"I get by with a little help from my friends" – The effects peer learning can have on the confidence of maths resit students.

'Effective learning is facilitated by social interaction' (Harkin, Turner and Down: 2001, pg. 52).

This research will address the issue around problem-solving skills of students taking a maths resit course (both functional skills and GCSE). In maths classes students can often feel that they are told how to do a skill then expected to carry it out in isolation with a right or wrong answer. This according to the literature (Hannula, 2002) and (The Research base, 2014) causes students to have negative emotions and attitudes towards maths before they even get into the classroom. These emotions and attitudes can stop students from exploring a task or communicating with others about tasks and problems.

One of the main authors that writes on this topic, Dylan Wiliam (2018, 2nd ed) states that peer tutoring can have just as strong effect as one-to-one tutoring. I intend to examine, across this research, the extent to which peer learning (and assessment) can have an effect on the confidence of learners in an FE maths classroom and can help overcome the negative emotions and attitudes by taking away the isolation within the classroom.

From the 10 'peer learning' methods highlighted by Griffiths, Housten and Lazenbatt, (1995) I will examine the advantages and disadvantages of using peer learning in the classroom as part of the maths curriculum, using the traditional 'student tutoring student' and also the forming of study groups within a session to solve problems. Throughout the small scale research, I will be focusing on two classes with wide range of abilities. I will be using a variety of case studies to bring the report to life and describe events (Bassey:2003) that have happened while trialling peer learning / assessment to give the students a voice in the research.

My initial findings found a powerful outcome that is not often reported, which is the potential to create learning communities in maths resit classes. Lave and Wenger (1991) stated that students feel more comfortable and confident 'were learning is a part of a social practice' that share ideas, support each other and ultimately have the confidence to approach questions even if their answer may not be fully correct.

Through this paper I hope to present a rich account of using these techniques to help other teachers overcome the issue of isolation in the maths classroom.

The problem:

Students often enter a maths classroom with already negative emotions and attitude and with a feeling of isolation. This research will look to address the issue around confidence and problem-solving skills of students taking a maths resit course (both functional skills and GCSE).

Literature review:

Throughout this research I am examining the use of peer learning, and its effects on the confidence of maths resit students. I will be assessing whether peer learning should be embedded further into curriculum models.

Peer learning encompasses several different types of learning techniques both in and out of the classroom. In both areas, partners or groups of students can be used to facilitate student-based learning. In each, there are aspects of teacher guidance at varying levels. The major peer learning strategies used in the last decade are; peer or student tutoring, group based discussions or group projects, and student-led classes or online discussions.

All of these strategies have advantages and disadvantages depending on their group dynamics and the way they are executed (Griffiths, Housten and Lazenbatt,1995)

With respect to student dynamics, peer learning strategies foster student relationships and help students develop a greater multicultural understanding and acceptance. When students are put into groups where they can talk freely, they can bring in aspects of their background and beliefs, potentially leading to more understanding among the members within a group (Lave and Wenger, 1991). Students also learn to interact with a group of people that they may not generally work with and can engage in conversation even if it is outside of their comfort zone.

When students engage in peer tutoring, they are able to learn practical skills in how to teach and give critical feedback. The students learn how to engage in learning that is not strictly teacher-led, and can engage more in the dialogue and topic questions to help with clarification. Peer tutoring can help to promote children's natural abilities in context with their learning. If students/learners are good at a particular subject, and enthusiastic about it, they should be able to teach others about that subject. Rather than an extreme focus on individual success, the emphasis becomes on how the child interacts with and relates to others. These social abilities are arguably just as important as academic abilities in the critical learning stages of life. (Young, 2013)

My research into peer learning began with the paper 'inside the black box: raising standards through assessment' written by Paul Black and Dylan Wiliam. In this paper Black and Wiliam explain that learning is not only about what the teacher does in the classroom but also the students (Black, P & Wiliam, D 1998). They explain that a greater and more improved use of formative assessment will increase the chances of low achieving students passing, but there is a group of students who see themselves unable to learn in a traditional teacher: student setting. This is where peer learning can help support these young people back into education.

Stewart (2012) challenged the way in which Black and Wiliam's article had been implemented throughout curriculum planning and in classrooms. Stewart states that 'inside the black box' was written with the intention of giving the lessons back to the students but felt that it had not been used in this way as there can often be too many professionals commenting that 'assessment for learning doesn't work' (Stewart,2012).

Dylan Wiliam has written further on the role of peer assessment in his book 'Embedded Formative assessment' in this Wiliam writes about the power that peers working together can have. This source began to direct me towards peer learning as opposed to peer assessment. Wiliam stated that peers working together (in the right way) can have just as big an effect on learning as one to one teaching. (Wiliam, 2018 2nd ed)

This work builds on Coffield (2009, 2014) in these two pieces of work Coffield wrote initially about the benefits of peer learning on a lesson in general, and then took this further with his work in 2014, in this Coffield gives an overview of communities of learning and highlights the three key principles of achieving this; 'learning must be the central organising principle of the college secondly sunset must be pushed always to towards higher level thinking skills and become an partner of the learning, thirdly the teachers need to be encourages to innovate, take risks and learn from any mistakes.' (Coffield, 2014)

The third principle here is one of the biggest factors that often prevents tutors from exploring peer learning further, some feel that this loses control of the classroom and is too big of a risk in a culture of constant observations and walkthroughs.

The second principle that Coffield talks about is, involving learners as partners in the learning process. There is debate as to how far students take part in this, Fielding (2011) produced a typology of seven different patterns of a student's involvement in the learning process (Coffield, 2014). Wiliam (2018) took this typology further breaking down each aspect in relation to formative assessment.

Fielding wrote about the levels of participation in a classroom, how in charge are the learners of their own learning, can students ever be fully in charge of their own learning. If students can be completely in control how do you get to that point.
Sennet (2012) continued to explore the role of the student in the classroom and how students work together best.
Sennets' work, links into the study of participation, Sennet stated that cooperation is embedded in our genes as human beings but often needs to be developed and deepened in order for this to be effective.
Based on the above studies into peer learning and its benefits, you can begin to link this into specific lessons, in his case maths to help build confidence in the students' approach.
Lipman (1988) wrote about the need to grow the thinking around problem solving in education rather than lessons just being the acquisition of knowledge.

Ashcraft (2002), talks about fear in lessons, particularly with maths, making students forget information. 'Fear is one of the biggest factors that often leads to people's brains 'shutting down' in certain situations and 'cloud over' so that they do not feel comfortable or feel unable to answer a question or approach the work that they have been set. This relates to Higton et al (2017) and the work on maths anxiety and the emotions that working in a maths lesson brings out of student. Higton et al state that students often enter a maths classroom in a negative mind-set due to them perceiving that it is a subject that they find difficult, or one that they will be having to tackle on their own. In support of this Roby and Jones (2015) work talks about creating an environment in the classroom where students feel safe in the room. If a student feels that their classroom is a safe environment they will be more confident to work and 'have a go' at tasks. (Norman and Hyland, 2003)
I have started to draw these studies together for this research into the effect that peer learning can have on the confidence of students in a maths classroom, I have chosen to use the work of Lipman, because now more than ever maths is a subject that require a lot of problem solving skills. As part of their study, Norman and Hylands found that students are often and attending maths lessons but still not participating, in these cases we do not know how much peer learning was taking place in the lessons but through this research I am hoping to show that peer learning being implemented in an appropriate way will increase the confidence of the students and therefore increase the participation and engagement.

What I planned to do:

In a classroom environment, students often do not display that they can break down questions and do not display the ability to justify an answer given (Stiggins, Arter, Chappuis and Chappuis, 2004), students will often put up defensive barriers, stating; why do I have to do this, this is pointless, I've never been able to do this. In more severe cases students can become abusive to teachers and peers and even storm off as a way of not having to attempt work that has become challenging. This can also be displayed as students shouting over each other and refusing to work.

(working example – in a lesson on metric measure, students often confuse of mm-cm etc. and this works them up, through questioning and communication and in a safe environment this can be more easily approached with students.)

The above are all acts of defence rather than defiance, students who lack confidence in their own abilities or with the subject at hand will become defensive, (Darby and Moyes,) (they often perceive that it is better to look like they are just refusing to complete work rather than complete and get it wrong.)

Through this research I will be incorporating peer learning into lessons and working with students to see if it is possible to get to a stage where students are confident to give an answer without fear of failure.

My research will be carried out at a medium sized college and sixth form centre in the north west of England.
The research will be carried out with 30 students split into 2 classes, the first class will be a class of Level 2 performing arts students (based in the sixth form centre) the second group will be a group of level1 sports students that also include students with ADHD and Oppositional Defiant Disorder. The research will be carried out over a period of 8 months. During this time, I will introduce aspects of peer learning, as noted in Wiliam (2018) and Coffield (2014).
I will initially be giving each student that is taking part in the research, a questionnaire to complete to give me a sense of the starting point of each individual student and the groups as a whole.
Once I have examined the answers given in the questionnaire I will then begin the introduction of peer learning methods and continue to analyse the effects this is having on the students in the class. This continued analysis will take place in the form of ongoing interviews and also through evaluating my own lessons and the engagement of the students. As the year progresses the assessment results (where available) will also be used.

From this research initially I am expecting that class one will engage with the peer learning sooner and with better effects, I am expecting class 2 to be more resistant to the changes and pose more of a challenge.

Methodology –

For this study I will be using a variety of methods to gather my findings, I will be using a mix of qualitative and quantitative data. With this study being an action research project, I will be looking for viable solutions to solve a real problem (O'Brien, 1998)

At the start of the study I will be gathering the initial thoughts of the students via a questionnaire, in this questionnaire I asked the students questions regarding their maths including;

- would the student be confident answering a question directed to them?
- would the student be confident answering a question open to the whole class?
- How would the student rate their own maths ability? (or confidence in their maths ability?)
- Would the student support their friends/peers in a lesson?

I will be using these initial questions to form the basis of the research, as these questions will help to show the starting points of all students and the group.

Throughout the research period I will be holding interviews with the students involved in the research, to see how their answers to the above questions have changed (if at all). I will also be speaking with other teaching staff to gather opinions on the use of peer learning.

Case studies have also been used to form this research to help highlight student's opinions on maths, the feeling of being isolated and a lack of community feeling and confidence initially. (Bassey, 2003)

Finally, I will be using the quantitative data of the students' assessments result and attendance as a measure of success. The quantitative data will be able to be coupled with the interviews and case studies to review the measure of effect that peer learning has had on the students in the lesson. To reduce the chance of bias or error the data will be coupled and assessed alongside a wide variety of literature.

Ethical statement –

Throughout my research I will ensure that everybody that is involved in the research will be informed exactly what research is taking place and why it is being completed. The research will be classroom based and will be examining the engagement of students with peer assessment. Each person involved has been told why their participation is necessary and what will happen with the information that they provide and how it will be used.

All staff and student that are involved in the research have given their consent that their work and any quotes and or interviews with them can be used in the research. They have also given consent that any pictures taken that may support the research can be used.

Everybody involved has been provided with my contact details so they can get in touch at any point, they have also been informed that they have the right to withdraw from the research, or not have their information used in the research, at any point.

I will ensure that there will be no harm arising to anyone that takes part in the research process.

Any data taken and all research completed will be stored in a way that complies with the BERA 2018 guidelines. In accordance with GDPR this data will also be readily accessible to those that the data may relate to.

On top of making sure I follow the BERA guidelines I will ensure that I complete my research with honesty, integrity and trust.

Key Findings and Recommendations:

Throughout the research period peer learning was gradually introduced into the class based on the results of an initial questionnaire that all students completed prior to starting the classes.
When analysing the results of the paper I noted that all students said that in a maths lesson they would instantly go to work alone. The majority said that they did not feel confident to answer either an open question or a question directed to them, this highlighted that collaboration is not common practice within maths lessons and that due to this many students were lacking confidence in their own maths ability. This finding was in line with what had been written in the literature, specifically in Stiggins R.J., Arter, J.A., Chappuis, J., and Chappuis, S. (2004)
One of the most intriguing points that came from the questionnaire was that the students wanted to be able to support each other in the lesson, but due to the confidence issues this was not happening very often in the class. This result supported my initial hypotheses (in line with Sennet, 2012) that peer learning could be a positive factor on the learning experience of these resit students.

Once I had assessed the results of the questionnaires I began to introduce the students to peer learning 'do you think person X has given us the right answer?' or asking students to begin to answer exam questions together. At this point the peer learning was heavily facilitated by me, this was to offer encouragement for discussion, in the literature Sennet (2012) wrote that to get the best responses from cooperative working that it would need to be nurtured and developed and this was what I was initially finding when completing the

action research. As the lessons progressed this would become more natural to the students, their first response if they were unsure with a question would be to ask a peer rather than stopping work and asking the teacher. In the lessons you could see the students begin to take control of the lesson as their participation increased (fielding, 2011)

At select intervals across the 8 months I held interviews with students to gain an insight into whether or not the peer learning was having an effect. It quickly became evident that, after some initial struggles (mainly due to confidence), peer learning was working. Students were communicating the interview that they felt more relaxed in lessons and felt like they were in a secure and safe environment (See appendix 1 for student quotes).

As stated in the literature review, I selected two peer learning methods rom the 10 'peer learning' methods highlighted by Griffiths, Housten and Lazenbatt, (1995). I chose to examine the traditional 'student tutoring student' and also the forming of study groups within a session to solve problems.
To introduce the student tutoring student, something that had to alter (but that I had not considered in the first instance) was the seating arrangement of the room (Gremmen, Van den Berg, Segres, 2016). Even before any communication between students or teacher takes place, if the room dynamics do not work peer learning will be a non-starter.
With the room set out so that students were sat in groups of 4 and of mixed ability the stage would be set for plan peer learning to take off. This is a topic that I feel would need exploring further and in a larger study, to what extent do the room dynamics have an effect on the learning experience of students?

The biggest impact has been attitudes and emotions in the classroom, this, as earlier explained by Lipman (1988) makes for an environment of problem solving and exploration in maths rather than one of purely acquiring knowledge.
The quantitative data has highlighted the initial successes as well, the attendance for students in class one has improved by up to 24% on the previous year. The results for this class are also in and 80% of the class passed, with the 20% that didn't pass showing improvements in their maths that can be built on going forward.

I feel that this action research project has gone some way to highlight that peer learning should be embedded into the maths curriculum, the evidence that I have gathered to date is showing that the students are engaging in the lessons more when learning with and from each other. This will be facilitated and even at points controlled by the teacher. But as the students gain in confidence the amount of free peer learning will increase.
Should teachers choose to incorporate peer learning into their curriculums, it should be noted that this is not a quick fix and to get this right the teacher will usually have to facilitate the students and encourage discussion to begin with.
When introducing peer discussions, a starting point can be to get the students to feedback on assessments, encouraging each student to find some praise for somebody else's assessment paper. If the students become comfortable sharing praise the critique can then gently be fed into the process so that students will then become more confident questioning each other's answer.
Through incorporating more peer learning, as noted, students did begin to grow in confidence and communicate with each more and gain greater problem solving skills. These are all skills that can be transferred into other environments including when the students are employed.

Something that came out of the research that is not often talked about and that could benefit from further research is the relation between peer learning and the human emotion side and also the background / working method of the students. How would the findings be different with different groups and with a different teacher? Through the sessions I developed a

strong rapport with the students which also went some way to help build the students confidence.
This further research would build on the work of Michael Young and his work on Powerful Knowledge, examining the effects of the knowledge of the powerful versus the knowledge that would be powerful for a student to have (Young 2013). This would also form links with work on the hidden curriculum and the development of student skills.

Student Case Study:

Student X - This student was 17 years old at the start of the academic year, they had never settled in an education establishment, had issues with authority and due to this had not yet achieved the qualifications they were capable of achieving.

I have chosen this student as a case study because from the first lesson I had this student showed clear signs of those that I mention throughout this research. Student X had no problem shouting out in a lesson but when it came to shouting out about maths or answering a question they became would not take part, instead reacting with aggression;

*'why the f**k should I answer', 'do you not know the answer, thought you was a maths teacher*'.

These are all clear signs of a defensive attitude due to a lack of confidence in their self with maths. This student felt very much isolated within a maths lesson because they had not ever been in a lesson where they had been encouraged to problem solve and shown that getting answer incorrect is not a bad thing but a learning opportunity.

Across the period of research, I worked particularly closely with this student, when speaking with the student one-on- one it became quickly evident that this student had very good problem solving skills and a good foundation of maths skills. This student would become the key to building peer learning into the classroom. I spoke with student X about their experience of maths and how I wanted my class to work, I explained about the problem solving and discovery, that if you get something wrong it can be discussed and not dismissed. After initially thinking I was talking rubbish student x started to alter in lessons. The first sign of this was when I had asked another student a question and they got an answer that was not quite right, student x shouted out, but this time (in his own way) words of encouragement. 'Hard lines lad, takes balls to give an answer.' This verbal encouragement was almost the spark for this class.

Student X went on through the year to achieve his first ever maths qualification.

Staff interviews:

I asked my colleagues for their opinion on peer learning, do they use peer and if they don't, what are the reasons for not using it?

The opinions were all largely similar on peer learning;

- 'it sounds great but we don't have the time for that',
- 'the students need to be taught the knowledge first'
- 'I feel like I lose control of my classroom'
- 'it can take a lot of preparation time'

The above quotes represent the general opinion of staff when asked about peer learning at the start of the research.

This supported the findings of Stewart (2012) highlighting that many staff misunderstand how to best incorporate the students into the learning process, or do not want to give up 'control' to the students (Coffield, 2014)

When I presented my research to my colleagues they were pleased to see the effects that peer learning has had on this small scale. And at the point of writing discussions are taking place about incorporating into the wider curriculum for the new academic year.

Student views after peer learning (Appendix):

'it feels great to talk about an answer with my mate'.

'I didn't realise that I could work with people'

'I always worked on my own with a book in school'

'I wish I could have done this before'

'If I work it out this way but X has done it that way can we both be right?'

Bibliography:

Ashcraft, M.H., (2002), *Math Anxiety: Personal, Educational, and Cognitive Consequences,* Available at: http://www.mccc.edu/~jenningh/Courses/documents/math_anxiety.pdf (Accessed on 3rd of April 2019)

Bassey, M. (2003), *Case Study Research in* Swann, J and Pratt, J (2003) *Educational Research in Practice,* Cantinuum, London

Calderhead, J. (1994). Chapter 2, Learning through mentoring, *Competence and the Complexities of Teaching.* In Gregson, M., Pollard, A. S., Nixon, L., Spedding, T. (2015). Readings for Reflective Teaching In Further Adult and Vocational Education. pp. 36-38. London: Bloomsbury

Clarke, S. (2001) *Unlocking Formative Assessment.* London: Hodder and Stoughton. Chapter 4 'Feedback' pp. 51-71

Clarke, S. (2001) *Unlocking Formative Assessment.* London: Hodder and Stoughton. Chapter 6 'Questioning', pp. 87-100.

Coffield, F (2009) *Everything you ever wanted to know about teaching and learning but were too cool to a*sk, Learning and Skills Network, London

Coffield, F. (2014), *Students as learning partners within a community of learning* In Gregson, M., Pollard, A. S., Nixon, L., Spedding, T. (2015). *Readings for Reflective Teaching in Further Adult and Vocational Education*. pp. 36-38. London: Bloomsbury

Fielding, M. (2011) *Patterns of Partnership: Student Voice, Integrational Learning and Democratic Fellowship*' in Mockler, N. and Sachs J. (eds) (2011) Rethinking Educational Practice Through Reflexive Research: Springer, 61-75

Gremmen, M.C., van den Berg, Y.H.M., Segers, E. et al. *Considerations for classroom seating arrangements and the role of teacher characteristics and beliefs* Soc Psychol Educ (2016) 19: 749. https://link.springer.com/article/10.1007/s11218-016-9353-y#citeas (Accessed on May 20th 2019)

Griffiths, S., Houston, K., and Lazenbatt, A. (1995) *Enhancing student learning through peer tutoring in higher education*, Coleraine, Ireland: University of Ulster.

Henry A. Giroux & Anthony N. Penna (1979) *Social Education in the Classroom: The Dynamics of the Hidden Curriculum, Theory & Research in Social Education,* 7:1, 21-42, DOI: 10.1080/00933104.1979.10506048

Higton et al (2017), *Teacher Workload Survey,* Government social survey

Hillman, j (2014) (The Research Base) *Mathematics after 16: The State of Play, Challenges and Ways Ahead.* Available at: https://www.nuffieldfoundation.org/sites/default/files/files/Mathematics_after_16_v_FINAL.pdf (accessed on February 19th 2019)

Lave, J and Wenger. E (1991) *Situated Learning. Legitimate peripheral participation*, Cambridge: University of Cambridge Press

Lipman M (1988) *Critical thinking, what can it be.* Available at http://www.ascd.org/ASCD/pdf/journals/ed_lead/el_198809_lipman.pdf (Accessed on 6th May 2019)

Norman, M and Hyland, T (2003) *The role of confidence in lifelong learning*, Education: journal articles. Paper 7. http://digitalcommns.bolton.ac.uk/ed_journals/7

O'Brien Rr (1998), 'An overview of the methodological approach to action research', Available at http://www.web.net/~robrien/papers/arfinal.html (accessed July 15th 2019)

Robin, A (2008) *Towards dialogic teaching* https://www.robinalexander.org.uk/wp-content/uploads/2018/07/RPIE-2018-Alexander-dialogic-teaching.pdf (accessed on June 12th, 2019)

Roby. C, Jones. E (2015) *Engaging Learners in GCSE Maths and English,* Available at - https://www.learningandwork.org.uk/wp-content/uploads/2017/01/Engaging-learners-in-GCSE-maths-and-English.pdf (accessed on Feb 19th 2019)

Sennet, R (2012) *Together: The Rituals, Pleasures and Politics.* London penguin books https://www.researchgate.net/publication/276220216_Sennett_Richard_2012_Together (accessed on June 12th 2019)

Stewart W, (2012) *Think you've implemented assessment for learning*, TES 2012 Available at: https://www.tes.com/news/think-youve-implemented-assessment-learning

Stiggins R.J., Arter, J.A., Chappuis, J., and Chappuis, S. (2004). *Classroom assessment for student learning: Doing it right- using it well.* Portland, OR: Assessment Training Institute

Wiliam. D (2010) *The Classroom Experiment,* BBC 2, 27th November 2010. (watched on 24th Feb 2019)

William, D (2018) 2nd ed *Embedded formative assessment*. Solution tree press Bloomington

Young, M. (2013), *Powerful knowledge in education.* In Gregson, M., Pollard, A. S., Nixon, L., Spedding, T. (2017). *Readings for Reflective Teaching in Further Adult and Vocational Education*. pp. 138-142. London: Bloomsbury