

“How can we improve the levels of sophisticated vocabulary used in answers to starter and plenary questions through the use of mini-whiteboard in secondary education?”

The use of Mini-Whiteboards within Secondary Education

Word Count: 5443

Feedback from the Previous Essay and Meeting the Targets

	Targed / Target	What I have done in this assignment
Targed / Target 1	Breaking sentences to improve readability.	Structuring of essay to provide a flow from the beginning of the research to the conclusion.
Targed / Target 2	Paraphrase key concepts and theoretical stances rather than relying on using direct quotations.	Paraphrasing during literature readings rather than using direct quotations constantly.
Targed / Target 3	Improve the level of reflection supported by literature.	Reference by using surname(s) and the year of publication to meet Harvard referencing standards. Also done in an alphabetical non-numbered order.

Aim, Focus and Purpose of the Research

The aim of the research is to investigate if there is an increase in the sophisticated vocabulary used when using mini-whiteboards in the classroom, allowing a whole class participation method to be used during the starter and plenary activities.

The researchers have chosen to focus on looking at a specific range of pupils based off of their prior attainment levels throughout years 7 and 8 (Ages 11-13), in order to justify results by relating to relevant literature discussing the use of mini-whiteboards in the classroom.

The purpose behind the research was to identify if there is a varied level of vocabulary used by pupils if alternative methods of answering and participating in starter and plenary activities is provided.

Research Context - The Classroom Setting

Discussing with my partner, the research will be undertaken through a non-participant, overt standpoint and we decided that we would use a range of pupils based on their previous attainment levels across our year groups to possibly identify any similarities or differences that we can identify from our research gatherings. We will then use these findings to see if they are linking into relevant literature or not. For my class, I conducted my research within a mixed ability year 8 form during an ICT lesson regarding spreadsheets information.

My partner's classroom consisted of a mixed ability year 7 form during a Humanities lesson. I discussed with my partner how we would implement the use of mini whiteboards into our lessons and we decided that using the starter and plenary activities to incorporate this would be applicable as we can relate the techniques across our subjects.

Literature Linkages

In order to find any relevance within the research activity, it is essential to explore relevant publications which will allow the researchers to form justifications with their own findings. The researchers believe that the thoughts of McCarney's principles on Landsberger's Hawthorne effect will be a negative downside to the research as the pupils will be knowledgeable that they're being observed along with their answers which will potentially cause an increase in participation and affect the overall results with a bias.

Beginning to look into how mini whiteboards are used within the classroom, Hirshman (2015, page 1) has written about how whiteboards provide individuals each an answering method, allowing teachers to monitor their pupils engagement and accuracy with tasks, pupils were also found to engage more productively with tasks by providing whiteboards as an alternative to entering information on paper. Hirschman (page 2) discusses how mini whiteboards are also great for prediction activities where pupils can easily write a quick answer which can be checked with other pupils around the classroom. Mini whiteboards are also a 'safe space' for pupils to write their answers as wrong answers can be easily erased from the board and the individuals mind, removing negativities from the pupils wellbeing.

Mini whiteboard advantages are described by Hirschman (2015) as being easy to setup and tidy and provide no paper wastage on small question / answer tasks. Continuing with the benefits of mini whiteboards, games and quick writing tasks are also easily implementable and by keeping the whiteboards out of the pupils sight when not in usage, it keeps them as an exciting feature.

WoodRose Academy identifies several benefits in agreement with Hirschman and describe mistakes being quickly correctable, pupils get to personalise their delivery of answers through their own sentences and see an all-round engagement level increase in pupils. WoodRose also uses the whiteboards to motivate pupils who would not participate in hands-up questioning activities and see a more frequent attempt at questions from un-confident individuals. They believe engagement levels are higher due to pupils feeling that even though they have written their answer, they do not necessarily have to show it to the class and to conclude a very beneficial part of using the whiteboards is that if the pupils answers don't work out, they can simply erase them.

In 2017, Callinan used mini whiteboards within their science lesson to have students draw concepts, allowing tracking of individuals progress and understanding. Callinan found that pupils were more concerned with correcting their whiteboard answers than their information sheets and in most cases, more information was recorded on the whiteboards against the sheets.

I looked further into this by reading Anderssons' improved formative assessment practise which correlated well with Callinan and Hirschmans' beneficial aspects of mini whiteboards with small assessment tasks that can improve an individual's achievements and move the learner along by following Wiliam and Thomson's model shown in figure 3.

	Where the learner is going	Where the learner is right now	How to get there
Teacher	1 Clarifying learning intentions and criteria for success	2 Engineering effective classroom discussions and other learning tasks that elicit evidence of student understanding	3 Providing feedback that moves learners forward
Peer	Understanding and sharing learning intentions and criteria for success	4 Activating students as instructional resources for one another	
Learner	Understanding learning intentions and criteria for success	5 Activating students as the owners of their own learning	

[Figure 3] Wiliam and Thompson's model of learner progression

Implementing such a model it however highlighted by Andersson as requiring a large amount of support in teachers' practise in order to have the model work successfully. Teachers are discussed as having benefits from collaborative experiences to develop their usage and understanding of formative assessment, leading to an improvement in classroom practices that enhance pupil achievements.

Although the previous authors have been discussing the beneficial aspects of mini whiteboards and formative assessment, in 2011 Stahl provides a counter argument of how do we actually measure an individual's vocabulary growth to inform their development and build upon their achievements in the classroom but Cochrane (2015, pages 25 and 26) argue that engagement can lead to opportunities to develop personal achievements and improve what they are receiving from their academic possibilities.

Cochrane links engagement with improving thinking and learning skills and how it is challenging to prepare pupils for the future due to difficulties such as Stahls. Cochrane used whiteboards to record keywords during starter and plenary activities and received feedback on how the keywords help pupils to organize and categorize information within their thoughts.

A possible linked strategy is to use formative assessments to measure vocabulary growth using methods such as mini whiteboards but the teacher tracking can be difficult due to the nature of whiteboards being easily erasable. In 2008, Lasry produced an effective teacher tracking method for formative assessment tasks by using flashcards to archive pupils answers as opposed to whiteboards. Cornelius (2013, page 1) mentions how formative assessment helps to inform the decisions that are made by teachers and monitoring pupils progress and engagement on an individual basis allows the development of new strategies.

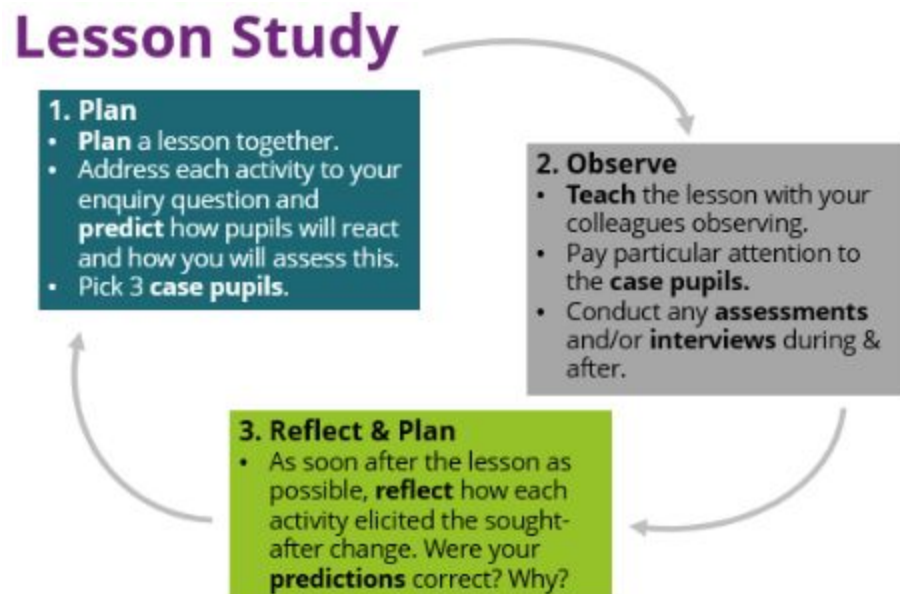
In 2019, Gimbutas conducted research into the effects on using mini whiteboards with academic performance being the research point. The researcher discovered a mixed outcome from their study with no significant impact on student performance being recognizable but there was a clear increase on participation and on-task behaviour. This is not to say that whiteboards do not have an impact on academic performance as a separate study from the same researcher showed an increase in the academic performance from using mini whiteboards. This may well happen in our lesson study and would be a great relatable discussion. Gimbutas found that for short test activities, using whiteboards increased test scores for revision against reading paper sheets and concluded with positive engagement from participants but academic improvement was not consistent for students.

Lastly, Nagro (2016, page 1) is in concurrence with Stahl on the difficulties in measuring vocabulary improvement and says how it can be challenging to find methods that include all pupils positively and instead using a variety of methods would be in the best interest.

Lesson Study Methodology Design

Lesson study research methodology is, as discussed by Lenski (2009, page 2) a cyclical process, allowing teachers to reflect on their practise through a model that is results-orientated and justifications are made from the gatherings of data during the cyclical process. The aim of the methodology is to improve the connection between the lesson planning and how the pupils' learning can be heightened. The concept was first introduced into the UK in 2001 by Pete Dudley who has pioneered several school systems advancements with lesson study research.

Marble (2006, page 1) highlights lesson studies as providing an opportunity for practitioners to develop relationships and increase their knowledge through the gathering and exchanging of information from their classroom practises. Professionals get to create and develop new techniques straight from the classroom itself and can reflect on the findings by using the cyclical model.



[Figure 1]

The National College for Teaching and Leadership have developed the cyclical model along with key points that are met throughout each stage.

For the activities themselves, we designed three predictions for the study itself and will re-visit these at the end to see if our thoughts relate into what our research and supporting literature is demonstrating.

Our three predictions were;

- 1) With the white-boards there is more learning / thought processing happening and a greater amount of discussions and opinions have been contributed to the activity.
- 2) The previously lower attaining pupils will have a greater understanding / engagement with the activity through using the white-boards.
- 3) Introducing the mini white-boards into the classroom is a new concept within our subjects and therefore the engagement levels will be higher than if they were considered a normal activity, possibly resulting in non-consistent results.

Using a lesson study methodology approach provides a model in which two or more teachers work together to develop their practise within the classroom with the purpose focusing on the pupils learning and trying to solve a learning-based problem that could be affecting pupils' progress. This then allows teachers to engage in developing new techniques within the classroom and is designed to improve a specific aspect of learning for numerous pupils.

With our research question aiming to look particularly at how the levels of vocabulary differ between traditional questioning methods and introducing a whole-class participation method we conducted a lesson study approach in order to collect information and form justifications.

Our lesson study design in particular allows the gathering of the required data, an opportunity to question three participants from the lesson itself, a proforma reflection sheet for the study itself and most importantly the essential ethics form for the participants parental consent. Our lesson study can be broken down into four sections; Planning, Observing, Interviewing and Reflecting.

The planning phase of the lesson study involved the researchers creating a lesson each but with the starter and plenary activities having similarities between them to be executed within the lesson itself and collect the data. During the planning phase we also chose three pupils from each of our classes based on their prior attainment levels to cover a potential range across the classroom in the answers we might be receiving. Researcher one would use whiteboards in their plenary and not in their starter activity and research two will use whiteboards in their starter activity and not their plenary, this will then possibly correlate into our findings in order to identify any changes between the activities and if the whiteboards were used or not.

This was done as we thought a link might be able to be found between the engagement levels with the task and the work that was being produced.

The non-participant observation phase is conducted with one practitioner leading their lesson as usual but implementing our starter and plenary activities and the other researcher conducts a non-participant observation of the lesson by following the designed observation schedule sheet which can be found at appendix entry one. The observation schedules from both researchers will be analysed within the '*lesson study results*' section further into the essay. The observer will also pay most attention to the case pupils and how they in particular are engaging with the activities and if any sophisticated vocabulary is being used within the activities themselves. The observational sheet notes allow the researchers to gather data relating to participation numbers and provide a rating for each case pupils answer between the two activities. Alongside looking for sophisticated vocabulary, we looked at the participation numbers for the activities to possibly later identify a relationship between the answers provided and how engaged the pupils were with their task in the analysis stage.

Thirdly, the interview phase is where the three case pupils follow a dynamic questioning sheet (appendix entry two) that is recorded and transcribed into the results section to follow. The focus group candidates were chosen by using the schools internal pupils monitoring system and selected based on their prior attainment and predicted targets, potentially allowing a variety within the focus group questions and answers. With the interview model being dynamic, the questions specified on the sheet can be explored further or alternative points can be explored during the interview to cover extra possibilities from the study.

Lastly, the reflection phase is used to analyse what has been gathered from the study itself and is used to inform future lessons from the conclusion. The reflections were captured using a proforma (appendix entry three) that was designed from Gibbs' reflective cycle. This allows the researchers to record the classroom description, any feeling and emotions from the lesson study, any positive and negatives that arose, whether or not literature relates to our findings, an overall conclusion from the lesson study and future recommendations if the study was to be conducted again.

Ethical Considerations

There are ethical considerations with doing research in a classroom which are highlighted throughout the BERA (British Educational Research Association) ethical guidelines which have been created through practitioners such as Pete Dudley. The ethical guidelines as mentioned by BERA themselves aim to advance the quality of research and provide top-quality educational research standards. The ethical standards refer to rules to abide by when conducting educational research to maintain a legal and professional standpoint within teaching. The standards are formed by considering ethical guidelines, ethical committees and having an ethics approval process before your research is carried out. The methods to be used are discussed and are to be approved by a third-party. This allows outside personnel to identify any potential risks within your research and how you can best mitigate them.

Our ethics form in particular (appendix entry four) allows the practitioners to highlight the documentation followed for the project (BERA Guidelines and the UWTSD Code of Ethics) along with dates the research itself will be conducted and the aims / objectives behind the project.

Purpose of Research Activity To see if the usage of mini whiteboards and whole-class participation aids in the vocabulary used when participating in starter and plenary activities as opposed to the hands-up question and answer method not requiring all to participate and provide an answer.
Research Question How can we improve the levels of sophisticated vocabulary used in answers to starter and plenary questions using mini whiteboard in secondary education?
Aims of Research Activity To investigate if there's an increase in sophisticated vocabulary used when alternative methods of answering are provided, such as mini whiteboards, allowing a whole class participation method.
Objectives of Research Activity Look at the Participation Numbers for No whiteboard vs Whiteboards activities Question 3 (have 3 backup pupils also) Students within an interview type setting (Various Previous Attainment Levels - Chosen by our Professional judgements from previous assessment for learning tasks done in PTE1 Nov-Dec)

[Figure 2] Snippet of the Ethical form where the purpose, question, aims and objectives are proposed.

Lastly the ethics form allows the identification of anticipated risks and how they can be mitigated, showing the thought has been considered before the project has been undertaken.

Lesson Study One - Results and Analysis

All case pupil answers and control answers are available within the appendices five through fourteen. The lesson plan for the first lesson study has the starter and plenary tasks outlined and how they will be incorporated into the lesson to gather our required information. The first starter activity is using the mini whiteboards within the humanities lesson to write a description of *'What the journey from Africa to America would be like for slaves'*. Pupils were allocated 10 minutes to write down their answers which will then be assessed for the vocabulary usage relating to the task. The starter activity had 3 sections of writing keywords on what the journey would be like, what countries was slavery involved in and what objects are associated with slavery. The plenary task contained three segments; pupils write three sentences of what life was like as a slave, pupils think of two keywords that relate to the slaves and thirdly the pupils draw a picture relating to the topic, again this is allocated 10 minutes.

From the observation schedule sheet, 31 pupils engaged with both of the activities (the entire classroom) showing instructions being understood along with the activities at hand being on the board for students to remind themselves. The case pupils vocabulary usage and engagement are rated between the researchers as 3, 2 and 1 as opposed to initial thoughts for the study being rated as 2, 3 and 1 based on prior attainments.

For the starter activity, case pupil 1 (of lower prior attainment) did not get to writing about what the journey would be like on the whiteboard, however the second segment regarding the countries involved in slavery were written, showing some prior knowledge regarding slavery and the third segment of relating objects was not answered. This therefore means that the first case pupil only answered one of three segments whilst using the mini whiteboards and this is believed to be due to the pupils disengagement within the activity and an uncertainty to the time remaining for the task.

Case pupil 1 however did portray good engagement with the non-whiteboard plenary activity where the three sentences were complete, keywords relating to slavery were identified but a picture was not drawn. Relating this to the starter activity, two of three activities have been engaged with here showing a greater engagement and vocabulary usage within the non-whiteboard activity.

Case pupil 2 (of higher prior attainment) had full engagement with the starter activity involving the whiteboards and wrote down several keywords such as 'traumatizing' and 'depressing'. For the plenary activity, two out of the three sentences were written and three keywords were written for the second plenary segment, however again the drawing was not complete. The candidate maintained little concentration with the activity itself and instead used their workbook to access their prior knowledge and quickly answer the activities.

Case pupil 3 (of average prior attainment) answered two out of the three starter activities regarding the whiteboards and used extensive keywords within their descriptions demonstrating a wide range of prior knowledge vocabulary being used within the activity. For the plenary activity, only one of the three segments were attempted, the one being the three sentences about slavery, this could be due to the time remaining for the task along with the pupils fluctuating engagement levels with the activities.

Several control answers were also taken from participating candidates to possibly identify any similarities between the pupils' answers for the activities. The control answers demonstrate that not enough time was given for the plenary activity as only 1 out of 8 answers have completed the drawing segment however also portray subject related vocabulary relatable to the answers given by the three candidates.

Interviewing the case pupils by following our questioning model (appendix entry two), each pupil displays a unique favourite section from the activities and all remember the activities contents. Overall the plenary was given a score of 12.5 by the pupils whereas the starter activity was given a score of 11. This is identifying how pupils rated the non-whiteboard activity higher than the whiteboard activity. 2 out of 3 case pupils displayed a favouritism with the plenary activity however 2 out of 3 also agree on looking at others answers before providing their own.

All pupils however said they prefer using the whiteboards with questions as all pupils participated with the topic and were not keen on hands-up questioning against using the whiteboards. Pupils said they were actually less nervous however when using the whiteboards with questions as they had time to prepare an answer and can read it out if they were not paying attention, this then lead into all case pupils feeling a greater level of confidence when answering with the whiteboards. To improve the lesson in the future, the pupils would increase the amount of available resources and lower the amount of sentence writing and instead write keywords.

Lesson Study Two - Results and Analysis

The lesson plan for the second lesson study (appendix entry ten) has the activities outlines as; A starter activity where pupils come up with 3 sentences on what Excel can be used for and 2 keywords relating to spreadsheets. The plenary activity then relates to lesson study ones' activity where pupils write down an explanation of what they have used Excel for, in an attempt to access prior knowledge from the pupils and see what vocabulary they use.

The observation schedule shows 26 pupils engaged with the starter activity (whole classroom) along with 26 also engaging with the plenary. With this lesson study being conducted in an ICT lesson, the concept of writing and the whiteboards was very new and it is important to be wary of this as it might hinder the engagement level criteria. The answers on the observation schedule are rated from the case pupils as 1, 2 and 3 as opposed to the initial thought of the ratings coming as 1, 3 and 2.

Case pupil 1 (of higher prior attainment) answered their starter activity in a word document and completed their three sentences along with two keywords, showing engagement with the topic and using vocabulary from their prior knowledge based on a task they have been conducting a project on. The three sentences were written with structure and punctuation and used numerous keywords within their sentences. The pupils plenary activity on the whiteboards was an extensive explanation of what Excel has been used for and is rated highly against other answers and the control answers. Several concepts are covered and a systematic approach is taken to writing the usage of Excel with beginning to collect the data, analysing the data and producing graphs.

Case pupil 2 (of lower prior attainment) wrote three simple sentences regarding what excel can be used for however did include technical vocabulary within their answers. One of two keywords were written along the second part of the starter activity. The pupils plenary activity answer wrote a short answer in comparison to case pupil 1 however was of a relevant nature and summarised their usages of Excel well.

Case pupil 3 (of average prior attainment) wrote bullet pointed starter activities on Excel usages but not many technical words were used and instead prior knowledge was used to complete the three sentences and the two keywords were not completed. The plenary activity of writing how the pupil has used Excel was not completed by the pupil due to timing and complications regarding the whiteboard activity.

The control answers from lesson study two display a mixture of bullet pointed sentence answers and using sentences to form their answers and a general technical vocabulary of words such as 'graphs, formulas and data'.

The interview segment of the second lesson study returned a 2 out of 3 for using the whiteboard within the ICT lesson as features such as spell checker and word lookup allow accuracy to be put into answers. Each pupil remembered the activities and the preferred activity was the plenary where the whiteboards were used to write down what the pupils used Excel for within their projects. Additional arguments were also made on how it is interesting to move away from computers within the lesson and practise handwriting. No answers were copied from other pupils in the lesson and again 2 out of 3 found the whiteboards to be the more engaging task.

In agreement with lesson study one, pupils also agreed that making a game out of the activities where pupils can collect points from their answers and receive prizes was a large talking point and could be implemented throughout the years work to collect multiple points and prizes. These answers can then also be used as a lesson / topic recap. Introducing whiteboards into the lesson sparked engagement between the 3 case pupils as a new concept was being introduced into the computing lesson.

Relating to the lesson goals, pupils successfully completed their activities through accessing prior knowledge and demonstrated this through thinking about the tasks and using subject related vocabulary within both activities which is what we set out to investigate. Using Gibbs' reflection proforma, both lesson studies have shown full engagement with the activities, again possibly due to the Hawthorne effect and an overall positive has come from using the whiteboard activities within the lesson as an alternative to traditional questioning methods such as hands up.

Both classes however showed different views towards the whiteboard task being their favourite leading towards a justification of pupils having their own individual preferences on how they want to answer tasks, therefore using numerous methods would best satisfy the majority.

Comparing both lesson studies results, pupils display varying opinions on using the whiteboards however a clear increase in confidence is discussed and the researcher has concluded that although pupils do use sophisticated vocabulary within the whiteboard activities, the same is also shown for their other activities where the whiteboards are not used, possibly due to the Hawthorne effect which returned results in which all students portrayed high engagement with the activities. Gamification was also a major discussion point between the two lesson studies and the case pupils portrayed interest in collecting points from their answers which they described as increasing their thought processes and keyword usage with the subject.

Relating our Findings to Literature and Research

Analysing the results from both lesson studies, a mixed result is found between having a preferable method of participating in starter and plenary activities which coincides with Gimbutas' findings on how participants displayed individual preferences and would benefit from a variety of methods being used rather than one sole method.

Callinan (2017) discussed how their participants however wrote more on their whiteboards than other provided methods which is also apparent for some of the participants from my study (appendix entry 11) where some pupils display a greater amount of writing on their whiteboards versus their computers.

Findings formative assessment methods can be challenging to include all pupils (Nagro, 2016) but provide teachers with an understanding of individuals progressions within the lesson and topic which help to inform future activity decisions (Cornelius, 2013). The researcher found it difficult to document the pupils whiteboard answers and had to use a camera to log them, which used time within the lesson as if the observed had not taken the images, this would be the responsibility of the classroom teacher and would not be a feasible method.

Lasry (2008) portrays how using flashcards against whiteboards provides an archivable method for helping formative assessment decisions which is a good counter-argument on whiteboards being situation objects and are dependent on what activity is being done. Reflecting also provides an opportunity to revisit the three predictions from the start of the research project and justify why they might or might not be true.

Our first prediction was that we thought the whiteboard would lead to more learning / thought processing happening and more discussions arise about the tasks which did not appear to be present from the data and instead we saw greater engagement from participants but identifying an academic increase is difficult without an archived baseline of the individual case pupils to compare with over time.

Our second prediction coincides with Callinan's findings of having participants having greater engagement with the whiteboard activities but could differ should a greater number of case pupils be investigated.

Thirdly, we predicted that the Hawthorne effect would be present within the classroom as the activity was a new concept for the pupils and they're aware of being observed which we believe to be true as our data showed maximum engagement from all participants in the lesson studies but may differ should the study be done on unaware pupils.

Our results also found pupil engagement was high during the whiteboard task as displayed in Hirshman's findings too but we also had the same participation levels in the none whiteboard activities, possibly linking to Gimbutas' point of no academic progress found within whiteboard activities and instead mainly identified an increase in the engagement of pupils along with on-task behaviour.

Hirschman's discussion on using the whiteboards during game-like activities was also a major point that the researchers found during the interview process with the case pupils. During both interviews, interests were displayed in creating games from using the whiteboards and having an individual scoring system would be beneficial for pupil engagement and effort applied.

Conclusion

The method for collecting our data sufficed in providing evidence for enhancing pupil engagement and enjoyment along with the pupils being interested to further the idea of moving the activities into games and a scoring system for the pupils through the year. The observation schedule had a rating for the case pupils which was deemed as an un-usable data capture point as there was no basis of what a good answer would be nor what the pupils had previously written, so providing a one off score would be meaningless data to just if their vocabulary has improved. Therefore a wider timeframe would be required along with collecting more data of the case pupils allowing the potential identification of an increase in their vocabulary.

As Gimbutas showed a clear mixture between the positive impact on student performance, our results also demonstrate a mix of opinions between the case pupils on using the mini whiteboards within the classroom and again finding an increase of the vocabulary used by the participants was not a measurable aspect but provided the researchers with sound and literature linked information on finding engaging activities for the pupils and by using several methods such as whiteboards and flashcards, teachers can develop their formative assessment strategies.

From the experience, we learnt that improving the lessons for the future would be beneficial as timings for the activities were an issue for some pupils and possibly providing a countdown on the board to emphasise the activities expectations would be beneficial to have pupils on track to complete the task. The researchers also identify a beneficial aspect being if the whiteboards were a norm within the classroom as we feel a bias was present as engagement levels were high between both lesson studies and pupils knew a study was being done within the lesson.

If the researchers were to conduct the study again, it would be of importance to have an idea of what the pupils already know and have them write this down using an alternative method to whiteboard and then conduct the whiteboard activity to compare with their previous work. The researchers have also identified two additional limitations in the study as the number of case pupils is not sufficient enough to demonstrate the activities as effective and although both lessons showed maximum engagement from the participants, the researchers feel that a larger data set would provide a different outcome.

The second possible limitation was that not all pupils might have engaged enough with the topic at hand and that doing an abnormal activity in the lesson might have made them veer away from the topic at hand and instead write generic answers to the posed questions. Conducting the research again would also allow the researchers to consider their interview questions and tasks with sophisticated vocabulary usage more in mind and by having the time frame across several lessons, each case pupil would be able to set their own start point and each possibly show their own individual progress over the course of the lesson to then complete the same questions at the end, possibly relating better into the researchers question as to whether or not an increase is identifiable from using mini whiteboards in education. The main strength of the activities were mainly leaning towards improving the engagement levels of the pupils by introducing new concepts into the classroom and provide the researcher an insight into how pupils can benefit from several strategies being introduced into their learning and although this study had some limitations, the data suggests that the use of mini whiteboards may help to increase the engagement and keyword vocabulary usage

Moving forwards, in my next school experience the researcher wants to use archive able formative assessment methods to track individuals progressions and inform my future decisions when creating tasks to best suit the entire class. The research also wants to develop this pupil's idea of gamification and through positive reinforcement, each pupil can display their knowledge and engagement with the activities over the course of several lessons rather than a singular lesson which might not be best for measuring pupil progress.

Recommendations

The forms we used to collect our data were adequate however the observation schedule answer ratings were hard to place as a scale was not present to accurately rate the answers 1-10, therefore a dynamic observation schedule might have been beneficial with tracking participants engagement and vocabulary usage levels.

Using the Leuven Scale would allow the researchers to better measure the pupils engagement and would be built into the observation schedule if the project was run again. The study also confirmed that some students were satisfied with the use of mini whiteboards in the lesson as a new concept as it kept the lessons contents unpredictable which lead to improved engagement levels from the pupils.

Lastly having the lesson run across multiple lessons to allow a better comparison between pupils vocabulary usage would be far more beneficial for analysing the results as a baseline would be able to be compared to for each pupil individually rather than using a generic assessment model which might not suit all pupils.

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Figures

[Figure 1] <https://tdtrust.org/what-is-lesson-study>

[Figure 2] Ethics Form Snippet

[Figure 3] Wiliam and Thompson formative assessment model (Page 5)

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