

ECAD7004:

Professional and Pedagogic Studies: Researching the Learning: what, how and why am I teaching?

Assignment Title:

Are pupils engaged with a 'Dual Coding' input during a 'Domain' lesson within a knowledge-rich curriculum?

Student Number: 1900123

	Targed/Target	Yr hyn yr wyf wedi'i wneud yn yr aseiniad hwn. What I have done in this assignment.
Targed/Target 1	Aim to develop an awareness of challenges to established viewpoints to help you make your own judgments	Throughout this assignment, I ensured that I challenged statements and opinions in order to make my own judgements.
Targed/Target 2	Consider counter arguments to support your own critical analysis	Throughout this assignment, I tried to support my writing by considering arguments for and against viewpoints. This allowed me to discover a wider judgement.
Targed/Target 3	Continue to develop your fluency in writing style.	Throughout this assignment, I tried to master an academic tone, kept context simple and tried to develop my fluency in writing.

Word Count: 4676

Glossary of Terms

Dual Coding - *a combination of visual and auditory stimuli to deliver teaching*

Domain - *a subject area with The Core Knowledge Scheme that delivers a blend of learning areas*

Read-aloud - *a script read by the teacher about a topic*

Retrieval Practice - *5 minute session at the beginning of a lesson to activate prior knowledge*

The following essay will highlight and discuss the findings collated within a classroom investigation. The investigation was carried out after discussing with my research partner about the teaching methods in our placement school. The placement school for both myself and my research partner was a one form entry Roman Catholic Primary School located in the Vale of Glamorgan. Our placement school, which has been recognised as an innovation school, (reference omitted for anonymity) implements a knowledge-rich curriculum, following the Core Knowledge Scheme (Hirsch, 1986). It has an emphasis on enhancing pupil's level of knowledge rather than learning through a skills based curriculum. The topic that we developed an interest in was children's engagement across the year groups as the school delivered a particular way of teaching through an independent curriculum. The school places great emphasis on teaching using a 'dual coding' input which consists of both auditory and visual stimuli in order to provide children with a deeper level of learning (Bear et al, 2006). We decided to explore this topic and therefore developed the question of **"are pupils engaged with a 'Dual Coding' input during a 'Domain' lesson within a knowledge-rich curriculum?"** In regards to this, the purpose of the investigation was to monitor the level of pupil engagement during a lesson adopting a 'dual coding' approach within both Year 2 and Year 4.

In order to develop a deeper understanding and gather further knowledge of this topic, academic literature was collated, studied and analysed prior to the investigation. As our placement school was recognised as an Innovation school, it was important to delve deeper into the understanding of what the title meant. Burgess et al (2019) explains that innovation schools were developed from pioneer schools and they are defined by planning and implementing strategies, methods and schemes of work within their curriculum. Therefore, these schools try new techniques to develop their own curricula which can then be evaluated and shared to create guidelines for other schools. In relation to this, it was displayed throughout my placement school as they implemented an independent maths, The Core Knowledge scheme (Hirsch, 1986) as well as provided staff with Teach Like a Champion (Lemov, 2015) behaviour for learning styles.

The Core Knowledge Scheme (Hirsch, 1986) consists of lessons known as Domain, which incorporates teaching cross-curricular themes which promote the importance of knowledge rather than skills based teaching, in order to enhance knowledge acquisition. In consideration of Professor Donaldson (2015), it was important to understand how this method of teaching would be beneficial to engagement and learning as it differs from the

skills based input suggested to be implemented throughout Curriculum for Wales 2022. As Welsh Government (2015) states, pupil disengagement can be a significant factor that affects behaviour management as well as a child's level of learning during a lesson. Consequently, research suggests that teaching methods need to tackle disengagement by ensuring learning has significance.

With this being said, Willingham (2009) states that in order for knowledge to be transferred to long term memory, it has to be memorable. The Domain lessons are delivered with both audio and visual stimuli, meaning the teacher reads a 'read aloud' (script) while images that relate to the topic are displayed, recognised in theory as dual coding (Paivio, 1971). Paivio (1990) believed that the human brain has two connected cognitive subsystems, one representing image and one representing sounds. According to his theory, the brain is able to process visual and audio information simultaneously because the subsystems are separate (Appendix 9). According to Baddeley (2010) the combination of the two forms an enhanced level of understanding and delivers a deeper level of understanding. Agreeing with this, Kirschener (2017) believes that the human brain needs both types of processes to make knowledge meaningful, therefore, transfers the knowledge from working memory into long term memory.

The implementation of the dual coding theory within the Domain lessons is displayed through presentation slides. Dual coding, however, only promotes the use of slides if they are used effectively (Caviglioli, 2019).

"It's laziness on the presenters part to put everything on one slide." Duarte (2008)

Thus, engaging one subsystem of the brain by incorporating slides while the teacher's speech engages the other, allows the brain to work in unison to develop a deeper level of understanding (Pavio, 1990). In accordance, Mayer's (2001) principles of multimedia learning supports the application of dual coding in order to obtain and secure engagement. He suggests that when displaying text and images, the visual channel is being occupied by both and therefore creating cognitive overload. Sweller (2011) et al proposes that in this case, cognitive overload is increased by the Split Attention Effect due to the learner processing two visual elements simultaneously, resulting in the brain conflicting between the two elements at one time. Consequently, the learner can become disengaged as the information becomes too overwhelming and interest is lost (Willingham, 2009). Through extensive research and evidence collated by Mayer (2001), the multimedia principles

propose that combination of images and words provide more effective learning and maintain pupil engagement.

Clark and Lyons (2004) highlight the benefits of the dual coding approach within teaching, therefore, this created high expectations prior to the investigation of the Domain lesson. They suggest that the use of visual in teaching has a number of factors to motivate and engage the learner. Incorporating images can capture the attention of pupils and act as an anchor for engagement as they can become engrossed and trigger their imagination. It can also help with activating prior knowledge as images may hold emotional significance to children and delve into their memories.

In contrast, Piaget (1964) believed that children should be active learners in order to increase their cognitive ability, thus, exploration and taking learning into their own hands should be essential within lessons. However, the Domain 'read aloud' requires children to sit on the carpet and obtain the information through audio and visual stimuli for at least 20 minutes. Mayer (2002) suggests that teaching by rote without involving learners can hinder their understanding and inhibit their application of the knowledge to other situations, as they may be able to retain facts but unable to understand the concept.

This reading supported our investigation and provided us with a deeper understanding of the theory surrounding the research question. Following this, my research partner and I were able to develop and prepare the appropriate investigation into monitoring pupil engagement when dual coding is implemented. The methodology used for this investigation was the implementation of a lesson study, consisting of the non participant observations of two lessons that both have the same focus. A lesson study is a form of action research involving collaborative teaching with other teachers (McNiff, 2013). As learning should be the centre of education, Sachs (2014) suggests that improving teaching and learning should be of the utmost importance in order to provide the best education. It focuses on improving a specific aspect and identifying the needs of pupils first hand. It promotes pupil voice as it allows children to feedback the features of the lesson. Therefore, it can support continuous professional development (CPD) by identifying the strengths and weaknesses of the practitioner and how to move forward to enhance teaching and learning. As suggested by Dudley (2014) three pupils were selected from each ability group within both Year 2 and Year 4 but at random to represent three tiers of children based on academic ability. Although lesson studies are beneficial for CPD, they aren't without limitations. Lesson studies can be

time consuming in an already intense working environment and therefore can create distress on teachers as it can be seen as another task added to their workload (Brosnan, 2017). With that being said, it was decided that the nature of a lesson study was the most suitable method for our investigation as we were able to carry out research first hand and collate primary evidence.

The observations of the three case pupils were carried out six times, once every 10 minutes to gain an average overview of the 60 minute lesson (Appendix 1a-c & 2a-c). After deliberating various methods of observation, it was decided that an adaption of the Leuven Scale (Laevers 1997) would be used the appropriate method to use as it is suggested to provide a deeper level of data. The observation schedule was developed to investigate and determine the level of engagement of the pupils during the dual coding input within the lessons. Each child was given a score from 1 (very low) to 5 (very high) to monitor concentration, interest and motivation and overall engagement. The children in both year groups were aware and familiar with myself and my research partner and were previously informed of the aim of the research. I was present as the observer during the Year 4 Domain lesson while the Year 2 Domain lesson was delivered by myself and observed by my research partner. However, this style of observation can become time consuming as it has to be carried out over a period of time in order to gain reliable results (Arnerich, 2018).

Interviews are also recognised as an effective tool for collecting data (Cohen et al 2016) and therefore semi-structured interviews were designed and carried on the three case pupils following the observation of each lesson (Appendix 3a & 3b). Semi-structured interviews were chosen due to the flexibility of the questioning and we decided this would be effective in order to offer children the opportunity to answer honestly and with as much detail as they desired. The freedom of questioning gives the impression of an informal conversation as the following question tends to adhere to the previous answer. Thus, the children can feel more at ease as interviews may cause pupils to feel anxious (Adams, 2015). Brinkmann & Kvale (2015) state the importance of the relationship between the teacher-researcher and the pupil therefore, the interviewer should not be silent and the interview should involve discussion. This method allowed the pupils to discuss their views about the lesson and dual coding. The observer took notes during the interview while the questions were asked by the student teacher. We also considered limitations of interviews and discovered that Creswell & Poth (2016) suggest that interviews can be labour intensive when collecting the qualitative data.

As semi-structured interviews allow more freedom with discussion, scribing or note taking can be tedious as open ended questions would require a detailed answer.

Reflection is crucial for CPD and to evaluate the delivery of the lesson in order to provide effective teaching and learning in the future (McKernan, 2013). Following the lesson study, a personal reflection (Appendix 4) was designed and carried out by each observer based on the model created by Gibbs (1998). This method was chosen by myself and my research partner after exploring various styles of reflective cycles due to the simple structure and the accessibility of applying it to further teaching. However, Jasper (2013) suggests that this method of reflection can easily become descriptive and therefore, time consuming, thus, this was considered when carrying out the personal reflections.

After gathering evidence from observational notes and interview answers, we also decided to collate quantitative data represented in a graph (Appendix 6a-d, 7a-d, 8). Graphs were used to distinguish patterns within and between the both year groups and can provide more visual, accurate results (Babbie, 2010). The qualitative and quantitative data gathered from both lessons will be triangulated to determine the level of engagement of the 3 sample children (Heale & Forbes, 2013).

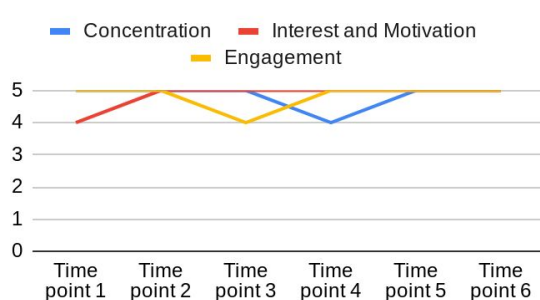
Ethical considerations are fundamental when conducting research, especially when researching when involving children and they were made compulsory following the result of the Nuremberg Trials (1946). This resulted in a series of experiments that were highly immoral, unethical and a vast amount of people died, however, due to the nature of the experiments, the data was proved to be unethical to use. Following this, guidelines such as BERA (2014) are put in place as a legal requirement and must be considered to ensure participants are treated ethically within research. UWTSD Research Ethics and Integrity Code of Practice (2019) obligates all students to follow this document to ensure correct ethical considerations are followed. GDPR (2018) warrants that confidentiality and anonymity should be a priority throughout the research ensuring that personal information is kept password protected in an encrypted device or locked away in a filing cupboard as well as ensuring all participants and location remain anonymous. Before conducting the lesson study, it was essential that permission was obtained from the head teacher, class teacher and parents (Appendix 5a-c). It was necessary for children to give informed consent which expressed that they were willing to participate while being aware of what the research entailed. In order for children to give informed consent Children under 18 years of age still

needed permission from parents however, they still have the right to choose and to be aware of something that may affect them. This, therefore, would be classed as assent (Waligora, et al, 2014). On going assent should be considered throughout the research by allowing children to have the right to withdraw at any time if they feel distressed or unwilling. This must be respected and can be measured by allowing children time to share whether they are happy to continue or withdraw with. When initially asking children if they would like to participate, it was essential to consider the power imbalance between child and teacher as children often feel as though they need to please the authoritative figure by saying what they think they want to hear. (Raheim et al, 2016) In this case, they may have felt obliged to participate as the student teacher would expect it, therefore, it was important to ensure persuasive language was prohibited.

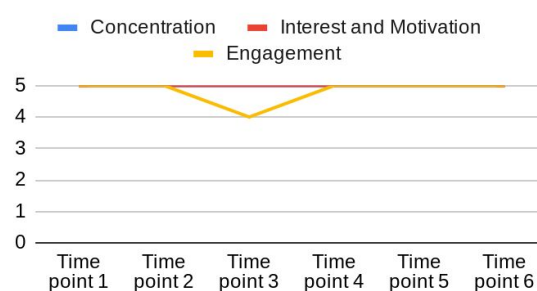
The first stage of the lesson study was conducted in the Year 4 classroom during a Domain lesson delivered by my research partner. As I was the observer in this instance, my role was to monitor and record the concentration, interest & motivation and engagement of three case study pupils. 'Child X' represented higher ability (HA) while 'Y' represented the middle (MA) and 'Z' represented the lower ability (LA) learners (Dudley, 2014). The lesson consisted of a 'read aloud' (Hirsch, 1989), delivered by my research partner, while the children sat on the carpet, listened and answered limited questions for 20 minutes. Prior to the reading, children's prior knowledge is activated through Retrieval Practice (Jones, 2019), which can also incorporate the use of visual stimuli to trigger memory recall. Following this, the children participated in a quiz then completed a diary entry. The 'read aloud' incorporated the dual coding input as the children were receiving auditory information from the student teacher combined with visual stimuli from the images on the PowerPoint slides (Paivio, 1971). The observation (Appendix 1a-c) was carried out six times throughout the lesson every five minutes within the 'read aloud' then twice during the focus tasks. The five minute period allowed time to assess each child in all three criteria and record it (Sedgwick, 2014). The purpose of the observations during the 'read aloud' was to monitor the engagement throughout the dual coding input. Monitoring engagement and interest during the task was to discover the children's ability to apply the knowledge and therefore assess the effectiveness of dual coding.

As the lesson finished just before break time, the interviews had to be conducted after break and the daily collective worship. My research partner asked Child X, Y and Z (case study pupils) questions regarding the lesson, while I took notes. The case pupils were once again

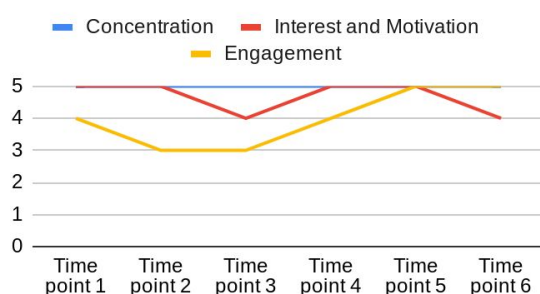
informed that they were able to withdraw if they felt anxious or uneasy, (Bergelson, 2019) however, the pupils gave assent throughout. The interview gave children an opportunity to express their opinions about the 'read alouds' and discuss the use of images to support their learning (Caviglioli, 2019). The case pupils were also able to express their preferences about how they would benefit from being taught Domain lessons. (Appendix 3b) They stated that they enjoyed the visual stimuli as they can '*see the big picture and picture the writing*' and the '*pictures can help with concentrating.*' In addition, the children also stated that they would prefer more questions throughout the 'read alouds', therefore, this was considered for the following lesson in Year 2.



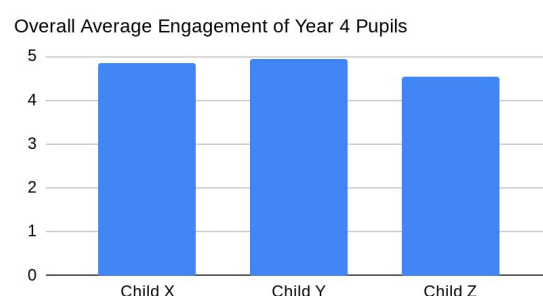
Child X



Child Y



Child Z



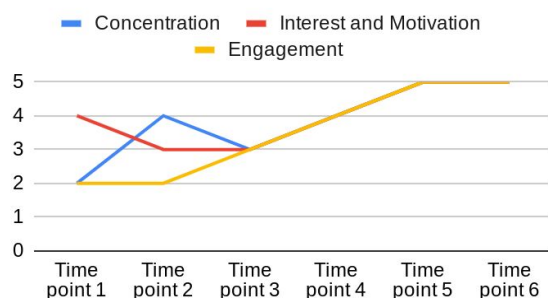
The observation schedule was used to develop a graph to represent the data collated. This displayed a pattern between the children's ability and their engagement with dual coding. The data shows that all three case pupils displayed moderate to very high levels of overall engagement throughout the lesson. The graphs display a pattern between showing that engagement decreased for all three pupils around around time point 1-3 and increased again at time point 3. However, it suggests that Child Z (LA) displayed moderate engagement from the start, yet gradually increased half way through. In addition with the answers throughout the interview from child Z, this could suggest that the retrieval practice was unable to secure their attention, however, images and information from the 'read aloud' helped this increase. The concentration and engagement of Child X (HA) declined further

into the lesson yet improved when on focus task. In accordance with Payne and Scott (2017) this may suggest that the child became disengaged as the information wasn't challenging enough. Child Z and X displayed the most fluctuation throughout the lesson but Child Y (MA) showed the most consistency throughout. This could suggest that the dual coding theory incorporated within this lesson was appropriate for the middle ability learner.

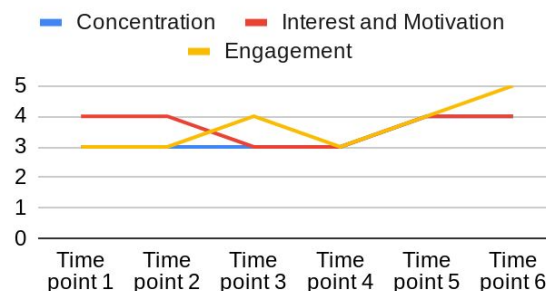
Lesson study 2 was delivered by myself in the Year 2 classroom and observed by my research partner, who was introduced before the lesson to secure familiarity and prevent any distraction or distress as there was a child with Autism Spectrum Disorder (Murphy, et al, 2014). Thus, distractions can frequently be caused within the classroom during teaching and learning. The features of lesson study 1 were repeated throughout this lesson in order to ensure the study and results were consistent, fair and reliable when comparing the data (Price et al, 2013). The lesson was introduced, similar to the previous lesson, with retrieval practice and visual stimuli to access their long term memory (Willingham, 2009). The 'read aloud' was delivered for 20 minutes while images were displayed that related to the story. The children were more animated than the Year 4 children as they physically demonstrated interest with facial expressions and gasps. During this time, my research partner conducted the observations (Appendix 2a-c) every 5 minutes throughout the 'read aloud' to monitor and compare the efficiency of the dual coding theory with younger children. In this instance, 'Child A' represented higher while 'B' was middle and 'C' represented lower ability learners (Dudley, 2014). Throughout the 'read aloud' children were asked questions to assess their understanding which corresponds with their level of engagement (Mayer, 2001). The final two periods of observation were carried out during the focus task to assess whether the children were able to apply their understanding.

The interviews were conducted immediately after the plenary of the lesson was delivered in order to retain as much memory of the lesson as possible. In this instance, this was possible as the lesson took place in the afternoon without a playtime break. As stated before, the case pupils were given the opportunity to withdraw if they felt distressed (Bergelson, 2019) but all children continued to give assent. The case pupils were provided with the opportunity to discuss their answers after the questions and the interview data (Appendix 3a) suggests that overall, they were engaged in the 'read aloud'. It is apparent that dual coding can support engagement as the pupils stated that 'if there weren't the pictures then you would fiddle but you don't get distracted because the pictures are there to look at.' In contrast, the case pupils also expressed that they can become distracted when other children aren't

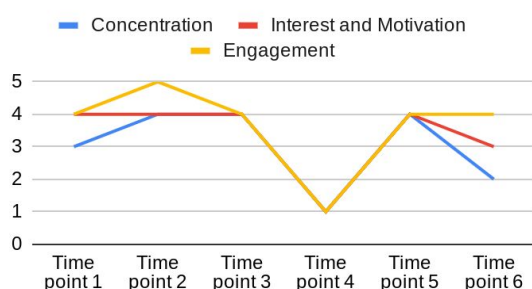
interested and start 'annoying' them. In correlation to the evidence gathered from the observation and the interviews, it proposes that dual coding can also be effective with Foundation Phase aged children.



Child A

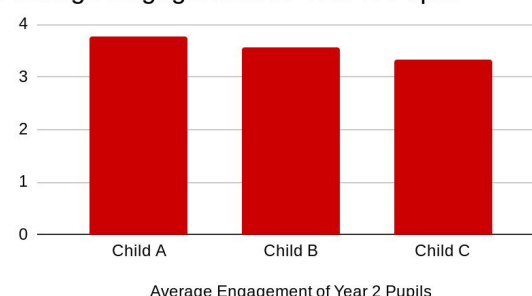


Child B



Child C

Average Engagement of Year 2 Pupils



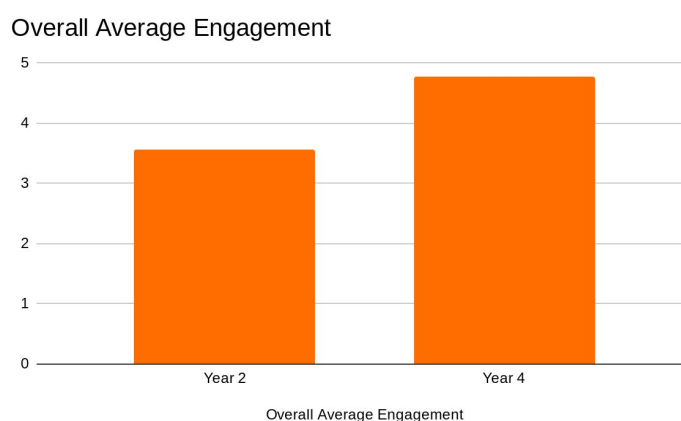
Average Engagement of Year 2 Pupils

The data collated from the Year 2 observations was also represented in graphs to distinguish possible patterns. After analysing the graphs, it is evident that the Year 2 pupil ranged from low to high levels of engagement throughout the lesson and there is limited correlation between the three children. However, it seems apparent that Child A (HA) and Child B (MA) increased in all criteria when participating in the tasks. Whereas, each criteria drastically decreased for Child C (LA) at time point 4, which may suggest that the child would benefit from starting the focus task 5 minutes earlier. The data for Child A or B did not decline at this point which could disregard the possibility of a significant distraction that caught the attention of all children. The average engagement data represents that Child A (HA) displayed moderate to high levels of engagement throughout the lesson. However, no case pupils showed low levels of engagement throughout the read aloud and the input of the dual coding theory.

Following the lesson study of both Year 2 and Year 4 lessons, personal reflections were carried out by myself and my research partner. This allowed us to analyse the lesson and

identify the strengths, weaknesses and understand how to implement any recommendations in our own CPD (Appendix 4).

The study allowed us to recognise how the dual coding theory can be applied in both Foundation Phase and Key Stage 2. The methodology used produced appropriate evidence regarding the research topic, therefore, supported the investigation of the question. After analysing and triangulating data from both lesson studies, it highlighted multiple factors regarding the research question. The evidence clearly displays that the pupils in Year 2 and Year 4 exhibited moderate to very high levels of engagement throughout both lessons. This proposes the dual coding theory was effective in maintaining attention. The opinions expressed from the case pupils also provided evidence that dual coding was beneficial as the children stated that images support understanding, imagination as well as inhibiting distractions. Kusumawati and Rachmawati (2016) highlight the importance of dual coding in order to optimise the efficiency of storytelling. Displaying visual stimuli while storytelling reinforces the neurological pathways in the brain, secures focus and improves high-level thinking. Thus, supports information being transferred from working memory to long term memory (Willingham, 2009). However, the evidence showed that engagement fluctuated for all case pupils throughout the lesson, which could suggest that their attention was reduced as they were inactive for a prolonged period of time (Harris, et al, 2018).



Overall, the evidence concludes that the average engagement of children in Year 4 was greater than those in Year 2. Multiple factors were considered in order to understand this outcome. This could suggest that the case pupils in Year 2 displayed less interest as they could not contextualise the information. In accordance with Allison and Tharby (2015), children become engaged with learning if it is enjoyable, meaningful or relatable to their own life or experiences. Contrastingly, Child A (HA) in Year 2 related the topic to their own life

experience during the interview (Appendix 3b). However, the case pupils also stated that the lack of interest and distraction from their peers can prevent them from engaging with the 'read aloud' sufficiently. Another aspect that was considered regarding the difference in engagement results between the year groups is the age of the children. Nisay (2020) suggests that children's attention span differs depending on their age and increases as they mature. Subsequently, it is proposed that children can concentrate for two to five minutes for every year of their life, suggesting a 7 year old could maintain focus for anywhere between 14 to 35 minutes. Thus, this provides a wider understanding of why the case pupils in Year 2 displayed lower levels of engagement in comparison with Year 4. In conclusion, the evidence collated suggests that there is a clear correlation between the use of dual coding within teaching and appropriate levels of engagement.

The limitations of the lesson study were considered throughout, especially when analysing the data, in order to evaluate the reliability and validity. The sample size of the investigation small, therefore, limited the validity as it represented only three children from two year groups. Thus, it may have been beneficial to have conducted a third lesson study to broaden the representation of children as suggested by Dudley (2014).

The methodology for collecting data was considered to be appropriate for the nature of the research, yet there could be arguments against the validity and reliability of the methods (Baxter & Jack, 2008). Although the case pupils were a small sample, they were randomly selected from three levels of academic ability that was previously selected by the class teacher. Thus, the selection is valid due to the unbiased choice of children. Reliability was also considered regarding sample size. The study does not exhibit an accurate representation of all children as the sample size was limited and the study was only carried out across two year groups within the school. Therefore, the findings from the investigation cannot be generalised.

The method of observation was reliable as they were carried out over a period of time, producing a timeline of data that could be compared between all case pupils to discover patterns. However, due to the observation being recorded 6 times, once every 5 minutes, it did not provide evidence from the full 60 minute lesson. This therefore, allows the validity to be questionable. As the observer for each lesson was not designated student teacher for each class, this suggests the recording was not biased or favoured in any way, making the

method and data valid (Baxter & Jack, 2008). This also applied to the interviews as the observer noted the answers provided by the case pupils.

Overall, this lesson study allowed me to understand the importance of engagement within a lesson and how both visual and audio stimuli can be effective in securing focus and attention. Within my future practice, I aim to foster a deeper understanding and implement a variety of methods inspired by the knowledge I have gained throughout this investigation. The combination of this knowledge will allow me to establish effective teaching strategies incorporating the use of dual coding (Paivio, 1971) and multimedia principles (Mayer, 2001) to support long term memory (Willingham, 2009). I desire to implement this style of teaching as I have experienced the benefits of dual coding theory within the lesson study. Adopting this approach will support my CPD and enhance future teaching learning.

In order for this investigation to be effective, there are a number of recommendations that could be highlighted if it was to be repeated. Firstly, the observations could be carried out in ten minutes intervals in order to obtain evidence over the 60 minute lesson, thus, providing a wider, more accurate representation of the data. In addition to this, as suggested by Dudley (2015), incorporating a third lesson study across a wider range of year groups could produce more generalised data that could represent the school.

A copy of this essay will be shared with the placement school to show good practice and highlight the effectiveness of the teaching practice implemented throughout their school. The placement school showed an interest in our research and requested a copy of the completed report in order to evaluate their curriculum design and support the development of their own action research. Overall, the report could be beneficial for the school to refer to as it provides an insight into the dual coding being an effective method for engaging children in teaching and learning.

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