

Design, conduct and critically evaluate a close-to-practice research project (Lesson Study), focusing upon the impact of practical demonstration (as a visual resource) on pupils' learning and engagement in Art lessons

Research Question: What impact does practical demonstration (as a visual resource) have on pupil's engagement and learning?

	Targed/Target	Yr hyn yr wyf wedi'i wneud yn yr aseiniad hwn. What I have done in this assignment.
Targed/Target 1	Continue to engage with a wide range of relevant literature to inform and build your personal viewpoint.	Wide range of relevant references have been visited to inform the research and construct my own view.
Targed/Target 2	Consider developing counter arguments when critically evaluating the impact of your own practice.	Literature and educational research have been critically evaluated to enrich my counter arguments.
Targed/Target 3		

1. Introduction

Since the beginning of my PTE practice, I start seeing a link between using visual resources and pupils' engagement in my lessons. Yet, demonstration (as a significant means of those resources) has always been at the core of my teaching strategy, as it has been particularly indicated by my mentor as a fundamental part of the Art lessons. Thus, emphasis on demonstration became one of my main targets for every lesson I teach, even if a lesson was part of a series of lessons, when the same technique had previously been demonstrated. This necessitated me working with my research partner to analyse, critically evaluate and reflect upon classroom-based research evidence to examine the impact of demonstration on

pupils' learning and engagement, with reference to the relevant education literature, theory, government documents and ethical issues.

Research Context

This research aims to address, design and implement close-to-practice research project (Lesson Study) methodology. The focus group for this research has been set to target three (Year 8) pupils to be observed (during the demonstration) from one class, and then another three (Year 8) pupils from a different class. The two observation events will take place in two different Art lessons at a mixed comprehensive and pioneer school based in a large city in South Wales. Thus, two cooperative research events have been arranged through alternately teaching and observing lessons planned by both researchers in which that one teacher delivers demonstration and teaching, while the other undertakes the observation (as a non-participant observer). However, the second lesson plan will be revised according to reflection of the observed lesson's outcomes, as well as the feedback gained from the observed three case pupils (as a sample group) to see if any improvement or a different learning outcomes will emerge as a result of the refinement in teaching approach.

The aim of these two observations has been set out to examine the impact of a teacher's practical demonstration of '*Monoprint*' Art technique on learning and engagement of the three case pupils chosen from each of the two classes. Furthermore, the research will shed light upon how pupils make connections between theoretical knowledge of some newly introduced terms and practical implementation of the technique they learn and practise through demonstration with relation to the lesson objectives. Since the lesson Success Criteria indicate some terms that seem to be unclear until they are practically explained during the demonstration. For instance, the meaning of '*mono*' in the context of print and why pupils have been given horizontally flipped images, as well as how to take out the excess ink before printing. Yet, the observations will be critically analysed, and the data will be treated in a context of ethics, respect, confidentiality and anonymity to comply with framework set by BERA Ethical Guidelines for Educational Research (2018).

2. Literature Review

One of the main targets I have set with my research partner has been to bridge the gap between educational research and practice, as well as to inform our practical research with a critical evaluation of educational research literature to avoid a '*monocausal analyses*' that is suggested by Broekkampa & Van Hout-Wolters, (2007, P. 204) as one of the main causes of this gap.

Thus, we primarily aimed to consider definitions and the significance of demonstration in classroom from numerous points of view.

Some scholars, such as McLain, (2018) view demonstration as a method of knowledge transfer when learners replicate what is practically exemplified by the teacher. While Wellington & Ireson, (2012, p. 135) view demonstration as a '*visible, purposeful and clear*' method of boosting understanding of the concepts. Similarly, Hetland *et al.* (2013) suggested demonstration as an authentic process of illustrating the concept. In the same context, the Open University, (2015) considered the importance of demonstration lies in providing students with real events experiences, phenomena or processes, as well as challenging and developing students' understanding. Moreover, Harbour *et al.* (2015) suggested that teachers use demonstration as a '*modelling*' method to help students clarify the concept and understand why they do that, as well as to solve problems which may occur during the process (Archer & Hughes, 2011).

Having looked through all these various points of viewing demonstration, I found that none of them could provide (on its own) a holistic definition of demonstration. I therefore tend to combine them all as a synthesised and comprehensive definition. I thus view the essence of demonstration as a pedagogical method of modelling that provides learners with the experiences of authentic events and processes of illustrating the desired concept or skill to enhance their knowledge and link theory with practice. This may occur through effective modelling and explanation during sequential steps of teacher's modelling and can be enhanced by questioning (McLain, 2018).

Secondly, I investigated the connection between demonstration and learner's engagement on a one hand, and between demonstration (as a visual resource) and students' academic achievements on the other hand. In this context, Harbour *et al.*, (2015), VanDeWeghe, (2006), Zimmerman & Pike, (1972) regarded demonstration as a modelling tool that supports pupils by preparing them to deal with both simple and complex tasks and behaviours; this includes addressing unclear concepts, using clear examples to reduce student's confusion and enhance their understanding, so that they engage with the task by making connections between what they think and their learned skills, and therefore, they learn the concept in a meaningful sense, which may lead to enhance their engagement and achievements (Sandholtz, 2011). Nevertheless, in an Art lesson, drawing skills can be demonstrated in a way that allows learners to understand 'learning to see' skills, which may suggest that not only visually talented people can draw (Artgrain, 2016). Similarly, Daniels, (2018, P. 13) suggested that visual learning assists pupils to learn new concepts, generate ideas and develop higher-order thinking, while visual thinking is necessary for learners to make

connection with the concept. Yet, demonstration enables integration of both visual learning and visual thinking when learners make connection between what they see, what they imagine and what they draw (ibid, 2018, P. 15).

Furthermore, when pupils understand the concept and practise what they learn from the demonstration, their engagement can be driven by the motivation resulted by their success in the task (Bartel, 2009). However, low attainment students should not be disadvantaged by comparing them with those who are higher performers (ibid, 2009).

Thus, I have discussed this issue with my research partner, taking into consideration implementing differentiation and scaffolding strategies to support pupils solving the problem within and after demonstration.

Thirdly, we looked further into how to deliver demonstration and what to consider when planning demonstrations. We found that demonstration can be more effective when it is implemented through presenting explicit examples with sequential instructions in addition to questioning and feedback to reduce student confusion (Harbour *et al.* 2015).

However, Bartel (2009) suggested that teacher demonstrations should be replaced by hands-on strategies which allows learners to learn from practice and by repeating their mistakes until the learning occurs through a change in their behaviour. For example most Art teachers instruct their students not to press so hard on the pencil when drawing, even with demonstration on how to use the pencil in drawing, we all notice that children still repeat this wrong use of pencil until they experiment (with time and practice) how to use it in the right way, and then change their drawing habits. Nonetheless, evidence of change in behaviour would require monitoring and observing students on a long-term basis, therefore, I have highlighted this point with my research partner to be considered for future Lessons Studies. We then investigated McLain's (2018) suggestion regarding considering pupils' prior knowledge and expected learning outcomes when delivering demonstration. Thus, we have refined our lesson plan to fit the purpose of our research question accordingly.

We have also considered Prince, (2008) recommendation to manage running demonstration based on start-to-finish strategy, with reminding of each step throughout the lesson.

However, we understand that not all pupils would necessarily remember the sequence of mono-print process. We therefore, decided to apply start-to-finish strategy for the first lesson and consider simplifying the demonstration process for the second lesson, by dividing the steps into two or three phases to make it easier and manageable for all levels, with a challenging extension of the main task for those who have higher level of attainment, and then to compare the outcomes of the two approaches.

3. Methodology

The methodology used for this research is Lesson Study (LS), which is a form of research that aims to develop teacher practice through an action that involves collaborative work by a group of teachers in planning, teaching, observing and analysing of learning and teaching (Dudley, 2011). Lesson Study was originated in Japan and has been applied since the 1870s, it is then introduced to the west and became widely popular as a pedagogical approach that has successfully contributed to improve teaching and learning standards in schools (Dudley, 2011).

Lewis (2004,19) suggested that teachers in Japan have recognised seven benefits of Lesson Study: increasing knowledge of subject matter, better instruction knowledge, better observation skills, stronger networking and stronger connection of daily practice for to long-term goals basis. Similarly, my placement school views LS as both short and long-term form of learning strategy and professional development for teachers.

Yet, this model of professional development is distinguished from other forms because of the method of cooperative planning and researching as well as its focus upon issues with learning, rather than the performance of the teacher (Cajkler *et al.*, 2015).

While the method of data collection for this research has been implemented through observing, questioning, interviewing, focus group (sampling) in addition to reflecting.

Having discussed the research design of our LS with my research partner in light of Dudley, (2011) recommendations, we both agreed on the topic and the lesson plan, along with the potential challenges that students might face particularly during demonstration and throughout the whole lesson in general. We have then identified the way of choosing the three case students. Finally, we set a plan for post lesson evaluation to reflect upon the second lesson accordingly, with a focus on the impact of demonstration of mono-print technique (as the main task for this lesson). However, we both regarded observation as one of the main element of data collection, since it provides a 'systematic description of the events, behaviors, and artifacts of a social setting' (Marshall & Rossman,1989, p. 79).

Thus, I have developed with my research partner an Observation Schedule questionnaire that is partly adapted from 'Leuven Scale' which was introduced and supervised by Professor Ferre Laevers (2008) at the Research Centre for Experiential Education (RCEE) in Leuven University, to be used for this observation in order to measure the three case pupils' levels of attention and engagement prior, during and post demonstration stages. The scale on this form is graded from 1 to 5, while grade 1 indicates to extremely low (when a child shows no level of engagement) and grade 5 for extremely high (when a child is completely engaged with the activity, and showing enthusiasm and creativity). A copy of the Observation Schedule questionnaire can be found on the Appendices.

Additionally, I have designed with my research partner a Reflection Report model to be used as a means of recording of the observation during each of the two observed lessons. This form has been adapted from Gibbs, (1988) Reflective Cycle by addressing the experience and reflecting critically on it through description, feelings and thoughts, evaluation (both positive and negative), analysis, conclusion (what is learned and what could be done differently). We have also considered Brookfield, (1995) critical reflection model by reflecting on the experience through four main lenses, which are: self-reflection lens, students' lens, peer lens and literature lens.

The focus group has been chosen to be three case pupils from each of the two classes to be observed during demonstrations. The three pupils have been chosen randomly from each class of Year 8 as a qualitative sample group to represent the whole classroom. Although the two sample groups have been chosen randomly, some factors have been considered when selecting them, such as: gender balance (e.g. two boys and one girl for the first lesson and two girls and one boy for the second lesson) and variation in levels of ability. Thus, according to Cohen, Manion & Morrison (2018) this sampling method maybe considered as a purposeful random sampling (mixed method).

Yet, at the end of each lesson, the observer will interview the three case students with focus on the demonstration. The interview questions have been formed and agreed by both researchers, and then to be revised according to reflection on the first lesson observation.

4. *Ethical Considerations*

Ethical issues should always be considered when undertaking educational research, especially when a research involves working with young people in a complex environment like schools.

Thus, the British Educational Research Association (BERA) set a framework for conducting research ethics under guidelines which can be summarised through the following aspects: responsibilities to participants; responsibilities to sponsors and stakeholders in research; responsibilities to the community of educational researchers; responsibilities to publication; and responsibilities to researchers' wellbeing and development. This includes treating all individuals who are involved in the research fairly, sensitively, and with dignity and respect, without any kind of discrimination related to their age, gender, sexuality, ethnicity, disability, class, nationality, cultural identity, or faith (BERA, 2018). This also corresponds with article 2 (Non-discrimination) and article 3 (Best interest of the child) of the United Nations Convention on the Rights of the Child (UNCRC) (UNICEF, 1992). Relevantly, the Education Workforce Council (EWC), set 'Personal and Professional Responsibility' as one of the key

principles of professional conduct and practice (2019). Yet, since the sample group in our Lesson Study are young children, a number of arrangements thus has been considered to comply with BERA, (2018) Guidelines; this has been implemented through: treating all participants in respect, dignity and equality; taking the responsibility of keeping names of pupils and the school confidential and anonymous (further details on how to store, protect and deal with the collected data have been explained in detail on the Ethical Form (UWTSD, 2019) which is on the Appendices). Yet, this research has not been conducted until the Ethical Form was approved by the University, since UWTSD Research Data Management statement, (2016) emphasised on compliance with ethical and legal regulations when dealing with research data. Moreover, a Consent Form has been provided to pupils and parents to confirm their approval on participation in the research events, with a clarification of the nature and purpose of this research, as well as their right to withdraw at any time as instructed by BERA, (2018). (a copy of this form can also be found on the Appendices). Yet, for confidentiality and anonymity, I should refer to the three observed pupils as A,B and C for Lesson Study 1, and A2,B2 and C2 for Lesson Study 2. This will also meet the core principles of General Data Protection Regulation (GDPR, 2018) set by Council of the European Union and European Parliament (2016).

5. Lesson Study 1 Results and Analysis

This section is set to discuss my view and reflection on the lesson taught by my research partner from a non-participant observer point of view.

The cooperative lesson was planned (as agreed) under the title '*Around the World*', aiming at Year 8, according to the Scheme of Work planned by the department. With relation to meaningful links to curriculum, this Art lesson which is part of a series of lessons aims to encourage pupils to think, research and discuss ideas on World Architecture and Pattern Designs, as well as teaching them how to produce a mono-print artwork, with understanding of the world culture and design concept. While the cross curricular meaningful link is set to make a connection with literacy through reading and researching starter task. The lesson was undertaken by my research partner with preparation of materials, tools and learning resources prior the start of the lesson. The classroom environment appeared to be positive and pupils seemed to be ready to learn.

The lesson commenced with a starter task, and most students appeared to be concentrating on the task with different levels of attention. The Lesson Objectives have been explained and displayed on the screen, with a discussion atmosphere throughout the lesson.

Demonstration of mono-print process then has been delivered by my research partner as start-to end (as planned for this LS1), while I observe the three case students.

At the end of the lesson, summary of the task, the learned skills and the concepts have been recalled through the plenary, with link to lesson objectives and success criteria.

Prior and during the demonstration, pupil (A) appeared to be at a routine level of concentration, with no real signs of involvement or energy. Having compared this with Leuven Scale, I found that this child's level of engagement may be measured between grades 2-3 *Low to Moderate*, since the child showed limited concentration and likely to be easily distracted, the child then gained slightly better concentration but with a limited motivation (Lavers, 2008). However, this pupil's concentration has increased when other students were asked to explain the steps of mono-print as demonstrated. Thus, the level of engagement according to Leuven Scale can be measured as grade 4 at that time. This student received some scaffolding support during the task to take the excess ink out before printing; despite there have been some unwanted smudges on the print, the student decided to continue with the task (instead of re-printing again). Pupil A achieved some pattern drawing after completing the main architecture drawing (as an extended task).

At the start of the demonstration, pupil B took a place close to the demonstration table with good level of concentration. During all stages of the demonstration student B showed a good level of engagement without interruption, this can be measured between grade 4 (at the beginning of demonstration) to 5 (during the second half of demonstration) according to Leuven Scale, (Lavers, 2008). This student retained the same level of attention when other students were asked to describe the main steps of mono-printing. Yet, when starting the task himself, pupil B spent considerable time experimenting of removing the excess ink, and frequently flipping up the paper to check the drawing, so that, the resulted print was better quality than student A, but still containing fewer errors (smudges) that he could not avoid.

Similarly, Pupil C showed a great focus during the demonstration with enthusiasm to answer questions raised by the teacher. During the task, this pupil seemed to be extremely highly motivated and confident with mono-printing process. Thus, this pupil's level of engagement can be measured at grade 5 according to Leuven Scale. Pupil C has completed the drawing and extended the task by filling some patterns.

At the end of the lesson, I have interviewed the three case pupils (A,B and C), with the presence of my research partner. The interview questions addressed what they have learned from the demonstration, how the demonstration has helped them achieving the success criteria, their suggestions for more effective demonstration, and how would they complete the task if the demonstration was not delivered. All three case pupils answered that they have understood the concept and learned mono-print technique through the practical demonstration, and they confirmed that they would not be able to complete the task without

the demonstration. However, pupil B expressed a desire of a demonstration with a longer duration for a greater effectiveness of the practical modeling. I, therefore, decided with my research partner to take this point into consideration for the second lesson.

Having examined the pupils' answers and discussion during the demonstration, as well as their resulted work, I could establish that most pupils have learned and practised skills of mono-print technique by producing their own work, in addition to learning about world cultures, so that they have achieved the learning objectives (but in various levels).

Overall, most elements of teaching and learning went well through this experience. However, it was required that each pupil to produce two prints, while on the demonstration only one print had been demonstrated. This have caused some confusion to many pupils, as all pupils have produced only one print as a result.

Additionally, all pupils did not completely take off the excess ink before starting the printing task; they could not avoid the unwanted smudges appeared on the prints (which are caused by their hand pressure on the printing tile). Thus, this issue will be particularly addressed and considered for the second lesson.

In my opinion, demonstration alone was not enough for pupils to understand how to avoid the errors caused by hands' pressure on the paper, as the students need to learn from their mistakes by practicing what they learn from demonstration. This may support Bartel (2009) suggestion of enabling coaching and encouragement for learning through pre-practice instead of watching a demonstration only, as this could help them solving most problems practically and independently.

Olson, (2011, p. 599) recommended discussing a new insight with colleagues who take part in a Lesson Study to reflect on their teaching practices. Thus, having further discussed my observation outputs with my research partner, we decided to revise the lesson plan for our second lesson by making it clear that only one print is required, taking into account pupils' voice to expand the time of demonstration for more engagement. We have also decided to allow them to pre-practice the technique prior producing the final print to familiarise themselves with the technique and learn by practice how to solve inking and printing problems, as well as dividing demonstration into 2-3 stages. This may support.

6. Lesson Study 2 Results Analysis and Conclusion

In this section, I will shed light on my reflective view from a perspective as a teacher in correlation with my research partner's observation insights, focusing upon the three case pupils (A2, B2 and C2) for our Lesson Study research.

The lesson has been conducted under the same title. The lesson plan has been revised by requesting that pupils to produce only one print (according to previous lesson's reflection), and the steps of the lesson have been delivered in a same sequence to Lesson Study 1.

All pupils appeared to be well focusing during the demonstration, while I have asked extended questions with connection to the success criteria to challenge and engage them with the learning activity, as well as to establish their understanding (as part of Assessment for Learning) of the concept. In this respect, the Department for Education (2009) suggested that Lesson Study can be used to improve teaching practice, pupil progress and to develop broader pedagogical approaches such as Assessment for Learning.

This time, I have encouraged pupils to pre-practice to be familiar with the technique, the tools and the printing process (before producing the final mono-print). I have also divided the demonstration into sequential steps to simplify the process of mono-print as recommended by (McLain, 2018).

According to the 'Observation Schedule' report, as stated by my research partner (copy of it can be found on the Appendices part) pupil A2 demonstrated high level of involvement during all stages of demonstration, as well as when other students were asked to explain steps of the task demonstrated; this was measured as 5 (*Extremely High*) according to Leuven Scale, (Lavers, 2008). Similarly, pupil B2 showed a high level of engagement, while pupil C2 demonstrated slightly lower level of attention during demonstration and when other students were asked to repeat explaining of steps of the demonstrated task.

Furthermore, during the task, pupils C2 asked for some assistance to make sure that he did the task correctly. Thus, some scaffolding support had been provided.

Pupils then were asked to reflect on their work (for self-evaluation) through answering questions about what they have learned, what went well, what challenges they have faced and what could be done differently for improvement. At the end of the lesson, summarising of task and learned skills and concepts have been delivered through the plenary, with connection to the Lesson Objectives and Success Criteria.

Interviewing of the three case pupils has been undertaken after the end of the lesson as an initial part of the Lesson Study research (a copy of the questions can also be found on the Appendices).

Pupils answered that they had learned about the concept and the technique of mono-print, and they had learned "*how to avoid making 'noise' by not pressing hard on the paper, not to use too much ink and to take out the excess ink*". Furthermore, they felt there could have

been more questioning if demonstration were not delivered, as they would not be able to complete the task without the demonstration.

In addition to the four questions asked in previous lesson, we added a question about what pupils think regarding the length of the demonstration to collect better evidence of reflection on previous interview answers. All the three pupils agreed that the demonstration was delivered at the right duration for them.

Implementation of pre-practice strategy has provided pupils with the opportunity to better understand the technique which is evidenced by the resulted students' prints that show fewer errors than the first lesson. While, repeating of the pre-practice printing process has led to change in students' behaviour which may indicate to learning development, as pupils learned from their mistakes, so that they avoid pressing their hands on the paper where possible.

Moreover, the observer stated that demonstration helped in better engagement throughout the lesson, as pupils enthusiastically wanted to practice printing for their own work to link theory with practice.

Yet, dividing the process of demonstration into sequential steps helped lower attainment pupils to better understand the concept with less likelihood of forgetting or confusion. It also provided me with a better control to supervise and overview each pupil's progress and therefore to assess their skills acquisition for further reflection.

In summary, demonstration through both lessons have played a significant role in enabling pupils to achieve the lesson objectives. Notably, presenting explicit examples, in addition to questioning during demonstration have contributed to better engagement with the task.

Additionally, Lesson Study methodology has provided me with the opportunity to take the ownership of improving the quality of teaching, as well as listening to pupil's voice (through extending the duration of demonstration for the second lesson as a response to pupils' request in Lesson Study 1). Moreover, Dudley, (2014) suggested that Lesson Study provides a unique development model for teachers and schools, as it helps teachers to learn more about how their teaching affects their pupils' learning, in the complex environment of the classroom. Thus, it provides close-up view to evaluate and observe the relationships between teaching and learning (ibid, 2014).

With regards to the impact of the demonstration on pupils' learning, I have noticed that both focus groups' resulted prints inevitably contain some unwanted errors (smudges), most of them are acceptable for this type of Art technique. However, the Observation Schedules show that the level of pupil's engagement has slightly improved at the second lesson with

the amendments we have made on the demonstration approach as well as the lesson plan. This has been evidenced through pupils' answers during the interview at the second research lesson study. Having discussed the outcomes with my research partner, we both agreed that our demonstrations were delivered successfully in a way that enabled pupils to achieve the learning goals. However, we have also learned from the first teaching experience about how to improve and reflect on our teaching practice in a method that provides pupils with better learning experience. Relevantly, having looked back into literature, we found that Hattie, (2009, P. 22) suggested that the impact on pupil's learning occurs when teachers learn from own teaching. Similarly, Murphy *et al.* (2017) indicated that teachers can learn from other fellow teacher's practice through Lesson Study. Moreover, Murphy *et al.*, (2017) also suggested that Lesson Study is featured by the element of concentrating on learning and learners, unlike other observation-based approaches which only focus on the performance of the teacher, since it provides a better understanding of students' needs.

I view our Lesson Study as a collaborative work, not only between the teachers, but also between teachers and pupils to improve learning process; this view may support Dudley's (2014) point of viewing LS as a partnership that brings pupils and teachers together to improve learning.

There might be some limitation of generalising the outcomes of this research, since it has been applied on a certain age group of case pupils in a short time, with a focus on a specific aspect of learning. Additionally, the sample group pupils' answers might be accused for not being fully accurate, since pupils can be easily influenced by each other's answers. Thus, further research would be necessary to target a wider sample group (and different age group) with different learning aspects. However, it would be advantageous to share the research output with colleagues and the school leadership. Relevantly, the Department for Education (2009) suggested that sharing the outcomes of Lesson Study cycle with other teachers may help in reflecting on new Lesson Study groups. Similarly, Crown, (2009) also suggested that sharing the outcomes of LS presents an opportunity to learn from colleagues to refine teaching approaches.

Yet, one of the challenges we have encountered through this experience was when two of the three case pupils decided not to take part in this research, just a few minutes before the start of the first lesson. As a result, we had to select other pupils who welcomed participating in the research event. This was anticipated and we were prepared for such a situation. However, we viewed this incident from a positive angle, as it showed our commitment to

comply with research ethics and the democratic atmosphere that we have promoted throughout our lessons.

There was also another challenge lay in adapting our university schedule with the school timetable for these two lessons, as well as arranging meetings for discussing our Lesson Study's reflections and further plan, particularly, after the second observed lesson, due to commitment with other module that is run by the university at the same time, as we feel that such a significant research study should be allocated considerable duration and dedication to achieve better attainments.

In conclusion, the use of Lesson Study model as a collaborative research methodology has provided an opportunity to understand the needs of the learners and to reflect on classroom teaching practice for developing innovative approaches to pedagogy in general, and learning aspects of demonstration through the Art lessons in particular. In this context, the Department for Education (2009) stated that some schools incorporate LS into their policy to improve teachers' professional development and management.

7. Recommendations

In my opinion, our research data collection method could be even more efficient if we used additional means of recording (such as audio recording or filming) should the school policy allow that. Additionally, it would also be more accurate if more teachers were involved (this may also help in avoiding bias). Consequently, this may lead to improve and reflect on teacher's performance.

For future lessons, I would consider start-to-finish strategy- which is recommended by Prince, (2008) if the demonstrated technique is short and simple, and a sequential steps-based demonstration for a longer demonstration- as recommended by McLain, (2018). I would also recommend applying Lesson Study on a larger scale as part of the School Development Plan (for developing teaching and learning priority), as well as considering increasing the number of the observed lessons and involving more observers for future research, with an emphasis on demonstration in correlation with main lesson elements (such as lesson objectives, formative assessment and plenary).

Yet, for more successful demonstration I would recommend effective questioning and feedback to gain pupils' attention, as well as to assess their understanding of the concept (McLain, 2018). Additionally, showing explicit examples during the demonstration may contribute to reduction of students' confusion (Harbour *et al.* 2015). Besides that, pupils' engagement is motivated and driven by their success in the task (Bartel, 2009). Thus, it is significant to link theory with practice by making connection between visual learning and

visual thinking (Daniels, 2018) which can be achieved through complementing demonstration by pre-practice experiments, accompanying with supervision, differentiation and scaffolding strategies to support pupils in solving technical problems.

In conclusion, this research experience was my first experiment of using Lesson Study as a methodology, however, it is a strategic choice for teacher's contentious professional development (Dudley, 2014), and will open the door for further research and practice in my future career.

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