning (Carlson, 1990; Margayan et al., 2004; Childs and McNicholl, 2007; Wiliam, 2011; Doyle and Rosemartin, 2012; Edwards, 2014; Edwards, 2015; Wiliam and Leahy, 2015).

Some students reported that their attitude to learning had shifted positively as a result of taking part in the intervention. It was unclear which differentiation strategy successfully positively shifted students' attitudes to learning. Such a view is supported by various literature. For example, Williams (2018; 2002) repeatedly argued that deploying a seating plan that the class teacher carefully planned, whether according to attainment or mixed, is most likely to lead to students experiencing a more positive learning environment in class. This is compared to the class not having a seating plan where, in such cases, friendships and peer pressure may dominate over learning and may play havoc unnecessarily, escalating disruptive student behaviours.

Some students reported growth in self-confidence as a result of participating in the intervention. It was unclear which differentiation strategy successfully led these students to perceive a rise in their self-confidence. However, such a view is supported by various literature. For example, Claxton (2007) and Hattie and Temperley (2007) repeatedly argued that students monitoring their academic progress using a form during class, such as using the progress-tracking sheet in school X, is a powerful and proven method where self-regulation leads to self-confidence and this, over time, is most likely to lead to self-motivation.

Some students showed high support for streamed seating plans as a result of taking part in the intervention. This is not surprising considering much education research that advocates for streamed seating plans, arguing that they are more effective than mixed seating plans. For example, Skilling et al. (2016) reported in their research that they witnessed that most students expressed strong support for streaming in subjects and preferred their seating plans to be streamed than be of a mixed attainment. Temperely (2010) reported a similar perspective from school children of a younger age group than Skilling et al. (2016) research but nonetheless, these children expressed a strong view again, favouring a streamed seating plan than mixed attainment.

The following themes emerged after evaluating teachers' perspectives of the effectiveness of the intervention strategies:

- Seating plans increased student engagement.
- A mixed review on seating plans reflecting student attainment.
- Seating plans fostered students' self-confidence.
- Progress tracking improved academic attainment.
- Progress tracking reduced disruptive classroom behaviour.
- Progress tracking led students to stay on-task for longer.
- Progress tracking led students to complete more tasks.
- Progress tracking allowed students to see their accomplishments, building their self-confidence.
- Tailored worksheets sustained academic progress, raising academic attainment.
- Tailored worksheets reduced disruptive classroom behaviour.
- Tailored worksheets led students to concentrate for longer.
- Tailored worksheets led students to stay on-task for longer.

- Tailored worksheets led students to work independently.
- Tailored worksheets stamped out misconceptions.
- Tailored worksheets improved students' self-confidence.
- Tailored worksheets may not be a sustainable practice because it is too time consuming. Mixed review whether it is worth spending the time to tailor worksheets considering the student benefits.

Most teachers reported that using seating plans, including both streamed and mixed attainment, increased students' engagement with their learning tasks. A positive response was expected, considering a firm belief that using seating plans was a powerful and proven tool to widen learner participation, as expressed by the majority of the teachers at the semi-structured interview prior to the intervention. As highlighted before, when discussing students' perspectives of the effectiveness of seating plans, there is much education research suggesting a direct link between teachers deploying seating plans, including both streamed and mixed attainment, and as a result, widening learners' participation (Doyle, 1983; Cordingley, 2004; Skilling et al., 2016; Fullan and Hargreaves, 1992; Timperley, 2010; Williams, 2002; Williams, 2018; Worth et al., 2017). It is curious then that teachers reported a mixed review on whether seating plans helped to raise student attainment. During the semi-structured interview post-intervention, some teachers expressed their firm belief that over time, due to the rise in student engagement, there will be a noticeable rise in student attainment. Some teachers were more reticent and simply expressed that there was no reliable evidence to claim that there was, or would be, an improvement in students' attaining higher grades or demonstrating a greater depth of knowledge, even though they acknowledged a noticeable rise in student engagement. Williams (2002; 2018) suggested a similarly mixed view among teachers when reporting back on what many school teachers said about having to try raising academic attainment through carefully considered seating plans. Williams (2002; 2018) could not conclusively suggest that seating plans had a direct link to raising academic attainment. However, he suggested that over time, it is most likely that the increased learner participation would translate into an increase in learners' attainment via many indirect ways. For example, it is exceedingly possible that a careful seating plan would allow students a safer and more productive environment for them to learn where they could escape peer pressure and access teacher support more readily (Williams, 2002), and this, in turn, would grow their self-esteem (Williams, 2002; Williams, 2018). Williams (2002; 2018) argued that this rise in self-esteem would develop self-regulation, which he argues are critical components to raising academic attainment as well as sustaining their attainment level. Many teachers in school X appeared to support this view, firmly believing that their seating plans fostered students' self-confidence.

Teachers expressed a common impression that there had been a rise in academic attainment due to students tracking their own progress during class. This perception was anticipated considering much education research strongly suggests a direct link between self-regulation and improved performance (Weiner, 1986; Cowie and Bell, 1999; Claxton, 2007). Another commonly expressed view was that progress-tracking reduced disruptive classroom behaviour. This perception was also

much anticipated due to Claxton (2007) and Hattie and Temperley (2007) reporting that many teachers saw their students deeply engrossed in tracking their learning or performance in order to achieve progress, no matter how small, and that this engagement deterred even their naughtiest students from disrupting the teacher and their peers. Some teachers expressed a view that progress tracking led students to stay on-task for longer. Education research supports this view (Claxton, 2007; Hattie and Temperley, 2007; Doyle, 2015), with Doyle (2015) offering a direct link between self-regulation and learners staying concentrated for longer. Claxton (2007) was careful to highlight that staying on-task included students engaged in completing their progress-tracking sheet, hence defining 'on-task' to have the practice of self-regulation as well as completing learning tasks. However, it was unclear whether the teachers in school X defined students as 'on-task' in this way. Some teachers expressed that students using progress-tracking sheets led them to complete more tasks during class. Much education research suggests a direct link between self-regulation and learners completing more tasks (Weiner, 1986; Doyle, 2015; Claxton, 2007; Hattie and Temperley, 2007). Claxton (2007) and Hattie and Temperley (2007) found that many teachers across the world, not just in Britain, divided large or complex learning tasks into smaller ones. This then raises the question, are learners completing more tasks or, in fact, are learners achieving one complex task at a steady pace? This would mean that the improvement is not in completing more tasks but rather, the improvement is in students staying on-task for longer. Some teachers expressed their view that progress tracking allowed students to witness their accomplishments and that such practice helped these students build self-confidence. There is ample education research suggesting that learners monitoring their own academic performance over time would lead to improved self-regulation and a noticeable boost in self-confidence (Weiner, 1986; Doyle, 2015; EEF, 2017).

Teachers expressed a common impression that tailored worksheets sustained their students' academic progress, helping to sustain students' academic output consistently at the higher attainment spectrum. Some teachers boldly claimed that their worksheets sustained academic progress and raised students' academic attainment to the next level. Education research supports this view that when learners are given accessible tasks, this maintains academic progress (Doyle and Rosemartin, 2012; Edwards, 2014) and, for some learners, rising levels of attainment (Edwards, 2015). Another common impression among teachers in school X was that tailoring students' worksheets reduced disruptive classroom behaviour. This was anticipated considering recent education research that draws a strong link between teachers pitching learning after carefully considering each learner's prior knowledge, with learners showing signs of improved attitude to learning (Doyle and Rosemartin, 2012; Edwards, 2014; Edwards, 2015). Some teachers expressed that tailoring worksheets led their students to 'concentrate for longer', 'stay on-task for longer' and 'work independently for longer'. These claims may be supported by Edwards's (2014; 2015) research findings which closely tie the act of teachers or lecturers pitching learning at a more accessible point to the act of the learners showing extended time spent on their learning. One teacher expressed a view that the tailored worksheets stamped out misconceptions. This teacher

referred to their painstaking act of reviewing each student's prior knowledge via pre-topic tests to tailor the subsequent classroom work. The teacher admitted that although this practice was time-consuming, it was a valuable opportunity for the teacher to correct miscommunication and misconceptions by tweaking the students' classroom work accordingly. Childs and McNicholl (2007) support this view, for they highlighted the importance of teachers checking learners' prior knowledge and tailoring work to make learning accessible. One teacher firmly believed that tailoring class work to individual students improved their self-confidence, which is supported by education research (Wiliam, 2011; Wiliam and Leahy, 2015). All teachers expressed that tailoring worksheets may not be sustainable because it was perceived as too time-consuming. There was a mixed view as to whether it is worth spending time to tailor worksheets considering the varying degrees of academic benefit this time-consuming practice brought students. The mixed view was not surprising, considering education research that reported other school teachers having similarly diverse opinions on whether tailoring work to suit every learner is time well spent for busy teachers (Wiliam, 2011; Wiliam and Leahy, 2015).

Conclusion

How can differentiation be used to improve learner participation and attainment for all students in School in Derbyshire? This practitioner research aimed to roll out an effective, coherent, and consistent differentiation strategy across the mathematics and science departments.

When teachers gathered to discuss what they perceived to be effective differentiation strategy, they most repeatedly expressed the following three as the method which they relied on, seating plans, tracking progress, and tailoring worksheets according to students' level of attainment.

The data drawn from the semi-structured interviews with the teachers, and online questionnaires with the students, were analysed using thematic analysis and a Likert scale to conclude that the three differentiation strategies were perceived effective by the teachers and their students. Both, the teachers and their students, indicated that the three differentiation strategies deployed for the intervention had increased student engagement and attainment positively, and moreover, a decline in disruptive classroom behaviour.

The next challenge will be to share the findings and ask for more extended teacher collaboration, involving inter-departmental collaboration, to seek ways for the three differentiation strategies to be used in other departments.

Findings against Literature

The findings of this study strongly support the claims from a wide range of literature that a seating plan is a powerful method for widening learner participation (Doyle, 1983; Cordingley, 2004; Skilling et al., 2016; Fullan and Hargreaves, 1992; Timperley, 2010; Williams, 2002; Williams, 2018; Worth et al., 2017) and growing learners' self-confidence (Williams, 2002; Williams, 2018). Teachers' views supported such direct links from their experience deploying seating plans. Teachers appear to favour the streamed seating plan where students of a similar level of academic attainment sit together as a group, with the low-attainment student groups sitting the closest to the teacher. Indeed, this agrees favourably with a range of literature over many decades that argues for streamed seating plans in class (Schon, 1983; Edwards and Mercer, 1987; Keiny, 1996; Worth et al., 2017). However, it was not clear whether this was a view by the small minority of dominant personalities driving such confidence behind this claim. Some teachers indicated that the mixed attainment seating plan was also effective according to their teaching experience, and there is an ample amount of literature that supports this view. For example, some literature argues that the streamed seating plans can make students feel embarrassed about their being perceived by their teacher and their peers as an under-achiever which, in turn, would drive down their self-confidence regardless of how many tasks they complete in class (Timperley, 2010; Williams, 2018). Therefore, a deeper exploration would prove to be very useful in the context of School X in order to propose a more precise, coherent and consistent seating plan strategy that can be rolled out across the whole school.

The findings also strongly support the view from a wide range of literature that students monitoring their own progress is a powerful method of widening learner participation (Weiner, 1986; Cowie and Bell, 1999; Claxton, 2007; Hattie and Temperley, 2007; Doyle, 2015; EEF, 2017). There is a strong suggestion that students monitoring their progress using a form such as a progress-tracking

sheet would see an increase in their learning engagement and attainment (Weiner, 1986; Cowie and Bell, 1999; Claxton, 2007). This claim appears to have led many teachers across the world to divide large or complex learning tasks into smaller ones (Claxton, 2007; Hattie and Temperley, 2007). Teachers in School X divided more extensive tasks into shorter tasks that took 5 – 10 minutes to complete and presented their students with a progress-tracking sheet. Students ticked off the tasks as they completed the set of short tasks. The teachers' and students' perspectives strongly support literature claims that progress-tracking reduces disruptive classroom behaviour (Claxton, 2007; Hattie and Temperley, 2007), leads students to stay on-task for longer (Claxton, 2007; Hattie and Temperley, 2007; Doyle, 2015), for students to complete more tasks (Weiner, 1986; Doyle, 2015; Claxton, 2007; Hattie and Temperley, 2007), and for students to improves their self-confidence due to seeing their accomplishments so readily (Weiner, 1986; Doyle, 2015; EEF, 2017).

The findings strongly support the view from a wide range of literature that tailoring questions and tasks to suit students' current level of attainment or prior understanding is a powerful method of widening learner engagement which sustainably increases the learner attainment over time (Carlson, 1990; Margayan et al., 2004; Childs and McNicholl, 2007; Wiliam, 2011; Doyle and Rosemartin, 2012; Edwards, 2014; Edwards, 2015; Wiliam and Leahy, 2015). Teachers tailored worksheets into three tiers, low-, mid- and high-attainment levels to be in line with the school's streaming policy. Teachers' and students' feedback appear to strongly support the literature claims that deploying tailored worksheets reduces disruptive classroom behaviour (Doyle and Rosemartin, 2012; Edwards, 2014; Edwards, 2015), leads students to stay on-task for longer (Edwards, 2014; Edwards, 2015), concentrating for longer (Doyle and Rosemartin, 2012), growing independence (Edwards, 2014; Edwards, 2015), and sustains academic progress (Doyle and Rosemartin, 2012; Edwards, 2014) with rising levels of attainment (Edwards, 2015) and stamping out misconceptions (Childs and McNicholl, 2007), and this, in turn, would allow for growing self-confidence (Wiliam, 2011; Wiliam and Leahy, 2015). Teachers' views support the general view, as suggested by the various literature findings, whether tailoring worksheets was a sustainable practice and if it was worth the struggle because it was time consuming to tailor worksheets (Wiliam, 2011; Wiliam and Leahy, 2015). Therefore, a deeper exploration would be necessary before suggesting a roll-out to measure teachers' honest views as to whether this is a worthwhile and sustainable differentiation practice or not.

Wider Implications

The study suggests a few broader implications. The teachers' CPD programme in future could serve as a test bed to gauge if the three differentiation strategies explored in this study (seating plans, progress-tracking sheets and tailoring worksheets in line with students' current level of attainment) are worth vigorously pursuing. For example, another eight weeks of the same intervention followed by student and teacher feedback could help to confirm if success could be replicated. If the second intervention replicated such positive feedback, this would then allow the

heads of STEM departments to approach other departments with greater confidence when suggesting that other departments try using seating plans, progress-tracking and tailoring worksheets in accordance with student attainment. Over time, this, in turn, would allow the whole school to have a coherent, consistent method of deploying differentiation as per the original ambition behind this practitioner research.

Another idea would be to explore other methods of differentiation beyond the three methods explored in this study. Other departments could be invited to conduct a similar study consisting of a similar format where an eight-week intervention would be followed by student and teacher feedback. This would increase the pool of differentiation methods, allowing greater freedom for teachers from the various departments to select what they see as most fitting. It may be that the seating plans, progress-tracking or tailoring worksheets do not work as well for a creative-arts lesson, and if so, other differentiation methods must be explored and added to the pool.

Next Step

Through this whole process I have learned that it is possible to facilitate learning effectively to all the pupils in a mixed ability classroom. Differentiated learning could be facilitated by combining more than one differentiation strategies to make the learning easier and enjoyable for the pupils in the classroom. I will be using the combination of these three strategies explore in this study in the near future and will continue to explore other differentiation strategies to improve the attainment of my pupils. Sometime it takes a little more time but the long term benefits are substantial.

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