

**GROUPWORK AND FEEDBACK: DOES THE
INTRODUCTION OF GROUP AVERAGE
FEEDBACK IMPACT ON STUDENT OPINION OF
GROUPWORK IN A MATHEMATICS CLASS?**

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**A RESEARCH & DEVELOPMENT PROJECT
SUBMITTED FOR THE
MSc LEARNING & TEACHING 2017**

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Abstract

From a mathematics teacher perspective, group work is an invaluable learning tool which allows for discussion and sharing of ideas and methods with peers and friends. However students can appear not to share our affinity for group work, often complaining of unfair distribution of workload and competition within groups. To investigate the impact of individual accountability combined with group reward incentive (Boaler, 2008; Johnson and Johnson, 2008) on student opinion on group work within the mathematics classroom, an intervention was implemented in which students were placed in heterogeneous ability groups for a term with individual assessment results contributing to a group average result at the end of the term.

This intervention utilised the STAD (Slavin, 1983;2015) method of collaborative teaching and learning by utilising group average feedback to improve and encourage cooperative learning with groups in maths lessons. No group work teaching strategies such as Jigsaw or pre-coaching were utilised in the period in which students were working in these groups and students were not encouraged to learn or interact in specific ways within their groups to limit alternative influences on student opinion. The intervention was implemented with two classes and student opinion was evaluated using a sequence of questionnaires. Interviews were also utilised to further analyse and evaluate student opinion on group work. The findings suggested this intervention had an impact on student opinion but to ensure a positive impact additional teaching and learning strategies should also be undertaken.

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Chapter 1: Introduction

1.1: Context

1.1.1: Personal context

From a mathematics teacher perspective, group work is a valuable teaching tool which encourages collaboration on interesting problems, discussion about mathematical ideas and misconceptions and a forum to test out ideas without the pressure of a large audience or the judgement of a teacher. It would appear however that student opinion on group work may differ. 'Miss they won't let me talk' or 'Miss he/she isn't doing anything' were common phrases in my classroom when I employed cooperative learning strategies and from discussion with my colleagues I realised this was also the case elsewhere. Where we see an opportunity for peer support and rich mathematical discussion, student experience can depend on the social dynamics within a group and their own confidence, mathematically and socially.

1.1.2: Department context

Within my maths department, our focus over the past couple of years has largely been on feedback, more specifically feedback to termly learning reviews. We have implemented a department wide policy on learning review feedback, removing marking on the papers themselves and introducing colour coded feedback sheets to allow students to focus on specific areas of strength and targets for improvement. An entire lesson is then dedicated to students working in groups using their test paper and feedback sheets to interrogate and analyse both their own work and the work of peers to identify mistakes and misconceptions. While the new feedback system itself

has been accepted and embraced by both staff and students, the ensuing feedback lesson has had teething problems. Staff have admitted feeling a loss of control over the feedback while students can struggle to engage in or see the importance of the peer interaction, valuing the teacher's opinions over those of their peers.

Furthermore, statements such as 'how many greens did you get?' and 'I got more greens than you' are reportedly starting to creep into discussions, detracting from the very essence of our feedback system - removing the competition and comparison of grades and marks. It seems necessary then, to ensure students understand and appreciate the many benefits of working in groups while also removing the competition and comparison elements which have dominated in the past.

1.1.3: School context and wider

Previously, feedback was identified as a school wide priority on the school improvement plan with feedback policies devolved to individual departments to ensure feedback was subject specific and appropriate. In our most recent teaching evaluation window however, student ownership over their learning and evidence of metacognition was observed as lacking in most lessons. When metacognition and student ownership were identified within a lesson, students were often working together to analyse and discuss their work and ideas. While using group work to enable student self-evaluation and reflection is an important motivation behind our feedback system design in our maths department, I believe this may not be happening in all cases, primarily due to negative or passive opinions and motivations in student groups. According to the Ofsted report 'Teaching, learning and assessment in further education and skills – what works and why' (2014), within outstanding lessons 'when using group work, teachers agree the protocols with the learners, state the expectations and encourage self- and peer-evaluation by learners

of the outcomes'. To ensure the latter is occurring we need to feel confident that our students display self-awareness of their learning within a group situation but crucially, that they are motivated to engage and contribute with this learning, either by helping others or using others to ensure their own progression.

1.2: Collaboration

Within my department, we are fortunate to have a collaborative practice coordinator who organises weekly research sessions in which we share new research and areas of current focus. These sessions have proved invaluable throughout this research project as I have been in regular contact with maths teaching staff who are engaged in research and eager to offer support and opinions. My Head of Department and Assistant Headteacher for teaching and learning have been an excellent source of advice and have been my sounding board on many occasions. My Head of Department has shown great interest in the research I have been conducting and is interested in implementing the intervention across the department in the future. I have shared my research with the whole staff body and senior leadership team at a research based inset day and offered a follow up drop in session where over twenty staff came to speak to me about implementing this group average feedback system in other subjects, having encountered similar issues as my colleagues and I when utilising group work in lessons. Through the Oxford City Learning (OCL) group, I have also had the opportunity to share my research and findings to local senior leadership representatives across the OCL partnership. Their questions and feedback proved invaluable as this experience forced me to further think outside my subject, department and school. Similarly, numerous opportunities to collaborate with other researchers within OUDE ensured I was regularly interrogating my findings and

strengthening my argument in response to questions and suggestions from research colleagues. These opportunities to share and collaborate has ensured I have remained focused throughout this project, despite other possible avenues for exploration opening up at various points in the project.

1.3: Rationale:

Through interrogation of the literature on cooperative learning and group work, I researched the different models of group work, as well as strategies to maximise student contribution and motivation. From my research of the literature, I designed an intervention based on Slavin's model of cooperative teaching and learning, Student Team-Achievement Divisions (STAD) (1983) and inspired by Boaler's research, 'Promoting Relational Equity' (2008) on the effect of group work on student relations. Students were placed in groups of three to four for a term and assessed individually at the end with individual marks contributing to a group average result for the group. As our department feedback policy provides students with colour coded feedback rather than a numerical result, this paper will refer to group average feedback as the combination of students individual assessment results. Students were aware throughout the term that their individual end of term learning review results would contribute towards their group's overall feedback. Student opinion on group work before, during and after the intervention was analysed through the use of online questionnaires. The data was collated and the research cycle was repeated with another class with some alterations to ensure rigorous data collection. Follow up interviews were conducted to further investigate student opinion. Throughout this cycle of research, intervention, questionnaires and interviews I have ensured my research questions have underpinned all actions taken.

1.4: Research Questions

Throughout this study I have considered the following questions:

- What are my students' opinions on group work?
- Does the introduction of the knowledge of group average feedback have an impact on students' opinions of group work?
- Does the introduction of group average feedback following a learning review have an impact on students' opinions of group work?

Chapter 2: Literature Review

2.1: Why is group work used in classrooms?

While teamwork and the ability to collaborate have long been highly valued in the working world, group work was largely unheard of in classrooms until the mid 1960's when specific training was provided to trainee teachers in the University of Minnesota on effective use of small group teaching (Johnson & Johnson, 2009), with education previously favouring the use of individualistic learning and competitive incentives (Johnson & Johnson, 2008). The term group work can be loosely defined as the 'physical placement of students into groups for the purpose of learning' (Lou et al, 1996) and is often misinterpreted by teachers to include any instance whereby learners are seated in small groups within a classroom situation and appear to be working together. For the purpose of this research project, the term group work may be interpreted as cooperative learning referring to students working in small groups to both help each other learn and work towards a common goal (Slavin, 2015; Artzt, 1997). The terms cooperative learning and collaborative learning will also be used interchangeably, as in *The International Handbook of Collaborative Learning* (2013) whereby the two definitions are clarified in the foreword as a relationship between learners with an emphasis on 'mutual influence and equality of participation' (O'Donnell and HMelo-Silver, 2013; 2). This distinction between students working on a task while seated in small groups and actually working together towards a collective objective and collaborating on the work is exceptionally important and is a distinction which needs to be understood by both teacher and student. Teachers who have failed to make this distinction are suspicious of group work and can encounter a perceived loss of control when allowing students to discuss tasks together, (Boaler,

2008; Pell et al, 2007) perhaps because tasks, groups and instruction have not been chosen or designed with cooperative learning in mind, indeed Lou et al (1996) describes numerous reasons why whole class instruction may be favoured by teachers, including time saving preparation time and a fixed pace throughout the lesson.

Vygotsky (1978) highlights the importance of collaboration and cooperative learning in a child's development offering the zone of proximal development as an alternative measure of development to the widely accepted and assessed measure of a child's currently completed cycle of development. Instead, the zone of proximal development can be defined as 'the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving in collaboration with more capable peers', (Vygotsky, 1978: 86). This experience of learning invites students to identify areas in which they perceive they need help and do so by receiving ideas and hints from peers within their group instead of relying on the teacher to progress. Furthermore students can often provide more accessible explanations than the teacher having shared the learning experience therefore possessing a greater awareness of the misconceptions and can translate new definitions into a simplified, shared vocabulary (Webb & Farivar, 1994). Gillies and Ashman (2008) found that when students became accustomed to helping and teaching each other in small groups they also developed an awareness of when their peers required assistance and implicitly provided this learning experience immediately in contrast to the delayed reaction the teacher may experience.

Classrooms are becoming ever more diverse with a broad spectrum of educational needs, ethnicities, languages and economical background commonplace in most schools resulting in a need for teaching and learning to be inclusive and responsive. Group work and cooperative learning can allow diversity in teaching and a greater flexibility in pace and content taught within each lesson (Lou et al, 1996). Aside from being a significant measure of a child's development, cooperative learning can alter and improve both student relationships within the classroom and attitude towards the subject by encouraging communication, respect and sharing of ideas (Boaler, 2008) as well as 'removing artificial barriers and prejudices created by ignorance and familiarity' (Artzt, 1997:3). Lou et al (1996) found that all ranges of ability students learned significantly more in small group learning situations including students with special educational needs (Johnson and Johnson, 1984) while Cohen (1994) praises cooperative learning as a teaching strategy for its ability to not only increase learning achievement but for developing 'higher order thinking skills, prosocial behaviour and interracial acceptance' (Cohen 1994). In her 2008 study, 'Promoting Relational Equity' Boaler investigated the connection between a mixed ability cooperative learning teaching approach and a significant improvement in student relationships within diverse cohorts in 3 Californian high schools. By placing students in groups while emphasising student responsibility to ensure all members of a group understood the mathematical concepts and tasks introduced by the teacher, students began to embrace a classroom environment in which students learned collectively rather than individually and as a result, treated each other more respectfully (Boaler, 2008). Students in this study described their maths learning as a social activity, with each group working towards a collective goal despite previously perceived social barriers while also experiencing an increased sense of responsibility

for their own and others' learning. While Boaler investigated the influence of cooperative learning with small groups on student relationships, Johnson and Johnson (1985) focused on inter-group cooperative learning as a means to improve cross-ethnic relations within diverse classrooms. Students were placed in one of two situations, the first involved students within groups working towards achieving a high whole class score, while the second involved groups competing against each other for the highest score. The results of this study implied that while cooperative learning within small groups resulted in improved cross-ethnic relations, cooperative learning involving groups helping other groups showed further strengthening of these relationships within the classroom. 'Social interdependence exists when the outcomes of individuals are affected by their own and others' actions' (Johnson & Johnson, 1989) and is one of many positive outcomes when group work and cooperative learning is established effectively within a classroom.

2.2: What does an effective collaborative group look like?

As previously discussed, simply placing students into groups and expecting them to work together will not necessarily result in a cooperative learning environment. There are many ways to organise groups, Johnson and Johnson (2004) highlight four possible categories: pseudo-learning groups, traditional classroom learning groups, cooperative learning groups and high performing cooperative learning groups.

Pseudo-learning groups and traditional classroom learning groups are often seen in classrooms where group work is considered a method of classroom organisation or for ease of differentiation (Lou et al, 1996) and are made up of individuals who are either competing against each other within their groups (pseudo-learning groups) or interacting only to clarify instructions rather than learning (traditional classroom

learning groups). In contrast, students working in cooperative learning groups and high performing cooperative learning groups are dedicated to the learning of their group as a whole and are distinguished from each other only by the outperformance and outstanding commitment to the group in the latter (Johnson and Johnson, 2004). For these cooperative learning groups to be successful, the teacher's role is incredibly important and should include: making pre-instructional decisions, explaining the instructional task and cooperative structure, monitoring students learning and intervening to provide assistance and assessing students learning. (Johnson and Johnson, 2008). I will initially focus on the importance of pre-instructional decisions, that is, deciding on the size and student make up of the groups.

2.2.1: Group Size

Lou et al (1996) found that while students achieve more when working in smaller groups than in whole class groups, this achievement is influenced by numerous factors, including group size. 'The optimal group size is three to four members because the group was too small for any members not to participate' (Gillies, 2003), a statement which is echoed in Artzt (1997). Artzt (1997) also mentions while students often drift to working in pairs as this can be a common way of working in classrooms, these students are a disadvantage due to the limited interaction which can take place. Conversely, Lou, Abrami and d'Apollonia (2001) found in their meta-analysis of 122 studies, that students working in pairs performed significantly better individually than when working in groups of three to five. It appears then that pair work seems to fall into the aforementioned traditional classroom learning group (Johnson and Johnson, 2004) whereby students are working towards an individual learning goal, albeit together. However, group performance was significantly better when working in a larger group than working in a pair indicating that completing a

group task in a larger group is preferable, (Lou, Abrami and d'Apollonia, 2001). Kooloos et al (2012) reported in their analysis of 27 groups of 15 students that students significantly preferred working in further sub-groups of 5 as opposed to their larger group of 15 and furthermore, that when in these sub-groups, students preferred working towards a common goal with the remainder of their larger group to working towards the same goal while feeling in competition with other groups. While the ideal number of students per group is not exact, 'groups must be small enough to need everyone but large enough to permit a diversity of ideas and skills' (Artzt, 1997), and ultimately, the size of the group will determine whether students are limited in opportunities for collaboration in a group which is too small, or restricted from forming a collaborative vision in a group which is too large (Dennen and Hoadley, 2013) and therefore needs to be given careful consideration by the teacher.

2.2.2: Mix of students

Group composition has a significant impact on the success of cooperative learning and is usually determined based on ability or diversity whether that be heterogeneously or homogeneously (Artzt, 1997;Cohen, 1994; Dennon and Hoadley, 2013; Webb, 1994). Heterogeneous ability groups are often advocated due to the positive impact on low achievers from collaboration with higher achieving students (Cohen, 1994), possibly due to the previously discussed research showing students often learn more through peer teaching of new material. Peer teaching may also occur within homogeneous ability groups as the zone of proximal development will differ between learners even of similar ability requiring learners to support each other (Dennen and Hoadley, 2013). Perhaps consequently, higher ability students have been found to perform better when working in homogenous ability groups, however when working in heterogeneous ability groups, composition of these groups did not

negatively affect the performance of high ability students (Webb et al, 1998). The following dilemma is important to consider: 'the performance of high and low ability students can not be optimized at the same time', (Webb et al, 1998; 643) however, Webb (2013) discusses her subsequent studies whereby it was found that when high-ability students performed better in homogenous ability groups than heterogeneous ability groups, this was due to the quality of group functionality rather than the composition of the groups and that the composition of cooperative learning groups should be secondary to the coaching and preparation of students for group work and providing structure for learning within these groups. Furthermore, whether students are organised homogeneously or heterogeneously their learning within a group depends on their ability to identify areas of weakness and strength within the group and collaborate to share expertise and ensure progress in learning (Borthick and Jones, 2003). Groups may also be formed heterogeneously or homogeneously based on ethnicity, age or economic status which, as previously discussed (Boaler, 2008:Johnson and Johnson, 1985) when groups were composed of culturally diverse students, cross-cultural relationships were developed and improved within the classroom. From an organisational standpoint, teachers may also wish to consider pace of the lesson and ease of organisation within the classroom when deciding on group composition (Artzt, 1997).

2.3: What motivates students to collaborate in group work?

Slavin (2015) identifies four possible theoretical perspectives on the achievement effects of cooperative learning : motivationalist, social cohesion, cognitive development and cognitive elaboration. Cognitive theorists focus primarily on student interaction and the influence of these interactions alone on learning, regardless of

task, assessment or teacher involvement (Slavin, 2015), however the emphasis on peer teaching within the domain of cognitive elaboration, as previously discussed (Gillies and Ashman, 1996) is a valuable teaching and learning tool. While cognitive perspective studies on cooperative learning tend to show positive effects on achievement in group work (O'Donnell, 2000), there are many variables such as the aforementioned task, assessment and teacher input structures which are not often accounted for (Slavin, 2015). Kempler et al (2013) have focused on the conflicts and consistencies between motivationalist and cognitive perspectives specifically on achievement goal theory and social cognitive theory. From their discussion of social cognitive theory it is evident that while student self- efficacy is essential to improving collective efficacy, it is also imperative to consider the experiences provided to students to allow for this development (Kempler et al, 2013). Perhaps the most significant conflict exists between motivationalist and social cohesion perspectives despite agreement in motivational explanations rather than cognitive explanations for achievements in cooperative learning (Slavin, 2015). Social cohesion or 'positive interdependence' increases learners' feelings of responsibility for the performance of the group (Johnson and Johnson, 2008) and therefore, should in its own right encourage students to achieve within their group with the process of group work and collaborative learning the reward (Cohen, 1994). Methods of cooperative learning which encourage social cohesiveness include the Jigsaw method created by Elliot Aronson in 1978 (Slavin, 2015) in which students study material in 'expert groups' returning to their base groups to disseminate what they have learned, further encouraging Johnson and Johnson's positive interdependence (2008) and therefore requiring it absolutely necessary for students to collaborate and help one another to achieve. Conversely, motivationalist perspectives prioritise task motivation, in

particular, requiring group members to achieve as a group to receive rewards or goals. The necessity of whole group participation to achieve can result in a decline of 'boffin' culture, in which high achievement is negatively viewed as noted in Pell et al (2007), whereby attitudes towards group work were analysed following an increase and improvement in the use of cooperative learning across a secondary school showing a decline in the 'anti boff social culture' as well as an increase in 'liking for group work'.

Despite the discord between motivationalist and social cohesive theories, Boaler's study 'Promoting Relational Equity' attempts to reconcile the two, initially promoting the social responsibility of students for their group members' learning while reinforcing this importance with group rewards in the form of grades. Similarly, Johnson and Johnson (2008) highlight the increased social responsibility felt by group members to perform well when group and individual accountability are introduced. While group accountability is increased when the group is assessed based on their overall group performance, individual accountability exists when the group is assessed on individual performances contributing to a combined overall result (Johnson and Johnson, 2008). Boaler (2008) assessed groups using both group and individual accountability but rather than students contributing towards a combined overall result, one student's paper was graded and the grade achieved on this paper would be assigned to all members of the group, therefore heightening both group accountability for the progress of each group member and individual accountability for performance on the assessment. 'Use of group goals or group rewards enhances the achievement outcomes of cooperative learning if and only if the group rewards are based on the individual learning of all group members'

(Slavin, 2015;8). To fully achieve both motivational and social cohesion perspectives on student motivation to cooperate in groups, the use of a group result based on the average of individual learning performances both ensures students want to achieve but also feel a social responsibility for the learning of their group members (Slavin, 1983). Group accountability or individual accountability alone are not sufficient for students to feel a social responsibility for their group members or an intrinsic motivation to succeed in their task or assessment, it is apparent that a combination of both are necessary to achieve optimal motivation to cooperate.

Student Teams-Achievement Divisions (STAD) from Slavin (1983) is a cooperative learning strategy which encapsulates the aforementioned combination of group and individual accountability in which heterogeneous ability groups initially master content as a group, supporting and encouraging each other before being assessed individually and receiving a group average from the results of these individual assessments. This is in contrast to the common method of assessing collaborative learning based on one collectively completed task or assessment which can be both inequitable because of the inevitable variety in group compositions and uncertainty in individual contribution to the overall result (Van Aalst, 2013). Group assessment can also result in 'social loafing', whereby students allow other group members to complete a larger share of the work due to this uncertainty in individual contribution although this social loafing effect can also appear when individual accountability is present, primarily due to an increase on group size; the larger the group, the more opportunities for unequal work distribution to occur (Johnson and Johnson, 2008). Boaler also identifies social loafing as a potential problem with group work, 'with

some students doing more of the work and others choosing to opt out or being forced out of discussions (2008;4)

2.4: What do students think about group work?

A study by Pell et al (2007) on the attitudes of adolescents in secondary schools introduced group work as a possible teaching and learning strategy to improve student attitude and willingness to contribute and collaborate in lessons. From this intervention, they found that a positive attitude towards group work was associated with 'high achievement and academic satisfaction motivation, low anti-school emotions, low anxiety, high extraversion and low passivity' (Pell et al, 2007;322). These traits associated with enjoyment of group work are also emphasised by Webb who refers to 'energetic, outgoing and extroverted' (2013;31) as personality traits associated with increased participation in group work. Pell et al (2007) makes reference to a paper by Entwistle, in which it is suggested that anxious students prefer more structured tasks and assessments over more open ended problems when working in groups which would further reinforce the advantages of STAD as a method of assessment over a group result to a collective product. Boaler found when interviewing students on their mathematical work in groups that while many students worked in groups, they viewed their learning as an 'individual and competitive endeavour' (2008;15) however these opinions changed greatly following the group average intervention discussed previously. Conversely a study by Chapman (2010) analysed the opinions of business school tertiary students towards group work and concluded that students felt more positively towards the use of group work in assessment than the faculty members who assigned them to work in this way,

showing an appreciation for the effectiveness and usefulness of group work which may indicate that maturity may be a factor in student's opinions of group work.

Chapter 3: Methodology

3.1: Description of the Intervention

To investigate the impact of individual accountability combined with group reward incentive (Boaler, 2008; Johnson and Johnson, 2008) on student opinion on group work within the mathematics classroom, an intervention was implemented in which students were placed in heterogeneous ability groups for a term with individual assessment results contributing to a group average result at the end of the term. This intervention utilised the STAD (Slavin, 1983;2015) method of collaborative teaching and learning by utilising group average feedback to improve and encourage cooperative learning with groups in maths lessons. No group work teaching strategies such as Jigsaw or pre-coaching were utilised in the period in which students were working in these groups and students were not encouraged to learn or interact in specific ways within their groups to limit alternative influences on student opinion. The intervention was implemented with two classes, 7S1 and 9S3 and student opinion was evaluated using a sequence of questionnaires. Following the results of the intervention with 7S1, alterations were made to the questionnaire before implementing with 9S3. Interviews were also utilised to further analyse and evaluate student opinion on group work.

3.2: Research Design

Elliot (1991:69) defines action research as ‘the study of a social situation with a view to improving the quality of action within it’, a definition I have applied within my own action research with a mixed methodology approach, specifically utilising Elliot’s interpretation of Lewin’s cyclical model of action research (Ivankova, 2014). Originally I intended to complete one cycle of action research but instead allowed

reflection and evaluation of cycle one to influence a second, slightly altered cycle. My research questions were centred around the evaluation of student opinion throughout the intervention and so it was necessary for each student to complete the questionnaire a total of three times. The initial questionnaire evaluated student opinion on group work before the intervention with the same questionnaire circulated following the introduction of the intervention. There is an important distinction to be made between research questions 2 and 3; does student opinion differ between acquiring the knowledge of the group average feedback intervention and the actual process of receiving and evaluating this feedback. A final questionnaire was completed a couple of weeks after students had received their group average feedback on their learning reviews and had evaluated their work and results as a group before returning to their normal seating plan and normal way of working. When this cycle of action research was completed and evaluated with the first sample group, it became apparent that alterations needed to be made to the questionnaire and so, in keeping with Elliot's action research cycle as described in Thomas (2013), I used these reflections to make alterations and run the cycle again with a second sample group.

3.3: The Sample

The intervention was implemented with two classes 7S1 and 9S3, each over 1 term of 8 school weeks. Within our department students are set from years 7-11 based primarily in year 7 on year 6 SATS results with subsequent set changes occurring based on teacher recommendation and student performance on learning reviews. Each year group is timetabled in two parallel halves grouped in 3 sets with a fourth 'intervention' group on one side of the year. 7S1 is one of two parallel top sets in year 7 comprising of 30 students with 12 females and 18 males. There are no

special educational needs, lower prior attaining or pupil premium students in this group and very few behavioural issues. Parental involvement within this group is considered high and many were classified as 'gifted or talented' in maths in primary school. 9S3 is one of two parallel third sets in year 9. There are 18 students in this class consisting of 13 females and 5 males. 11 of these students are lower prior attaining students with the remaining 7 classified as middle prior attainment. Of the 18 students, 6 students have special education needs 3 of which fall under the category of communication and interaction while the other 3 students are diagnosed with social, emotional and mental health needs. While there are no overt behavioural issues, disengagement and lack of mathematical confidence are issues which are apparent with many students in this class. While there does not exist a mix of higher, middle and lower prior attaining students as classed school wide within 7S1 and 9S3, references will be made to these categories within the context of each individual class. The decision to implement the intervention of group average feedback with these particular groups was largely due to practicality. As the department mentor for interns it was important to choose classes with whom interns would not be placed throughout the year to avoid confusion when collecting data. As such, I am the only maths teacher of these students and have taught both classes since September.

3.4: Composition of Groups

The impact of group composition on the effectiveness and student enjoyment of group work is well documented and discussed in the literature review (Boaler, 2008; Johnson and Johnson, 1985; Cohen, 1994). From analysis of the literature I chose to place students in heterogeneous ability groups, as much as possible within classes which are already set based on prior attainment. Based on the class numbers, in

7S1 students were placed in six groups of four students with two groups of three students while 9S3 were divided into six groups of three students to ensure groups were small enough to encourage full participation from members but not large enough that social loafing would be possible (Slavin, 1983). The classroom was organised so students were sat in their groups each lesson with little opportunity for cross-group communication.

3.5: Questionnaire Design

Student questionnaires collected both qualitative and quantitative data with follow up interviews collecting further qualitative data. The questionnaires were created, distributed, answered and data analysed via the Google Forms programme. As a school, all staff and students are automatically registered with a Google account and as such have access to associated programmes which allowed the questionnaires to be created and distributed with relative ease amongst the sample. I received feedback on the questionnaires prior to distribution from a colleague who is also completing an action research project. He agreed with my choice to utilise both closed and open questions. The questionnaire was split into three sections each of which evaluated essential aspects of student opinion (Appendix 3). Section 1 evaluated how often students worked in groups both in maths and other subjects by asking students to choose 'sometimes, rarely or never' as well as choosing the subjects in which they felt group work was useful from a list. Section 1 was included only in the pre-intervention questionnaire following comments from my colleague as he and I felt responses to these questions would remain consistent throughout the intervention. Section 2 comprised of 9 statements evaluated by the students on a 5 point Likert scale. Language within these statements was as simplified as possible and a neutral balance of positive and negative statements presented to avoid bias as

students may try to identify the 'correct' answer (DeLeeuw, 1992). Section 3 provided the opportunity for students to expand on their responses to section 2 by asking students to complete the sentences 'Sometimes I enjoy group work because' and ' Sometimes I do not enjoy group work because'. Questionnaires were completed individually in lesson time within a time limit with no incentive to complete faster than their peers and were re-distributed mid and post intervention for comparison of opinion.

Following the implementation and evaluation of the intervention with 7S1 and in keeping with my cyclical action research design, the questionnaire was revised before distribution to 9S3 (Appendix 4). Questions 1 and 3 in section 1, 'How often do you work in groups in 'school name' and 'How often do you work in groups in your maths lessons', were evaluated as unnecessary as they provided no information required for analysis of student opinion. Question 2, which asked students to indicate the subjects in which they felt group work was useful remained as the only question in section 1. Sections 2 and 3 remained the same with an additional section 5 added in the mid and post intervention questionnaires (Appendix 5). Section 5 comprised of the open questions, 'Has your opinion on group work changed? Why/Why not?' and ' Would you like to say anything else about group work?'. These questions were added to allow all students, not just those selected for interview, to expand on their responses to section 4, following the sparsity of expansion of opinion in the mid and post intervention questionnaires from 7S1. The initial questionnaire was distributed following students being placed in their groups but before students were made aware of the group average feedback intervention. Students had been working in these groups for two lessons with teaching continuing as normal while also providing

opportunity for students to work in their new groups without the potentially perceived added pressure of a group average result.

3.6: Interview Design

To further investigate student opinion on group work, interviews were conducted with a sample of three students from 9S1 following the final questionnaire. The sample of students interviewed were chosen students who chose to identify themselves in the questionnaires. As previously discussed, the classes with whom the intervention was implemented are set based on prior attainment however the students chosen to be interviewed included a higher, middle and lower prior attaining students in the context of 9S3. Interviews were one-on-one to allow depth and development of discussion and conducted during tutor time, typically lasting 8-10 minutes. Interviews were semi-structured and followed a pre-determined interview schedule (Appendix 6) to provide structure to the discussion without restricting follow up questions and prompts (Thomas, 2013). The list of possible questions were chosen in response to ambiguity and disparity in responses in the pre, mid and post intervention questionnaires. These questions focussed on motivation to contribute in groups and student opinions on the impact of a group average. Student responses were documented by myself as students responded with additional notes added later.

3.7: Ethical Considerations

To ensure BERA (2011) research guidelines were adhered to, the CUREC 1a ethical approval checklist was used to identify and address potential ethical issues and ethical approval was subsequently granted by the university ethics committee. As group work is a normal way of working within our department and I adhered to our

department marking and feedback policy, parental consent was not withheld by any parents following the distribution of an opt out letter (Appendix 2). Headteacher consent was granted and support offered from my head of department (Appendix 1). Draft questionnaires were made available in my CUREC application and students were informed of and given the option of anonymous response within the google form. All copies of questionnaires were stored electronically on a password protected account and no paper copies created.

While students who received the intervention received group average feedback to a termly learning review in contrast to individual feedback received by their peers in the parallel group, the standard way of working in the department is to allow students to analyse their unmarked papers while comparing solutions and ideas before receiving individual feedback which is regarded as a revision list. The sample students continued to undergo the analysis and comparison of work while also receiving their group revision list and so were not at a disadvantage to their peers. As assistant curriculum leader with a responsibility for key stage 3, it was important that I retained the ability to analyse and utilise the data gathered from students in their termly learning reviews. As individual learning reviews were marked in the standard way of working within the department and the intervention applying only to feedback given to the student, the usual comparison and analysis of data following the learning reviews was possible.

A further ethical consideration was the composition of the groups. While homogeneous ability groups are preferable for higher prior attaining students, heterogeneous ability groups have been shown to be more beneficial to middle and

lower prior attaining students (Webb, 1998). From her studies however, it is apparent that the performance of higher prior attaining students did not suffer when grouped with lower attaining students while benefiting the LPA students. For this reason, I chose to group students heterogeneously by ability although if running this intervention again, I would consider trialing homogeneous groups as an alternative.

Chapter 4: Findings

4.1: Cycle 1 Findings

4.1.1: 7S1 Questionnaire Results

The pre-intervention questionnaire was answered by students before they were placed in groups and informed about the intervention. The mid-intervention questionnaire was distributed four weeks into the term when students were working in groups with the knowledge of the group average feedback they would receive at the end of the term. The final questionnaire was distributed a week after students received, discussed and analysed their group average results. All questionnaires were distributed in the same format. The online questionnaire was emailed to students' school email address via an individual link which gave students the option of submitting the form anonymously. The class was brought to a computer room during regular lesson time and students answered the questionnaire individually. All students responded to the questionnaire (n=30) and no student chose to answer anonymously. A copy of the questionnaire completed by 7S1 can be found in Appendix 3.

Section 1, which was included in the pre-intervention questionnaire only, evaluated the frequency in which students felt they worked in groups in our school in general (Question 1), the frequency in which students felt they worked in groups in maths lessons (Question 3) as well as the subjects in which they felt group work was most useful (Question 2). In response to the question, '*How often do you work in groups in 'school name'?*' 50% of students responded that they worked in groups 'sometimes'

within lessons, with 42.9% feeling they worked in groups 'often' and the remaining 7.1% choosing the option 'rarely'. There appeared to exist a correlation between responses to question 1 and question 3, *How often do you work in groups in your maths lessons?*, albeit with a slight increase in the number of students choosing 'often', from 42.9% when considering all lessons to 46.4% when considering maths, which may be a result of 'prestige bias' (Thomas, 2013; 208) whereby students may want to please me in their responses as their maths teacher. In responses to question 2, *What subjects do you feel group work is useful in?* students were asked to tick all subjects to which they felt this statement applied. The mean number of subjects ticked by students was four, with maths the most popular option, chosen by 92.3% of respondents, followed closely by P.E. with 89.8% of respondents choosing this option. While maths may have been chosen by respondents due to the aforementioned prestige bias, it may also be due to the increased group work opportunities provided by teachers in my maths department due to our previously discussed emphasis on group work when receiving learning review feedback. Subjects within the humanities department; Geography, History and PRE, were the subjects in which students found group work least useful with Art viewed as the least group work friendly subject by 7S1.

Section 2 of the questionnaire utilised a five point Likert scale from strongly disagree to strongly agree to evaluate student opinion on group work and was included in all three questionnaires. Nine statements were included in this section. As these statements were included in all three questionnaires, the results and comparison of these questionnaires are summarised in Table 1 below.

Statement	Mean score pre-intervention	Mean score mid-intervention	Mean score post-intervention
I enjoy working in groups in all subjects	3.92	3.90	3.81
I enjoy working in groups in maths	4.3	4.0	3.98
I think working in groups allows me to progress in maths	3.92	3.54	3.56
I think working in groups supports my mathematical learning	3.96	3.64	3.52
I enjoy talking about maths with my friends/classmates	3.75	3.45	2.18
I find working in groups challenging	2.25	1.9	1.98
I find working in groups frustrating	2.03	2.77	3.13
I would prefer to work on my own in every lesson	1.74	1.9	2.1

I would prefer to work in groups in every lesson	3.03	3.36	3.52
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Table 1: 7S1 mean Likert scale scores Section 2

From the results in section 2, it appears that while positivity towards group work (enjoyment, perceived progression and support) showed an overall decline throughout the intervention, preference for group work in every lesson increased. Perhaps most interesting however is the disparity in trend between statements 6 and 7, *I find working in groups challenging* and *I find working in groups frustrating*. While students seem to find group work less challenging following the intervention, their frustration towards group work has grown which may be a reason behind the increase in preference towards working on their own in every lesson. This may also be linked to the significant negative trend in response to *I enjoy talking about maths with my friends/classmates*. The results from this section seem to indicate that communication may have been an issue with students in this class. This will be further explored in the analysis of Section 3.

Section 3 of each questionnaire invited students to complete the following two statements:

1. Sometimes I enjoy group work because...
2. Sometimes I do not enjoy group work because...

Two main trends appeared in the open responses to these statements; social and academic. For ease of presentation, student responses have been coded numerically followed by a questionnaire response letter (eg. 10C represents student 10's response in the post-intervention survey - survey C). Particular characteristics of

individual students such as SEN or prior attainment (HPA-higher prior attainment, MPA- middle prior attainment and LPA- lower prior attainment) will be highlighted where appropriate.

Sometimes I enjoy group work because...

Responses to this statement were detailed and thorough in the pre-intervention questionnaire but answers became less detailed as students progressed through later surveys. This may be due to the aforementioned prestige bias; perhaps students wanted to impress me as their teacher with academically centred responses, especially as all students chose to submit their questionnaire responses with email address attached.

Responses to this statement in the pre-intervention questionnaire certainly seemed to stem from a want to learn and progress while utilising their group to achieve this. Many students recognised their group members as alternative sources of information or skills as 1A commented, 'if I'm stuck on a question my friends can work with me and I can learn new skills', 5A agrees with this statement, 'If you need help there will be someone other than the teacher to help you' while 4A said 'It helps you get knowledge that others know to help benefit your learning. e.g. finding new methods to do addition or multiplication', identifying specific skills he felt he needed help in, and perhaps did not want to ask the teacher. Similarly, 9A said 'As well if you don't understand something you can have somebody in your group to help you which is better than a teacher as you have it from a student who does it a bit easier than the teacher as they are your age' while 28A states 'We can all discuss everything we don't get and feel confident to say stuff'. Seeing group members as a source of new

information continued to surface in responses throughout the mid and post intervention questionnaires. 4B expanded on his preference for asking group members for assistance with methods, 'if you can't work something out than you can ask anyone on your table to help you instead of waiting for a teacher or being embarrassed to ask', a sentiment agreed with by 18C (LPA), 'you may not know the answer but someone else in your group might so together you know more then on your own, than if you were sat there and didn't want to ask'. Appreciation for group members ability to help when students are 'stuck' was a common theme throughout the mid and post intervention questionnaires. 30B commented that 'if you're stuck your group can help you and explain to you what's wrong', similar to the response of 4C, 'People can help you and you can help others'. However it is 16C who eloquently summarises the symbiotic relationships created between group members within her group, 'It helps me to understand things I wouldn't otherwise understand. Other people think of ideas and solutions that would never occur to me, and it helps me think 'outside the box'. If I don't understand something, they can help me, and in return I can help them'.

The majority of students identified the benefits of group work in tackling mistakes or misunderstandings in their work. 3A stated that 'we can tell when we are wrong not just by a mark on paper, but also by our friends opinions. Together, we can work out where we went wrong' and 12A similarly said ' you can get answers from other people and you can learn from your mistakes from other people telling you what they think the mistakes you made where'. These opinions were not to remain throughout the intervention however, with 3C merely responding, 'Occasionally you get help from other people in your group', a far cry from her previously mentioned reasons for

enjoyment of group work in the pre-intervention questionnaire. Additional to finding and correcting misunderstandings, 17A highlights the benefit of sharing and discussing solutions and ideas within the groups, 'you get to work with other people so you can share what you know to become better in the subject and also to understand other people's ideas because it may be a great one' a sentiment shared by 23B, who seems to appreciate the importance of shared group knowledge 'everyone can support each other and if everyone knows something you can tell everyone else in the group and then everyone knows roughly the same amount'.

6A noted the dual benefits of group work, both academic and social, 'you can ask others for help if they understand the question and you don't understand the question. Also work is more enjoyable when you get to do it with others' as did 10A, 'it is helpful to get feedback from others and also you can get help from others if they understand something you don't . or the other way around ,it also useful to work in groups because it builds up a relationship between different people that you wouldn't usually work with'. 15A chose to focus solely on the social benefits, 'I get to do work with my friends' while 11A looked beyond the work completed and instead commented on the opportunities for interaction when the work is completed, 'You get to discuss other things when you are done with your set task/work'. As students progressed to answer the mid and post intervention questionnaires, social benefits were mentioned less in responses, with only one response in the post-intervention questionnaire referencing social benefits, 14A said 'it's inclusive and refreshing to work in groups than on our own'. This decline in appreciation for the social benefits is clearly correlated with responses to statement 2.

Sometimes I do not enjoy group work because...

As with statement 1, the responses to statement 2 became less detailed as students progressed through the intervention and responses were similarly split between the two main themes, social and academic. Many students who identified sharing of ideas, correction of misunderstandings and peer teaching as reasons to enjoy group work mentioned social anxieties as a rationale for experiencing a dislike of group work. The majority of these students seemed to feel that any social discord is as a result of the behaviours of other group members. 1A felt 'Sometimes people mess around too much and it puts me off my work', as did 2A 'I sometimes do not enjoy group work because some people I get put with are distracting and I find it hard to listen'. 2C however indicated heightened frustration with these students, 'It is frustrating when someone doesn't understand even after it has been explained to them because they are just messing about', showing an insight into why students may be distracted or messing about within the group. While 15A previously highlighted the social aspect of group work as advantageous, she also commented 'it is annoying if your group doesn't cooperate because it lets the team down', perhaps indicating that her enjoyment of group work may largely be due to the composition of the group. These feelings of irritation towards misbehaving or off task group members continued to appear in the mid and post intervention questionnaires. 15C identified particular students she found particularly difficult to work with, 'I am put in groups with people who are hard to work with and do not help' but does not expand on what makes these students difficult to work with.

Even when groups are communicating and working together, the inevitable disagreements that come as part of working in a group can be troublesome for some

students. 6A stated that 'sometimes you get put into groups that you don't like and also the other people in your group may have a different point of view towards any answers and they may not even listen to your answers' while 26A said 'people don't always believe they are wrong and they will say that they are right and won't change their decision'. These feelings of frustration are intensified in mid and post intervention questionnaires. 17B states 'I sometimes have different answers to another pupil and they think you are wrong but you are right' followed by 17C, 'Not everyone lets you speak' which seems to show a breakdown in communication within his group. Inequality of workload is also mentioned by a couple of students, 12B said 'because some people in the group don't work as hard as everyone and leaves everyone else to do the work' while 27C commented not on quantity of work completed by group but on the quality, also showing a dislike for the heterogeneous ability composition of the group, 'some people may not be as smart in that particular subject and that may pull you back, not push you forward and that can be frustrating or annoying'. Conversely, others mentioned leaders emerging with groups as a negative development, with 8C stating 'some people sort of become dictators, telling everyone what to do' and 9C mentioning 'there is always someone in the group who tries to take lead' as a negative result of group work.

4.2: Cycle 2 Findings

4.2.1: 9S3 Questionnaire Results

As discussed in the methodology section of this paper, alterations were made to the questionnaire following analysis of 7S1's responses before circulation to 9S3.

Sections were removed and others added to allow for expansion on student opinion, especially in the mid and post intervention questionnaires. As with 7S1, the online questionnaires were distributed via school email accounts and completed within lesson time. However with 9S3, students were seated in their groups for two weeks before completing the pre-intervention questionnaire with teaching and learning continuing as normal, with the exception of the seating plan. The mid-intervention questionnaire was then distributed four weeks into the term, after students have been made aware that their end of term learning review feedback will be taken from their group average results. As with 7S1 the post-intervention questionnaire was completed two weeks after students had received their feedback. A copy of the questionnaires completed by 9S3 can be found in Appendix 4. All students were present for the pre and mid intervention questionnaire (n=18) with 1 student absent for the post-intervention questionnaire (n=17). Students were given the option of anonymity and 6 students chose not to reveal their identity in their responses.

As with 7S1, section 1 was included within the pre-intervention questionnaire only, now comprising of one question 'What subjects do you feel group work is useful in? Tick all that apply' on revision of the questionnaire. 88.91% of students felt PE was the subject in which group work was most useful, the most popular choice possibly due to the necessity within team sports. Maths and Science were considered the second most popular subjects for accommodation of group work within lessons with 71.1% of students choosing these subjects. It is worth noting that the 'prestige bias' which appeared evident in 7S1's responses seems absent here, perhaps due to the age of the students and therefore increased maturity. Students choosing to remain anonymous may also have lead to more honest response without fear of offending

me, their teacher. While Art remains the subject in which students find group work least useful, humanities subjects have been chosen by far more students, for example, PRE was chosen by 42% of 7S1 while 68% of 9S3 have identified PRE as a subject which facilitates group work usefully.

As with the results of section 2 for 7S1, the mean score for pre, mid and post intervention on the 5 point Likert scale is displayed in Table 2 below.

Statement	Mean score pre-intervention	Mean score mid-intervention	Mean score post-intervention
I enjoy working in groups in all subjects	3.6	3.7	3.66
I enjoy working in groups in maths	3.5	3.72	3.88
I think working in groups allows me to progress in maths	3.27	3.33	3.5
I think working in groups supports my mathematical learning	3.33	3.67	3.72

I enjoy talking about maths with my friends/classmates	3.16	3.72	4.4
I find working in groups challenging	2.27	2.27	2.22
I find working in groups frustrating	2.77	3.22	2.77
I would prefer to work on my own in every lesson	2.38	2.05	1.5
I would prefer to work in groups in every lesson	2.71	3.22	3.44

Table 2: 9S3 mean Likert scale scores Section 2

From these results, it appears evident that student opinion of group work became progressively more positive as they progressed through the term with enjoyment and perception of impact of group work on progress and learning scores improving. Students also showed a more positive attitude towards ‘talking about maths with my friends/classmates’. As with 7S1, there appears to exist a slight disparity between students finding group work challenging and frustrating. While student opinion of the challenge associated with group work remains unchanged following knowledge of the group average feedback, it declines following the receipt of each group’s learning review feedback, perhaps further indicating that students felt positively towards the intervention as a whole. Conversely, student frustration within their groups increased following knowledge of the intervention, returning to pre-intervention frustration levels following their feedback. Perhaps most interestingly however, is the change in

preference towards working alone in every lesson, with this statement showing the greatest change in opinion, with students indicating they would prefer to work in groups in every lesson, over working on their own, by a significant difference.

For ease of presentation and to avoid confusion with 7S1 results, 9S3 will be coded in the following way for analysis of the results of section 3: students will be identified by a letter followed by a 1,2 or 3 indicating which questionnaire the comment was taken from (eg. B2 represents the response of student B in the mid-intervention questionnaire). As before, SEN and prior attainment will be indicated when appropriate. The open ended statements in section 3 remained the same as for 7S1 and responses to these statements will be presented in a similar way.

Sometimes I enjoy group work because...

While the responses of 7S1 to this statement declined in detail as students progressed through the intervention, the responses of 9S3 remained short and concise throughout which may be due to lower literacy levels with higher levels of LPA students in this class. As with 7S1, responses to the above statement tended to fall into the two categories of social and academic reasons with the majority of responses in 9S3 referring to the social aspects of group work. S1 and R1, both LPA, shared identical responses, commenting 'it's fun' with D1 stating that 'it's nice to work with other people'. C1 said 'You can work with your friends sometimes' while E1 stated 'It's more fun to work with other people, especially if you are friends'. Comparing these responses to the responses provided in mid and post intervention questionnaires, it is evident that these particular students consider the social aspects of group work imperative to their progress with C2 stating 'some people are really

nice and helpful and I did not know that before about them' and C3 stating 'working in groups helps me make more friends' while E3 commented 'I like to talk about maths with my friends, it makes it seem easier'. Clearly these students feel socially confident and are eager to engage in the community opportunities provided by group work. Other students considered working within a group an opportunity to develop their social skills, with M1 stating 'it helps us develop skills that we will need for later life' and H2 commenting 'it is useful to share your ideas and hear what others think because they might think differently'.

Similarly to 7S1, students in 9S3 enjoyed the collaborative element of working within a group, even before the group reward incentive was introduced. F1 noted that 'it means we can learn of each other and discuss things we might find difficult' while O1 said 'We can discuss the work and if you find it difficult you'll have other people to help you and you can learn from them'. While F1, O1 and P1, who said 'If you are stuck on a specific subject then you can get help from people in your group' were eager to be on the receiving end of peer support, some other students seemed excited about the prospect of sharing mathematical ideas, such as B1 and L1 (both HPA) who responded respectively, 'It helps understand or learn how others think or work things out' and 'we get to share ideas and how we understand topics in maths'. One student, Q1, identified another benefit to group work, stating 'work can be split between the group meaning i don't have to do a lot'.

Following completion of the mid and post intervention questionnaires, it became evident that the element of group work enjoyed most by students was the opportunity to receive peer support. While S1 and R1 were solely focused on the 'fun' side of

group work, S2 stated 'if I am stuck I can ask my friends and it seems more fun' while R3 commented 'it's more fun when you all work on the problem together'. O3 evidently appreciates the efforts of her group members stating 'even when everyone else gets it, they explain it to me and don't make me feel stupid' while conversely, B3 (HPA) can shed light on this situation from a different position, 'I enjoy explaining maths to my group because I feel like a teacher and it makes me feel like I understand more than when I work on my own'.

Sometimes I do not enjoy group work because...

While responses to statement 1 could be categorised into social and academic reasons for enjoyment, of the 18 responses to statement 2, 17 responses to the pre-intervention questionnaire made reference to social issues or anxieties which students harboured before the intervention. Numerous students admitted to worries about the composition of the group, M1 stated 'You might not like or know the people you are in a group with' while S1 commented 'if it's people I'm not friends with or can be comfortable with' and R1 said 'if you are put in groups with people you don't really know then it might be awkward and then it won't help learning'. Like R1, Q1 related issues with group members with her learning, 'it can be annoying if you're in a group with people you might not get along with. it can also be a bit frustrating if you want to get a point across but everyone else is talking'. F1 was also apprehensive about the behaviour of group members, 'I don't feel like I learn much and the rest of the group can sometimes be off task'. Other students showed evidence of feeling self-conscious in their responses, with G1 commenting 'I feel left out because people do not want me in their group' and P1 revealing 'I like to do things on my own or in my own way'. I1 simply stated, 'I'm not in the mood'.

The results of section 2 appeared to show a shift towards more positive opinions on group work and these results are reflected in the responses of students to statement 2 in the mid and post intervention questionnaires. In the mid intervention questionnaire R2 stated 'If people in the group won't talk because they don't know each other', it appeared his fears from pre-intervention had been realised, however in R3 said 'if someone else is taking charge or I don't know what to say' revealing that perhaps his anxieties about group work were less about his group members and more about his own self confidence within the group. While G1 felt left out in group work, G2 seemed to feel less so, commenting 'depends on the people in my group and the work' and finally, G3 said 'Not everyone lets you speak', revealing similar feelings as R3 and perhaps highlighting a breakdown in communication within some groups. As with 7S1, disagreements within groups appear to damage student opinion of group work, perhaps due to a lack of experience engaging with conflict or arguments, mathematical or otherwise. As indicated in the results to section 2, frustration with group members was a common response in the mid intervention questionnaire, with N2 stating 'There will always be disagreements and it gets tedious' and F2 commenting 'We argue on the answers' however this frustration seems to have dissipated following students receiving the learning review feedback as N3 said 'I don't like when people disagree with my answers, even if they are right' and F3 seeming to move on from feeling frustrated 'I don't like working in groups when there is no obvious reason to'.

Section 5 comprised of the open questions, 'Has your opinion on group work changed? Why/Why not?' and 'Would you like to say anything else about group work?' and was included only in the mid and post intervention questionnaires.

Has your opinion on group work changed? Why/Why not?

Eight students responded that their opinion on group work had not changed in the mid intervention questionnaires with six students commenting that their opinion had changed for the better and four students declaring a more negative opinion towards group work. N2 said 'Yes because I've found it is difficult to work with certain people' while Q2 stated 'Yes because I used to like it before but now I just don't like it because I feel claustrophobic'. Conversely, M2 responded with 'I liked my group and the variety of abilities involved. It wasn't as frustrating as I thought it would be' which was a significant improvement in opinion from her pre-intervention questionnaire while E2 simply stated 'yes because I feel that I have improved with the help of some people in my group' Similarly, S2, who previously identified group composition as a reason for not enjoying group work stated 'yes because now I feel that being in certain groups does help and others don't make a difference' which shows a shift from wanting to be placed with her friends to understanding the benefits, or lack thereof, of being placed with specific other students.

The post intervention questionnaire showed similar results, with nine students stating there was no change in opinion. Eight of these students simply answered this question with 'no' while N3 elaborated slightly on his negative opinion on group work throughout, 'no because i think it is still not very good'. K3 clearly outlines her positive change of opinion following the intervention, 'a bit, at the start I was very against it but now, in Maths I think it has brought me forward and I enjoy having discussions with other members of the group', an opinion which is shared with J3, 'yes, I think I can talk about maths better since I have worked in groups in every

lesson'. However, Q3 and N3 continued to reflect negatively on the experience, commenting respectively, 'yes, I used to not mind group work and now I don't want to work with those kids again' and 'yes my opinion got worse, please no more group work!'

Would you like to say anything else about group work?.

While many students chose to respond 'no' to this question, remaining responses to this question were largely related to group composition, for example S3 said 'I really enjoy group work as long as its with people i'm compatible with' with numerous students declaring that the opportunity to choose their own groups would ensure higher quality and/or quantity of work. K2 said 'We should be able to pick our teams, not set by the teacher, we would get more work done'. R2 offered a compromise of sorts at the midpoint of the intervention, 'Maybe we could pick one person to work with then you pick the rest of our team?' an idea shared by L2 'you should allow pupils to put themselves into their own group but with guidelines, for example you have to have boys and girls in your group'. Conversely, A3 felt that the teacher should choose groups to ensure fairness, 'I think that the teacher should choose groups more so we can work with other people' while H3 recognised the benefits of both teacher and peer chosen groups, 'It depends on who you work with, a group with all friends can cause a lot of annoying noise but working with people you dislike is also bad'. F3 commented 'it is a great way of learning and it teaches you important life skills' while E3 said 'It's a good way to improve your work and helps you in general' showing an awareness of the benefits of group work in wider life. C3 seemed to summarise the collective opinions of the class with his comment 'I think that you should be in groups in most subjects but not all the time because

sometimes it is better to work independently or sometimes give the opportunity to choose whether you want to be in groups or on your own'.

4.2.2: 9S3 interviews

To further elaborate on responses to the questionnaire, three students were chosen to be interviewed. These students were B (HPA), M (MPA) and S (LPA) and were chosen to represent the three areas of prior attainment and, practically, because they chose not to remain anonymous in their responses to the questionnaires.

Students were interviewed during tutor time in the week following the post intervention questionnaire, in a 1:1 semi-structured setting following the interview schedule in appendix 5. While the interviews were conducted in a conversational style, the following overarching questions directed the discussions and responses are discussed below:

1. What motivates you to participate in group work?
2. How do you feel about groupwork now?

What motivates you to participate in group work?

S's response to this question reflected his appreciation for the 'fun' and social side to working in groups, 'When the people in my group are people I like and if the questions are fun then I want to help find an answer. But if you are with people you don't like then you don't really care about finding the right answer because you might not want to help them'. Following the prompt 'but what if you are working towards a group answer?' S responded, 'it really depends on my group, if I don't like the people in the group then I'd rather get a bad result than have to try to be friends with them'.

M's motivation to contribute seemed to indicate an appreciation for the mutual benefits of working in a group, 'I want to speak in group work and help when I can so

that maybe the other people in the group will help me when I am stuck'. In response to the prompt 'what did you do when you got stuck in the group', M replied 'I sometimes asked for help, or I might wait to see if any one else was having the same problem I was, so that I wasn't asking for help all the time. I didn't want people to think I was the weakest in the group or that I needed to be checked on all the time. Sometimes when there are smart people in the group, it feels like they have made themselves the leader and they can start to talk like a teacher or something, at least that's what it felt like in my group'. Interestingly, B, a higher prior attaining student and an extrovert in lessons seemed to share this opinion and responded to this question with, 'I wanted to help the people in my group because I only learn in groups if everyone in the group is as smart as me or smarter so if I could get them to understand the task or the maths we were working on then we could start to talk about more difficult problems. I didn't really get a chance to do this because there were some less smart people in my group who I didn't mind helping but I think I would have been more motivated to contribute if there was another leader in the group, I just felt I was automatically in charge so had to contribute to the conversations, I was really motivated to do that'. When prompted with 'Did receiving learning review group feedback change how motivated you were to contribute?', B replied, 'no because I would still help the others even if they were getting their own results'.

How do you feel about group work now?

Based on his questionnaire results, it was not surprising to find the S felt very strongly about group composition as revealed in his response to this question, 'I don't mind it but I really wish we could pick our own groups. It's pointless forcing us

to work with students we don't know or like and I know I would enjoy working with my friends and then I would work harder. After we got our group feedback, it felt like some people in the group were blaming others if we got a bad mark on a question but this wouldn't happen if we did it with our friends.' To this, I prompted 'Why do you think I mixed up friendship groups when I created the groups', to which S replied, 'I think teachers sometimes think we are more mature than we are, like I know I should be able to pretend I like someone and just get on with working with them but it just puts me in a bad mood and I don't want to do it'. I then asked S if there was anything he enjoyed about working in group work for a term to which he responded ' I learned some hacks from some of my group, like how to remember times tables and little things like that so that was useful'. Similarly to S, B felt that group composition played a part in her enjoyment of the term, 'I like working in groups but I think it is better to put a few smart people in every group, that would mean there is not as much pressure on the less smart people when we get results back, although it might be more obvious who brought down the mark. It would also take the pressure of the only smart one in the group to have to help everyone.' In response to the prompt 'did you feel you were the only one who could help your group members?', B replied, 'well no but I was the most confident one so I would sometimes just jump in and answer, maybe I should have let someone else have a chance I guess'. In contrast to S and B, M seemed to have enjoyed the experience and especially mentioned the mix of students in her group as a positive, 'working in a group is great because you have more opinions and answers than just your own and even when people mess around sometimes, we knew we had to help each other to do well on the learning review'. Interestingly, M also added, 'group work also means we can kind of look after ourselves and the teacher can get on with her other work, and it's good to get a

different explanation than the teacher's that comes from someone who talks about maths like me'.

Chapter 5: Analysis

5.1: Overview of findings

7S1 and 9S3 have returned contrasting opinions before, during and after the intervention was implemented. The responses of 9S3 indicate an improvement in opinion on group work following the introduction of group average feedback with a significant increase in mean Likert scale scores in response to seven of the nine statements provided in section 2 of each questionnaire. Level of challenge felt by students while working in groups decreased and the statement 'I would prefer to work in groups in every lesson' increased by 0.73. While levels of frustration rose mid intervention, these returned to pre-intervention levels in the duration of the intervention. Contrary to the improvement in opinions across 9S3, responses from 7S1 indicated a decline in opinion towards group work in maths lessons. Likert scores evaluating enjoyment of group work, enjoyment of talking to classmates about maths and belief in the advantages of group work such as increasing progression in maths and supporting mathematical learning fell throughout the intervention and levels of frustration rose significantly. Despite this negative change in opinion, the mean scores for the statement 'I would like to work in groups in every lesson' rose by 0.49.

Responses gathered in the open-ended questions in sections 3,4 and 5 in the questionnaires, as well as in post intervention interviews, highlighted four main themes which seemed to influence student opinion on groupwork significantly. These themes are explored further below.

5.2: Support within groups

'I think working in groups supports my mathematical learning'

Responses to this statement in the questionnaires were mixed. The mean score from 7S1 dropped by 0.44 from pre-intervention to post-intervention while the mean score from 9S1 increased by 0.39. This may be an effect of the ability setting in which students work. While 7S1 is a class of primarily HPA students, the majority of students in 9S3 are MPA or LPA. Van Aalst discusses numerous studies by Webb and Barron which found that while LPA students benefit from working cooperatively with HPA students, when HPA students work with and support MPA and LPA students, they often occupy a leadership role and deem themselves responsible for the learning of others which can lead to an increase in confidence, both mathematically and socially (2013). Perhaps the opportunity to support and assist group members was not granted as often in 7S1 and is 9S3 resulting in more homogeneous ability groups of HPA students working at a similar level. Van Aalst also refers to competition with homogeneous higher ability groups for the role of leader which can lead to disagreements if ideas are not accepted (2013). 9S3 is made up of a wider range of prior attaining students, which perhaps granted more opportunity for students to learn within the zone of proximal development therefore achieving and learning more than they would as individuals and enjoying this achievement (Vgotsky, 1978).

Numerous students identified the support of their group members in the questionnaires as a positive aspect of group work with some indicating a preference for peer support over support from the teacher in some instances. In the interviews,

student M elaborated on the positive support she received from her group members and also explained some reasons as to why she found peer explanations more useful than the teachers in some cases citing a shared language as a useful tool as did student 9 ‘..a student who does it a bit easier than the teacher because they are your age’. Student 4, from 7S1, admitted to a preference for asking for peer support rather than asking the teacher due to feelings of embarrassment at asking for help which may be due to the higher expectations of students in a top set. Webb and Farivar similarly found that when students share a learning experience, they can translate the learning into a shared, simplified vocabulary (1994). From the other side, B described how she was motivated to help her group members due to a sense of responsibility for their learning and a motivation to progress onto more difficult tasks, showing an awareness of when her peers needed assistance and providing this assistance immediately (Gillies and Ashman, 1996). B also discussed her role as a leader within the group, which reinforces the findings of Webb (from Van Aalst, 2013).

5.3: Contribution within the group

What motivates you to participate in group work?

Slavin (1983) discusses the difference between a cooperative incentive structure and a competitive incentive structure and highlights the importance of a cooperative incentive structure, that is a goal or reward based on group performance, in effective group work. The use of a group average calculated from individual assessment results aimed to act as a cooperative incentive therefore encouraging all members of the group to participate and cooperate, however this appears to not have been the case in every instance. Johnson and Johnson (2008) refer to the term ‘social loafing’

to describe members of the group who allow or expect others to complete most or all of the work while Van Aalst (2013) refers to 'slackers' who did not contribute their fair share to the end goal.

Pre-intervention questionnaires from 7S1 identified these social loafers or slackers as a worry for numerous students with many referring to students who mess around or are disruptive as a hindrance or 'annoying'. These feelings of animosity towards those not pulling their weight is intensified in the mid and post intervention questionnaires with students such as student 2 agonising over the inability of students to understand a task or mathematical idea because they were messing about and then continuing to mess around because they don't understand. However, while 7S1 showed apprehension towards these slackers, some members of 9S3 realised an opportunity to become just that when working in groups, as mentioned by student Q, 'work can be split...meaning I don't have to do a lot'.

As previously mentioned, student B's leadership role within her group was a motivator for her, however other students wrote of their dissatisfaction with the self proclaimed leaders of their groups. Student 8 revealed that some group members 'became dictators' and student S bemoaned the 'smart kids' who became self-elected leaders of the group. Miller et al (2013) advises that to avoid dominance in groups it is advisable to focus groups on learning and improving rather than providing a competitive incentive, which is essentially what this intervention aimed to provide to groups, however perhaps the goal of a group average result was not sufficient to alter behaviours in such a short space of time.

5.4: Composition of groups

I find working in groups challenging

By far the most common reason given in response to '*sometimes I do not enjoy group work because..*' was related to group composition. Artzt (1997) discusses different methods of choosing groups in the mathematics classroom, random, student led and teacher led, however Johnson and Johnson (2004) assert that it is the teacher's role and responsibility to choose the groups in which he or she feels students will benefit most, both socially and academically. Chapman (2006) agrees while that teacher chosen groups are preferable, if this is not an option then student chosen groups are more effective than randomised group selection. Following findings from the literature, I placed students into heterogeneous ability groups as while this is not the ideal situation for HPA students (Webb, 1998) neither is it detrimental to these students while simultaneously benefiting the MPA and LPA students. While a small number of students compared and contrasted the ability levels of their group members, such as student B and student 27, who contrastingly spoke about 'smart people' in the group as either pulling the group up or putting group members down.

It was however the social mix of students within groups which caused students to dislike group work most with 78% of all responses to all questionnaires (n=142) referencing the composition of the group at some point. Responses in the mid and post intervention questionnaires seemed to focus less on 'people I don't like' and more so on 'I would prefer to be with friends' perhaps indicating that relationships within the groups improved or developed but not to the extent that students felt they would if they were grouped with friends. Some students in 9S3 offered some

alternative methods of grouping students with student R proposing a combination of student chosen teams based on guidelines provided by the teacher.

5.5: Communication within groups

I enjoy talking about maths with my friends/classmates

While the mean Likert scale score for this statement declined by a total 1.57 throughout the intervention with 7S1, the mean score increased from 3.16 to 4.4, a total change of 1.24 from pre-intervention to post-intervention with 9S3.

Communication was clearly a problem within groups in 7S1 particularly when dealing with disagreements over methods or answers with frustration growing as the intervention proceeded. The mean score for 7S1 for the comment, 'I find working in groups frustrating' increased by 1.1 while the mean score for 'I find working in groups challenging' declined by 0.27 which may indicate that students did not associate their frustration with the tasks or assessment within the group, but solely with their group members. Responses to section 2 in the questionnaire highlight some of the reasoning behind students' frustration and dislike for communication with group members, in particular, the clear frustration in student 17's responses towards not being allowed to speak by other group members and his answers not being listened to. Boaler (2008) offers a possible explanation for a breakdown of communication in a group which is that 'even if teachers do not stress a competitive approach, students measure their success by the success of others and only know they are doing well if they are doing better than others' (Boaler, 2008;15).

Conversely, the issues around communication and frustration with other group members appears less in the opinions of 9S3. In contrast to the responses of 7S1,

9S3 showed an decrease in the level of challenge felt by the students and although feelings of frustration increase mid-intervention, there was no change from pre-intervention to post-intervention mean scores with a relatively low mean Likert scale score of 2.77. The increase in frustration levels around the mid-intervention point may have been related to the added perceived pressure on 9S3 to perform in their upcoming learning review, due to their impact on key stage 3 reports. It appears that receiving and analysing their results satisfied students in this regard which lowered levels of frustration.

Chapter 6: Conclusion

6.1: Summary of Findings

In this project I have investigated the impact of a group reward combined with individual accountability on student opinion of groupwork in my maths classroom.

The intervention comprised of students working in groups for the duration of a term and receiving group average feedback to their end of term learning review.

Throughout the implementation of this intervention I have explored the following research questions:

- What are my students' opinions on group work?
- Does the introduction of the knowledge of group average feedback have an impact on students' opinions of group work?
- Does the introduction of group average feedback following a learning review have an impact on students' opinions of group work?

I was motivated to investigate this issue because of my own experience of unmotivated and competitive attitudes towards group work, both of which contributed to a negative learning environment when collaborative learning was utilised in class.

From analysis of the literature, it was suggested that group incentives, such as grades or rewards, combined with individual accountability towards these incentives would motivate students to develop and utilise collaborative learning skills (Slavin, 2015), while also improving relationships between students (Boaler, 2008).

The many advantages and disadvantages associated with group work are of central importance for our understanding of cooperative learning and the optimal conditions required to ensure effective group work in our classrooms. Despite this, little

attention has been paid to student opinion on group work with research focusing primarily on achievement within groups. This project sought to evaluate student opinion on group work and impact this opinion using recommendations for effective group work from the literature.

What are my students' opinions on group work?

From analysis of responses to the pre-intervention questionnaire, and as previously discussed, students in both 7S1 and 9S3 presented four main themes as common concerns or reasons for enjoyment when working collaboratively in groups; support, contribution and communication within the group as well as the composition of the group. Generally, students enjoy supporting their group members and furthermore, are happy to receive support from group members with numerous students indicating a preference for peer support over teacher support. When students do not feel supported or feel as though they are the main form support within a group, enjoyment is lessened. Levels of contribution are a cause of anxiety and frustration for students within these classes. While social loafing of group members is a general concern amongst my students, equally students feel quite negatively towards leaders emerging within groups and 'taking over'. Communication within groups and anxieties over arguments or disagreements was also mentioned by numerous students, although appreciation for mathematical discussion and sharing of ideas was also commented on by many. Finally, students feel strongly about the makeup of their groups, with numerous students requesting to be placed in groups with friends or displaying a dislike for working with certain members of the class. Most

students indicated they would work better if placed with friends in a group although a small number of students expressed appreciation for the pre-defined composition of the group.

Does the introduction of the knowledge of group average feedback have an impact on students' opinions of group work?

The purpose of the mid-intervention questionnaire was to analyse the opinions of students after they being informed of their individual accountability towards a group incentive, in this case, learning review feedback. As in the pre-intervention questionnaire, many students commented on the composition of the group, with many linking the group composition with a breakdown in communication or support systems when this breakdown occurred, in essence, blaming the group members for a lack of progress or learning. 7S1 began to display increasingly negative opinions towards group work following the introduction of the knowledge of the group average while 9S3 began to display increasingly positive opinions. From student responses to the open ended questions in the questionnaire, it seems that while 9S3 began to embrace the concept of working towards a group goal, 7S1 continued to possess a competitive attitude towards assessment, blaming others in the group for 'bringing down the group' or admitting feeling blamed for not understanding.

Does the introduction of group average feedback following a learning review have an impact on students' opinions of group work?

The findings of this project reveal that while the implementation of this intervention did impact on student opinion, the impact was inconsistent across the two sample

classes both between the groups and across individuals within the groups. The opinions of 7S1 were impacted negatively overall with increased levels of frustration towards their group members and a decline in enjoyment of groupwork. Despite this however, students would still prefer to work in groups every lesson over working individually every lesson. Conversely, the opinions of 9S3 were impacted positively following the intervention with increased scores for enjoyment, feelings of support and feelings of progress in mathematics as a result of group work. From my findings I propose that while implementation of this intervention alone certainly impacted on student opinion, to impact positively on student opinion it will be necessary to combine collaborative teaching and learning strategies. In particular, from analysis of the literature, I feel it is necessary to ensure pre-coaching is undertaken with students to develop and improve collaborative learning skills before embarking on an intervention such as this.

6.2: Limitations of the study

Further implementation of the intervention with similar cohorts to 7S1 and 9S3 would have allowed for further investigation into the opinions of students on group work but was not possible due to time and timetabling constraints. In hindsight, distribution of the pre-intervention questionnaire to a larger sample of students, for example, multiple classes from a wider selection of year groups and key stages, would have provided a more comprehensive representation of student opinion on group work in response to research question 1 but analysis of a much larger sample would be beyond the scope of this project. Similarly, group interviews or a focus group would have allowed for further discussion with students on their opinions on group work but were beyond the scope of this project.

To further investigate student opinion on group composition, it would be necessary to repeat this intervention with a mixed ability class. Due to the ability groupings of classes in my school, this was not possible within my context currently but to ensure true heterogeneous or homogenous ability groupings, a wider spread of prior attainment than was available in my sample classes would be necessary.

Finally, as the sole implementer of this intervention, my analysis and choice of student responses for inclusion in this project may be considered subjective. However my intent was to investigate the opinions of my students within my mathematics classroom which I have achieved.

6.3: Implications for future practice

Within my classroom, I intend to utilise group work more often with all of my classes across key stage 3,4 and 5. While I may not initially introduce the idea of group average feedback, I will certainly continue to utilise individual accountability towards a group incentive but perhaps on a smaller scale. I intend to spend a considerable amount of time coaching my students on how best to interact and behave when working collaboratively and also plan to sample various different collaborative learning strategies such as Jigsaw, to compare and contrast student opinion following a more social cohesion approach.

Within my department, I have been given responsibility for key stage three assessment with a particular view to improving our feedback loop following assessments. As our current feedback loop contains considerable group work opportunities, I plan to present my findings from this project to the members of my

department with an aim to improving group work teaching strategies across the maths department.

As part of the school improvement plan, staff are currently focusing on developing and improving metacognitive strategies with our students. As group work requires students to not only understand how they are learning so as to explain their understanding to group members, students can also develop the ability to interpret the learning of their group members so as to intervene when necessary. I will be sharing my research on group work and effective group with members of staff in upcoming Inset sessions as part of this school improvement plan.

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Appendices

Appendix 1: Letter to the Headteacher with reply slip

Dear [REDACTED],

I am writing to enquire about conducting research in school this academic year. As you know, I am studying for the Master's in Learning and teaching at Oxford University, supervised by [REDACTED]. In my final research project, Group work and Feedback: Does the introduction of group average feedback impact on student opinion of group work in a mathematics class? I will explore whether the introduction of a group-average feedback intervention alters student opinion on group work.

The research will take place with primarily a year 7 class but may be run for a second time with a year 9 class.

By participating in the research, the school would be contributing to a project that will deepen the department's understanding of group work in mathematics and so contribute towards developing ways of improving group work and assessment for similar students in the school in the future.

I hope to conduct this research between December and July. I will be asking students to work in groups, filling out questionnaires before, during and after the intervention has taken place. From the results of these questionnaires, I will choose individual students to be interviewed further.

Oxford University has strict ethical procedures on conducting ethical research with teachers and young people, consistent with current British Educational Research Association guidelines. As practitioner research however, the University recognises that schools have the highest ethical standards in any event. I have written a letter to parents with the option to opt- out by 13th January 2017. Throughout the research, students and other teachers will be able to refuse to participate in any research activities at any time.

All participants, including students, teacher and the school, would be made anonymous in all research reports. The data collected would be kept strictly confidential, available only to my supervisor and me, and not used other than specified without further consent.

If you feel you would like to take part in the study, or need more information about what is involved, please contact me.

I look forward to hearing from you.

Yours sincerely,

[REDACTED]

Group work and Feedback: Does the introduction of group average feedback impact on student opinion of group work in a mathematics class?

[REDACTED]

University of Oxford, Department of Education

[REDACTED]

€ We do not wish to participate in this project.

€ We would like to find out more about this project.

/ We would like to take part in this project.

If you would like further information, please contact me, or my supervisor. If you require clarification of the ethical approval, process please contact Chair of Department of Education Research Ethics Committee [REDACTED]

Supervisor email: [REDACTED]

Chair of Department of Education Research Ethics Committee [REDACTED] email:

[REDACTED]

Group work and Feedback: Does the introduction of group average feedback impact on student opinion of group work in a mathematics class?

Research Study Information for Parents or Carers of Project participants

Dear Parent/Carer,

Your child has been chosen to take part in a research project conducted by [REDACTED] as part of our research at the Department of Education at the University of Oxford. The study may involve your child as part of a sample of mathematics students. Before you decide whether you want your child to participate, it is important that you understand why the study is being conducted and what your child's participation may involve. Please take time to read the following information and the enclosed opt out form carefully.

What is the purpose of the project?

The purpose is to study how the introduction of group-average feedback can impact student opinion on group work.

Why may your child be chosen?

Your child may be asked to participate as they are in a maths class taught by the researcher.

What will happen during the study?

This study will involve asking a sample of students to fill out questionnaires about their experiences of group work in maths lessons. They will be asked to do this three times, before, during and after the introduction of group-average feedback.

Does your child have to take part? What are the risks and benefits of taking part?

You are under absolutely no obligation to allow your child take part in this study. If you do not want your child to take part then please return the opt out form to myself. There are no known risks to participating in the study. There are several possible benefits to your child from the assessments as they will give information on how to improve group work and assessment within the school.

What will happen to the results of this research?

The results of the analysis may be published in academic publications or presented at academic conferences. Your child will not be named in any research publications or presentations and all information will be confidential and stored under a pseudonym. No one but us will have access to your child's name. If you do not wish your child to take part, you can return the attached opt out form by **Friday 13th January** confirming that you do not give their consent.

Who is organising the research?

This project is being organised as a part of our research activity in the Department of Education. The project has been reviewed by, and received ethics clearance through, the University of Oxford Central University Research Ethics Committee.

Contact for Further Information or Follow-up

Should you have any further questions about this research, please do not hesitate to contact [REDACTED] or [REDACTED]

[REDACTED]. Should you have any comments or concerns about this study at any time, and you are not satisfied with the answers we have given you, you can contact the Chair of the Departmental Research Ethics Committee, [REDACTED] 15 Norham Gardens, Oxford, UK OX2 6PY, [REDACTED]

Yours faithfully
[REDACTED]

OPT OUT FORM

If you **DO NOT** want your child to participate in the research, 'Group work and Feedback: Does the introduction of group average feedback impact on student opinion of group work in a mathematics class?' please fill out the form below and return it to the school by Friday 13th January. If we do not receive an opt-out form from you, your child may be invited to take part in this study, as described in the accompanying information sheet.

I, the undersigned, hereby DO NOT give permission for my child to take part in the above study.

Name of child: _____

Name of parent/guardian: _____

Signature: _____

Date: _____

Appendix 3: Questionnaire Distributed to 7S1

Section 1

Please complete this form with as much detail and honesty as possible.

1. How often do you work in groups in Matthew Arnold School?

Mark only one oval.

- Often
- Sometimes
- Rarely

2. What subjects do you feel group work is useful in? Tick all that apply

Tick all that apply.

- Maths
- English
- Science
- Geography
- History
- Music
- PRE
- Art
- Languages
- Core
- PE

3. How often do you work in groups in your maths lessons

Mark only one oval.

- Often
- Sometimes
- Rarely

5. I enjoy working in groups in maths

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

6. I think working in groups allows me to progress in maths

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

7. I think working in groups supports my mathematical learning

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

8. I enjoy talking about maths with my friends/ classmates

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

9. I find working in groups challenging

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

10. I find working in groups frustrating

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

11. I would prefer to work on my own in every lesson

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

12. I think we should work in groups in every lesson

Mark only one oval.

	1	2	3	4	5	
Strongly disagree	<input type="radio"/>	Strongly agree				

Your thoughts....

Complete the sentences

13. Sometimes I enjoy group work because.....

14. Sometimes I do not enjoy group work because.....

Appendix 4: Pre-intervention questionnaire distributed to 9S3

What subjects do you feel group work is useful in? Tick all that apply

- Maths
- English
- Science
- Geography
- History
- Music
- PRE
- Art
- Languages
- Core
- PE

Section 2

Choose the number which applies to your opinion. 1 is strongly disagree, 5 is strongly agree.

4. I enjoy working in groups in all subjects

Mark only one oval.

	1	2	3	4	5	
Strongly disagree	<input type="radio"/>	Strongly agree				

5. I enjoy working in groups in maths

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

6. I think working in groups allows me to progress in maths

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

7. I think working in groups supports my mathematical learning

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

8. I enjoy talking about maths with my friends/ classmates

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

9. I find working in groups challenging

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

10. I find working in groups frustrating

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

11. I would prefer to work on my own in every lesson

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

12. I think we should work in groups in every lesson

Mark only one oval.

	1	2	3	4	5	
Strongly disagree	<input type="radio"/>	Strongly				

Your thoughts....

Complete the sentences

13. Sometimes I enjoy group work because.....

14. Sometimes I do not enjoy group work because.....

Appendix 5: Mid and Post intervention questionnaire distributed to 9S3

What subjects do you feel group work is useful in? Tick all that apply

- Maths
- English
- Science
- Geography
- History
- Music
- PRE
- Art
- Languages
- Core
- PE

Section 2

Choose the number which applies to your opinion. 1 is strongly disagree, 5 is strongly agree.

4. I enjoy working in groups in all subjects

Mark only one oval.

	1	2	3	4	5	
Strongly disagree	<input type="radio"/>	Strongly agree				

5. I enjoy working in groups in maths

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

6. I think working in groups allows me to progress in maths

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

7. I think working in groups supports my mathematical learning

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

8. I enjoy talking about maths with my friends/ classmates

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

9. I find working in groups challenging

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

10. I find working in groups frustrating

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

11. I would prefer to work on my own in every lesson

Mark only one oval.

1 2 3 4 5

Your thoughts....

Complete the sentences

13. Sometimes I enjoy group work because.....

14. Sometimes I do not enjoy group work because.....

Finally...

12. Has your opinion on groupwork changed? Why/Why not?

<https://www.google.com/forms/d/1mo1b10a5rA5RmsMgVt1Opc8l-Qz/W-pA3Gbp25U10XVrUsg/edit>

Section 2

13. Would you like to say anything else about groupwork?

Appendix 6: Interview Schedule

Aim of Question	Question asked	Follow up prompts/questions
To investigate motivation	What motivates you to participate in group work?	Why is that? What would encourage you to participate? Did working towards a group goal motivate you? What did you do if you got stuck? Did you enjoy helping others?
To investigate if opinions had changed	How do you feel about group work now?	Why is that? Why did you enjoy/ not enjoy that aspect of group work? What would you change about how you worked in groups? Why do you think I asked you to work in groups? What would make you change your mind?