
Critical thinking and problem solving: reporting school-based practice: primary schools.

A central element of the Connecting Classrooms Critical Thinking and Problem Solving programme is that participants have the opportunity of putting aspects of the course into practice in their classrooms, reviewing the outcomes, and sharing their findings with other course members, together with other schools in the UK and internationally. These reports are a sample from the groups of teachers in from Cohort 1 (Spring 2016), and Cohort 2 (Summer 2016).

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The Creative Curriculum: how and why do the foundation subjects play a pivotal role in teaching critical thinking skills? Christ Church Primary School, Chelsea

What did we want to achieve?

In this project I wanted to consider what the nature of critical thinking is in a primary school context, then furthermore, how to structure, develop and embed it in my classroom teaching, across the whole school and within the new curriculum. Within my role as a member of the SLT and whole school Creative Curriculum Coordinator I also wanted to explore the intrinsic connection and relationship between creativity, critical thinking and problem solving. This linked well with the formal introduction of Philosophy for Children, through training and experience, across all key stages in my school.

The focus area I choose was to apply the teaching of critical thinking skills within a subject area rather than discretely. During the last academic year, my focus subject area was Geography (part of the school's development plan) but in this project it was taught within a unit of History (The Victorians). The means by which I taught these skills were within 'thinking routines' taken from a project called Artful Thinking. This is an American initiative whose approach for teaching thinking uses Art as a force for developing pupil's thinking dispositions. My specialism in Art Education and the connection between creativity and critical thinking is an area that I have been particularly interested in for teaching Art & Design in primary schools. The goal of Artful Thinking is to help pupils develop thinking dispositions that support thoughtful learning by making critical thinking a more visible and apparent aspect of classroom life. In my senior leadership role it seemed logical, whilst introducing the new creative curriculum (Geography, History, Art and DT) within our school, to simultaneously embed and integrate a common understanding and reiterate the importance of nurturing young children's creative and critical thinking. As an outstanding school, an ongoing development focus is to 'narrow the gap' between children's attainment, the progress and performance of pupil premium children and the role of pupil voice. Teaching critical thinking skills addresses these challenges through an emphasis on: language, expectations, modelling, opportunities, motivation, relationships and classroom environment.

How did we go about it?

This initial project was carried out in my own Year 5 class of 29 children (aged 9-10).

The class cohort consists of four children with SEN; two children with statements (ADHD) (Visually Impaired) and six with EAL needs.

The children took part by completing three thinking routines/ frames over five sessions (approx.30 mins). The stimuli were three different Victorian black and white photographs.

Photograph 1 with a routine called Think/ Puzzle/ Explore

Photograph 2 with a routine called Looking 10 x 2

Photograph 3 with a routine called Creative Questions (part 1, 2 and 3)

Photograph 1 and Think/Puzzle/Explore

This thinking routine was an introduction to the Year 5 history topic, Victorians and I was particularly interested in the effect that this would have on their engagement to learn, ask questions, write known facts and inspire further learning.

Three groups of learners were particularly drawn to my attention in terms of their strong interest, natural ability and affinity with this approach to learning. They were pupils with EAL, high attaining and 'quiet' pupils and lower attaining children with low level behaviour concerns. As a class teacher this also highlighted the merits and potential drawbacks of differentiated group teaching as opposed to mixed attainment learning in primary school. Children's questions focussed on historical concepts such as: setting, figures, age, gender, economic status, propaganda, relationships, similarity and difference. Many of their questions reflected historical critical thinking skills such as: enquiry, evidence and communication.

Photograph 2 and Looking 10 x 2

This routine was an exploration of the children's use of language and vocabulary. It was very clear that a paucity of language prevented some children from contributing ideas in a whole class discussion but given time and an opportunity to write down individual words or phrases, gather and formulate their thoughts, they grew in confidence. Again, this routine emphasized the historical skills of observation and communication.

Photograph 3 and Creative Questions

This part of the project was carried out over a period of time and had three different aspects: initial questions (in black), answers written after a research homework (in green) on the related subject (Queen Victoria's family), additional answers and questions written by another classmate (in red). Lastly, there was an opportunity to reflect on any new ideas about the artwork/topic. This activity encouraged self-generated questions, collaborative learning and reflected better understanding of known historical facts (particularly from higher attaining pupils). The final part revealed how the pupils learning had progressed and how they were able to ask higher order questions; commencing with phrases like, 'what would change if, what if we knew?' More open and flexible thinking was also apparent from the whole class in the final session.

How well did we achieve our aims?

I have briefly described some of the impacts that I observed on pupils' learning but decided that it would be beneficial to ask them how they had felt about these activities and experiences. I wanted the pupil evaluation form to consider the three orientations of critical thinking: making better sense of information (facts), becoming a more open thinker and becoming better and more confident at metacognition (thinking about thinking!). The context for this project was within a history unit but one of the aims is to encourage critical thinking in all core and foundation subjects.

What was the impact on pupils?

These are some quotes from the children:

- I enjoyed doing this because I like looking at pictures and asking questions.
- I found it pretty easy most of the time but sometimes I found it challenging against my brain.
- I like looking at pictures to find little clues of her life and feelings.
- I liked looking for clues and hints in the pictures because there were things that I knew and didn't know so I learnt new things. And it was a subject that I hadn't studied yet.
- It was challenging to begin with but it got much easier and funner!

Other outcomes:

This project has given me an opportunity to consolidate my understanding of the key role that images can play in teaching thinking skills to primary aged children. It is also clear that to teach CTPS strategies you need to make them explicit and give children time and opportunities to practise them. If these are skills that can take weeks, months or years to learn, then a whole school approach is needed.

I hope to be able to share this project with the other members of SLT in my school and whole staff, and I would like to be include these findings in my Geography initial teacher training sessions.

Arabella Davies, Year 5 class teacher, Creative Curriculum whole school coordinator and member of the Senior Leadership Team, Christ Church Primary School, Chelsea.

Higher order questioning and critical thinking project: Cherry Orchard School, London

What did we want to achieve?

After attending Day 1 of the course I decided that I wanted to introduce higher order questioning and encourage critical thinking across the school. I wanted children to be able to look at sources and artefacts and question their authenticity and purpose. We also wanted children to demonstrate critical enquiry skills and not just to take 'teacher's word for it.' This would be most likely to work in History and Geography, however encouraging higher order questioning could be implemented across all subject areas.

How did we go about it?

On my return to school I held an inset to share the resources and the above ideas from the course. Although we agreed that we did encourage critical thinking and higher order questioning through Socratic Dialogue and P4C already, we aimed to raise the profile across the school. All teachers had higher order sentence starters questioning stems in their classroom and children were encouraged to ask questions using these. We also did less talking to allow the children to do more. So children had more control over the direction and dialogue of their learning. This almost accidentally turned into class debates which were so rich in language where children exercised critical thinking and worked on their confidence.

We at first taught children how to critically analyse historical sources and then trained them to ask all of the possible questions surrounding the piece of evidence. We encouraged children to use an open mind and understand that sometimes there is no such thing as a definitive answer. We also encouraged children to challenge our answers and not just to 'take our word for it. This was done through extensive modelling between teachers, TAs and LSAs.

How well did we achieve our aims?

After six weeks we had another staff meeting to discuss the impact we felt these strategies had had on the children. Staff collectively decided that children were beginning to 'think outside of the box.' They were exercising curiosity and asking higher order questioning about their learning. During debate we noted that children's confidence had grown and they were fluent in presenting their ideas.

S. Celebioglu, Cherry Orchard School.

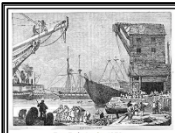
Developing critical thinking and problem solving in young children: Curwen Primary School, Newham

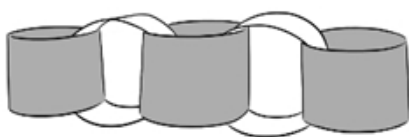
What did we want to achieve?

We wanted to develop teaching strategies that promote the development of Critical Thinking and Problem Solving (CTPS) core skills in young children. The sooner children begin to use CTPS skills, the more inquisitive they become and the more they embrace learning. Rather than it being a conscious process, CTPS skills will become embedded into cognitive processes and become a natural way of thinking. With this in mind, it is important that the journey of learning CTPS skills begins early, with primary schools being the ideal platform from which to start this process.

How did we go about it?

As CTPS skills are best taught in the context of subject matter. As such, two tasks were designed that could be adapted to a variety of subjects. The first was a picture analysis activity, Picture of Influence, whereby an image was chosen and children had to describe what they could see in the image. Linking to this, children had to describe what this suggested, making links between what they could see and what these things suggest is happening or resulting. The final stage asked for the consequences of the suggestions. The final stage was adapted in later activities; children were asked to think of questions that they would like to ask about the image, to further develop their understanding. They were guided towards higher level thinking questions, e.g. beginning 'Why might...?', 'How will...?'.

 <p>What can you see?</p>	<p>What does it suggest? (Think about people, work, buildings, environment)</p>	<p>What questions would you like to ask about the picture?</p>
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The second activity, entitled Chain Reaction, again asked children to think of consequences. Building on from the Picture of Influence activity (but could be adapted as a stand-alone task), children identified something that they could see in the image, e.g. smoke coming from the ships funnel. They then thought about the consequences of this, on people and the environment, writing each next step on a piece of paper until they had exhausted their ideas. Children were then encouraged to look back over their statements and identify gaps, or where further explanation was needed to create a full picture. Only when they were satisfied that they had fully explained the chain of events, they put together the Chain Reaction paper chain.

How well did we achieve our aims?

The Picture of Influence activity requires a lot of guidance, especially when it is introduced. The task requires modelling, with the best outcome being achieved where the teacher has pre-planned suitable suggestions and consequences to enable children to be guided where they may initially find it difficult. Having different options for the final 'box' in the activity allows for the activity to be used at different stages of a lesson, e.g. as a starter that can be

returned to when consequences have been investigated further, or as a tool for further planning if children are asked to think of questions they want to ask about the image. The Chain Reaction activity was more focused, enabling children to consider one aspect at a time. As such, this is accessible to all abilities, where the concept or idea that is being considered can be tailored to the pupil's ability. The notion that there can be gaps, and that the chain of events can be added to before it is completed, give the participants confidence to look back over their work and correct any errors of misunderstandings. Both tasks certainly encourage children to evaluate evidence, consider different perspectives and look for deeper meanings.

What was the impact on pupils?

Pupils were engaged and motivated to think for themselves. The Chain Reaction activity in particular promoted team work and communication skills, which resulted in children supporting each other in thinking critically about the task. They were able to consider different viewpoints and think deeply about issues, following the knock-on effects of each through to the end.

Emma White

Head of Year 5, Geography Subject Leader – Curwen Primary School, Newham.

Using critical thinking as a line of enquiry to explore the sustainability of our school: Dacre Braithwaite Church of England (VA) Primary School, North Yorkshire.

What did we want to achieve?

Our aim for this project was to enhance our children's critical thinking skills, with a particular focus on asking questions. We wanted the children to gain confidence in raising their own questions and discussing these with the hope of deeper thinking taking place in the classroom.

Our school project was also linked to our eco focus which was to explore the impact that we, as a school, have on the environment and to consider how we could reduce our carbon footprint and make our actions more eco-friendly.

How did we go about it?

The children initially explored an info-graphic based around sustainability. This led to discussions, both in groups and as a class, which encouraged the children to naturally raise questions. Not long after this, questions about our sustainability as a school were raised by the children which they were very keen to find answers too. Some of these were:

- How far away does our food from? What impact is this having on our environment? How can we reduce this?
- How can we encourage more wildlife to our school?
- How can we reduce the amount of electricity we use in school?
- How can we reduce our carbon footprint when we travel to school?
- What improvements can we make to the school grounds to improve our carbon footprint?

Due to their enthusiasm and interest, we decided to act upon the questions the children raised during our critical thinking/geography session and planned a whole school 'Sustainability day' where the children worked on a variety of different activities. Each activity focussed on one question the children had raised with the intention of them exploring these further and generating their own answers and solutions through enquiry.

How well did we achieve our aims?

Our 'day in the dark' sustainability day was a great success and really encouraged all of the children to engage in meaningful discussion and provided lots of opportunities for deeper thinking throughout the day at all levels, ranging from reception to Year 6. The children were completely engaged as the whole concept of the day, even the focuses of each session, were based upon the initial questions they raised during lessons. The activities we conducted for each question raised by the children has been highlighted below.

1. How far away does our food from? What impact is this having on our environment? How can we reduce this?

In groups, the children were asked to find the food labels which were scattered around the room. They had to identify which part of the world this food was grown in and then plotted this information onto their own version of a world map. After this, the children further discussed how we have access to some of our food through imports and how they arrive in England. The children also explored ways in which we could reduce our food air miles by maybe growing some of our own crops in school and using local produce.

2. How can we encourage more wildlife to our school?

The children were very proactive and decided to make many different features such as bird feeders and bug hotels in order to attract more wildlife into our school grounds. They also got involved with some gardening in our school wildlife area.

3. How can we reduce the amount of electricity we use in school?

The children did a survey of the school and the electrical appliances we use on a daily basis. They discussed which items they felt were important which we needed in school and also explored the possibilities of reducing our use of some other electrical items. The children also took a meter reading the beginning of the day and compared this with the reading at the end of the day after we had a 'day in the dark' where no electricity was used for the whole day. They then compared this reading with that of a normal day and worked out how much of a difference this made to our energy usage and our school electricity bill.

4. How can we reduce our carbon footprint when we travel to school?

Each group plotted their houses on a map of the local area and we also identified where school was. They compiled a list of the children who all lived in the same village. They were very shocked to find that lots of children were travelling from the same villages, at the same time, to the same location every day. They discussed what kind of impact they could be having on the environment by using so many cars and decided to take action! The children created posters promoting car shares which are to be displayed around the school for parents to see. Some children are even in the process of writing letters to inform parents of what they discovered during this session and some of their ideas to reduce the number of cars travelling to and from our school every day.

5. What improvements can we make to the school grounds to improve our carbon footprint?

The children drew their own maps of the school grounds (expectations differed depending on the age of the children) and conducted an outdoor survey of our school grounds. They identified areas which they felt needed improving and how this would impact our sustainability as a school. Some areas included our wildlife area, some of our drainage systems and our outdoor lighting system settings. This activity promoted some fantastic discussions where the children challenged each other's ideas and really supported them in effective deeper thinking.

What was the impact on pupils?

Our critical thinking sessions have had a significant impact on our children's confidence in raising questions and both discussing and building upon each other's ideas. They are able to raise questions based around many different prompts, such as info-graphics, and are doing so with increasing independence.

With reference to our sustainability day which was a result of the children's critical thinking, they have become much more aware of the impact our daily actions can have on the environment and have supported each other in the process of developing answers and solutions to their own questions. As a school, we have seen a significant enhancement in the children's deeper thinking skills and hope to continue supporting them in developing these skills through further critical thinking opportunities.

Other outcomes:

As a result of this project, I personally feel much more confident in incorporating critical thinking into my lessons to encourage and promote deeper thinking across the curriculum. I will continue to plan critical thinking sessions within my teaching as the children are always engaged, make fantastic contributions and share great insights which often develop their own and other children's learning.

I have shared some of the key messages and ideas from this critical thinking course with my colleagues and they have also been planning some opportunities for this with their own classes. As a staff, we organised and conducted our sustainability day which we all felt benefitted the children's deeper thinking skills.

Overall, critical thinking activities within our school have had a significant impact on our children's learning. We are very impressed with how it has supported them in developing confidence in raising questions and how it has promoted high quality discussions, leading to the development of their deeper thinking skills.

School context

Dacre Braithwaite Church of England (VA) Primary School is a small, rural school located in Nidderdale, an area of outstanding natural beauty. All of the staff at this school were involved in our sustainability day which was a part of this project.

Emily Bosomworth, class teacher, Dacre Braithwaite Church of England (VA) Primary School

Critical thinking in Year 4: Durdan's Park Primary School, Southall.

Durdan's Park Primary School is in the first year of a two year visible learning programme whereby the children are becoming more independent and assessment capable learners. In order to develop this further the children need to be able to think more critically about what they are learning about thus taking them from surface level learners to deeper level thinkers (and as such learners).

What did we want to achieve?

We wanted to use the critical thinking course as a tool for getting our children to think more critically not only in foundation subjects but across all subjects around the school. This would enable the children to take charge of their learning which will then lead them to develop a deeper understanding of what they are learning.

How did we set about it?

To begin to implement this in the school the Geography coordinator (myself) decided to use debating and evaluating sources as a basis in Year 4 for introducing the critical thinking questions to the children so that they can begin to think more deeper about the topic that they are debating.

Primarily the children were given a chance to debate whether it was a good idea to build the Aswan dam in Egypt as this linked in with the topic. During this session the children were given evidence for and against that they ordered on a good/bad continuum. After the children completed this task they underwent a debate about this question. This task was completed completely unaided with no teacher input nor questioning templates for them to use as a guide.

The second time that we engaged in a debate was World Fairtrade day. During an afternoon we were looking at whether Fairtrade was a good idea or not. This task was aided as we went through the pros and cons together and discussed them as a class and using the critical thinking questions as a guide to help us to think more deeper into the topic and then the children were sent away to create a list of pros and cons themselves and then split into groups and debated the topic.

The final element was to look at sources of evidence. During a climate change session, the children were given three sources of evidences (quotes) from different members of society. The children were first asked what they thought of each quote and then after using the thinking questions to question the reliability of the source by evaluating them.

How well did we achieve our aims?

During the first session where the children used the continuum, some of the children began to form discussions as to why they believed that it should go onto a certain spot on the continuum. These discussions showed the children have already begun to think somewhat critically but needed more modelling/scaffolding in order to get them there. When participating in the debate the children did not quite use some of what they had been looking at and the discussions were surface level answers.

The next session was more successful for the children and this was a turning point for the children's thinking. More modelling of how to use the critical thinking questions began to get the children to begin to question the evidence provided and some even began to think outside of what was provided and more into other elements that Fairtrade could have an effect on. This showed that the critical thinking for these children worked and moved on their learning as well as maturing their attitudes and making them aware of more aspects in their life (but beyond their maturity). This task really challenged what the children originally thought about Fairtrade and because of this changed opinion some began to think about how it can be developed so that it can actually mean what it says.

The final session the children were able to independently able to evaluate the sources using the critical thinking questions to aid them. Once modelled to them they were able to do it more effectively however this whole session once again changed the opinions of the children as what they thought about during the reading of the quotes somewhat changed as they looked at the different reasons as to how their background and actually what they are saying can have an effect on them. They also began to identify why sources are more reliable than others as well.

What do we plan to do next?

The aim is to carry out a critical thinking inset with the staff in the school and give them this as a case study to show the development that they can achieve with their children and ideas of how to implement it into their foundation subject. They will be given the list of critical thinking question templates to assist them in their class and will be expected to complete a task where they use this in.

Kimberely Rowsell, Durdan's Park Primary School, Southall.

Children asking questions: Fleckney Church of England Primary School, Leicestershire.

What did we want to achieve?

We wanted to enable the children to ask questions and find the answers themselves rather than simply give them information. We then wanted the children to use the answers they had found.

How did we go about it?

Our topic was Brazil and the rainforest; we had already taught seven lessons so the children had good knowledge about where rainforests can be found and what they are like. We were due to look at what rainforests give us and the issue of deforestation.

We re-planned the first lesson so that the children had an overarching question – Who cares about the rainforest; does it matter? They had to come up with as many questions as they could that they would need to find the answers to before they could answer the main question. They brainstormed questions such as: What would life be like without the rainforest? What do we get from the rainforest? Why are trees being chopped down? Are we chopping down more trees than we need? We then gave them access to information so they could research the answers to their questions. The children came to the conclusion that rainforests do matter but they matter to different people for different reasons.

The second lesson focussed on the children using the information they had found out. They were told they had been employed by the Brazilian government as advisors. They were being asked to prepare a presentation to the government about whether they should allow trees in the rainforest to be chopped down. They had to give reasons for their decision and solutions to possible problems. They were given some statements from various interested parties (such as a cattle rancher, an environmental protester, a member of an indigenous tribe etc) and told they needed to keep everyone happy.

How well did we achieve our aims?

The children needed some prompting in the first lesson to think about what kind of questions they might need to answer because many of them immediately thought they could answer the overarching question; they thought the rainforest only really mattered to the animals and that it should be left alone by humans. However, very quickly, they began to think more carefully and come up with pertinent questions such as those in the previous section. By the second lesson, the children were much more confident at asking questions and thinking for themselves. They were able to apply what they had found out and give thoughtful advice to the 'government'.

What was the impact on pupils?

The pupils achieved much more than if they had just been told why the rainforest was important. They were far more engaged and able to verbalise their thoughts and opinions.

This experience has had a large impact on my teaching because it has shown me the value of relinquishing ‘control’ and allowing the children to direct their learning. I was still able to steer them in the direction I wanted them to go but they were far more enthusiastic because they were driving their own learning.

As a school, we have organised training for at least two more members of staff to have training in Philosophy for Children and then feedback our experiences to the whole staff.

School context

Fleckney Church of England Primary School is the only school which serves the village of Fleckney and is larger than the average primary school. There are just under 400 children on roll. The majority of the children are White British, with a few from other cultural backgrounds. Very few speak English as an additional language.

The proportion of disabled pupils and those who have special educational needs is just below the national average, although the proportion who have a statement of special educational needs is well below average. The proportion of pupils known to be eligible for free school meals is below the national average.

Sarah Panter, Year 6 teacher and geography co-ordinator.

Critical thinking through questioning: Godstone Village School, Surrey.

What did we want to achieve?

We wanted to enable children to think through situations and problems from multiple perspectives and show resilience while doing so through their own use of questioning. Also, we wanted adults to understand their role in using questioning to support this process.

How did we go about it?

I had my Teaching Assistants keep a track of the number of different questions asked by me over the course of one week. Also, they kept a track of the questions asked by the children and the different kinds of questions over the same period. I then identified questioning areas which I saw were weak and developed these in myself and in the children. To achieve this I had a list of these questions by my desk and I used them specifically in my planning. For the children I modelled this skill regularly and we used debate to provide us with an environment to practise the use of this type of questioning.

How well did we achieve our aims?

Children have become more independent thinkers. Problem solving across all subject areas has become more resilient and children enjoy questioning each other's point of view. As the teacher I feel more able to teach learning skills which can then be applied in a range of contexts. Children are more able to give their views and back them up confidently and to accept the opinions of others as valid but challenge them respectfully.

What was the impact on pupils?

Pupils' achievement has improved particularly in non-routine problems in Maths and inference based work in reading.

My teaching has also become more reflective. I am far more often facilitating learning and enquiry rather than feeding knowledge. I feel others' teaching would benefit hugely from this approach by making them able to facilitate thinking and problem solving and I intend to deliver this as training to other staff members in the Autumn Term 2016.

Adam Kohlbeck, Godstone Village School, Surrey.

How can focused support with children's questioning skills, in Year 5 and Year 1 topic lessons, improve the critical thinking of these children? Kensington Primary School, London

What did we want to achieve?

Our first title was 'How can we improve critical thinking in the school through our use of effective questioning?', then it became: 'How can we improve the questioning skills of our children in order to get them to think more critically?', then finally the title above.

Initially I wanted to improve the questioning of children by adults in order to get children to think more critically, however when I looked at adult questioning across the school this was of an exceptional level. However in some classes, children seemed quite passive, not always asking higher level questions of the teacher, of each other or of themselves. I therefore decided to try and improve the questioning skills on the children in our schools.

How did we go about it?

I distributed a really useful [resource](#) in improving children's questioning to teachers, in the hope that they would be able to use this in class to help improve this. However, without embedding this into anything the teachers were doing, it became buried in the paper work and unfortunately teachers didn't use it.

How well did we achieve our aims?

With the help of my Head Teacher I have come up with a way of embedding this into the curriculum and make outcomes more achievable. I am going to work with Year 5 and Year 1 to improve the questioning skills of children during topic lessons. I hope to do this by incorporating big pictures to start each history/geography topic, which children can ask questions about. To start with this will be supported by the teacher, offering questions stems of different levels. And after time, hopefully children will get used to some of these openers and come up with some more create questions, leading to more critical thinking. These questions can then be revisited at the end of lessons as a plenary or at the end of a topic.

In this way the project will be linked to the school's priorities, namely oracy. In working with two year groups I hope to be able to more easily support, monitor and observe changes.

What was the impact on pupils?

The project is ongoing.

Other outcomes:

I have learnt a lot about my own professional practice throughout this process, and had the opportunity to reflect on this. For example it was a mistake to introduce resources to class teachers en masse, and cold, without embedding it at all in something that teachers were already doing.

Eleanor Lucas, class teacher and History and Geography Coordinator at Kensington Primary School.

Improving creating questions to help critical thinking in lower Key Stage 2, Leigh Primary School.

What did we want to achieve?

I wanted to use critical thinking within a geography lesson to improve class participation and creation of questions.

How did we go about it?

Part A: I created an infographic stimulus using Digimaps. I showed an OS map of the local area with the school highlighted and fast food outlets starred. Children had to use their place knowledge to recognise what the link was between the starred buildings.

Key Questions I gave included:

- What are we investigating? How do you know?
- What questions could I ask you using this map?
- What facts does it tell us?
- What other evidence would be useful?

Part B: We then repeated the activity with SOS High School in Ethiopia using Google Maps.

Key Questions I gave included:

- What kind of food outlets are here?
- What is the same? What is different?
- What questions could I ask you using this map?
- What facts does it tell us?
- What other evidence would be useful?

Part C: We then compared and contrasted what we had gained from the two maps.

Key Questions I gave included:

- Using what you have learnt so far... what would the places look like in the future? What do other people think?
- Why do people have different views on this?
- Which place would you like to live when you are adults? Do you think there will be the same issues?
- Do the conclusions make sense?
- Are your conclusions supported by evidence when giving reasons?

Part D: Two weeks after the initial study, both maps were printed off. The children were able to make decisions in groups of what food outlets might appear based on the population numbers and where they would be ideally located.

How well did we achieve our aims?

Part A: Children made the link quickly between the fast food outlets and the school and began to suggest questions such as: are the children at the school overweight? Do the parents have busy working lives and need the fast food? Does the locality of the fast food restaurants make the children at the school obese? Are they open when the children are leaving? Do the children eat at the food outlets often?

Once one child began the questions, the children soon became more and more engaged and their critical thinking skills became evident. Lots of assumptions were made but they soon realised they had to ask questions to prove the assumptions to be correct or misinformed. The children generally working below age related expectations really thrived and created questions building on the examples given by others. They joined in well within the session and at a much higher participation rate.

Part B: The children were shocked by the Google Maps with only three food outlets shown. They instantly began to create questions and minimal adult interjections were needed.

Independently the children debated if cafes were food outlets and whether they would class it as similar to the fish and chip shops and KFC that are around our school. The discussion was really healthy and after a while there was no conclusion. The children understood each other's views and didn't know who was right and who was wrong but handled it in a much calmer way than expected from past experience.

They quickly recognised the differences and again came up with questions that I could ask from using the maps and looking at the distance between the school and the cafes/coffee shops. The children working at age related expectations really thought about it and recognised that they were making assumptions about the lives and careers of parents and wanted to find out more about this to see if their assumptions could be backed up.

Part C: All children found this possibly the trickiest bit as they struggled to see how the areas and businesses would change and needed this breaking down further. When one male pupil did understand, he modelled both asking and answering the questions and modelled this to this class. He then moved around the class and modelled it group at a time. By the end, all children came up with a rough idea but were very competent at saying which they would prefer to live in/bring children up in. The class was split and were able to begin a debate where they voiced their opinion on this. This was much more successful than debates have been, taking turns and commenting on each other's points well.

Part D: Two weeks after the initial Critical Thinking study, I printed out both of the maps and gave them the job of decision making. In groups of 5 or 6, they had to decide where gaps were on the map and what places they might need. We looked at the estimated population of the two localities and the groups decided where and what food outlets might be built next. Interestingly, all groups did not place any more food outlets on the local map deciding there was more than enough choice. When looking at the map of Ethiopia, they varied what was placed on the maps but all wanted to provide them with more of a range of food. The reasoning behind this conclusion was because they were all now going to school and so would be working soon and could afford to eat at more food outlets. Only two out of the 5

groups placed a fast food outlet (either KFC or McDonald's) yet all groups placed restaurants such as an Indian restaurant, an English restaurant, a Chinese restaurant, a Greek restaurant based on giving them a variety of restaurants from around the world so that they could experience a variety of food.

What was the impact on pupils?

The children were keen to ask the questions and were engaged fully with the creation of the questions, perhaps as there was less pressure to actually answer them. They bounced off each other's ideas well and when predicting answers were showing high order thinking. The learning was enhanced by peer support hugely. Children working below age related expectations achieved the objectives and thrived on it being oral and being able to bounce ideas off each other.

The children went much deeper than expected due to the nature of the questions. They were definitely engaged straight away by having it beginning with something they all recognised and could talk about personally. By then moving it away they were able to compare their ideas and thoughts with more confidence.

Within the three sessions the impact was incredible, both engagement and achievement. The children were able to improve their geographical learning, meeting the objectives covered. The children's participation increased and they used higher order thinking within the lesson. As their participation increased, they were more welcoming to different approaches and working using their ideas as well as those of others. After the sessions, they were incredibly proud of their own achievements and have spoken about the activities lots since.

Other outcomes:

Since this study, I have used more hooks, such as infographics, to begin lessons. This is when the children have to make the links and has defiantly enabled all children in the class to join in. Our first unit in the new school year is based on comparing three localities. The teaching strategy used in this case study is the approach that will be rolled out across Lower Key Stage 2. This approach to teaching and learning will be shared and modelled with colleagues during Geography coordinator time and during staff meetings with the idea that it will be brought into the curriculum as a part of all subjects.

School context

Leigh Primary School is a larger-than-average primary school; the majority of pupils are from minority ethnic backgrounds, of which the largest group is Bangladeshi and over half of the pupils speak English as an additional language. The proportion of pupils known to be eligible for the pupil premium is above average.

This case study took place in the single Year 3 class with the class teacher and with support from the teaching assistant.

Victoria Peart, Year 3 class teacher at Leigh Primary School.

Raising participation from the least confident, improving critical thinking skills of all: Orchard Primary School, London

What did we want to achieve?

- To increase the confidence of all children, leading to increased participation from least confident.
- To create a culture of having a go, through welcoming all ideas and letting children lead discussions and evaluations.
- To improve children's ability to think creatively, to analyse and to evaluate their own ideas and those of their peers.

How did we go about it?

The Head Teacher came and informed the children that we have some money and would like to improve our outside area. She told the children they have the best ideas as it is theirs and they know what they want.

1: We selected a sample (SEN, PPG, already confident, boys and girls etc) of four children and asked them to take pictures of things they liked about our outside classroom, then pictures of areas they would like to improve. The class teacher uploaded and created a flip chart and the children shared this with the whole class. The rest of the class added to their ideas of what they liked and wanted to improve.

2: An adult facilitated the children wittling the ideas down into 'do-able' and 'not do-able' by discussing each idea and asking themselves and each other 'why' (it could or couldn't work). The children then chose their top five from what was left.

3: Class teachers all fed the children's ideas back in a phase meeting. The Phase Leader then sent out specific areas to each class, for the children to create a mood board to present to an appropriate leader. However, this was not the initial plan for the research, as I believe it took away from the children having ownership of it as they did not decide which one they wanted to pursue themselves.

4: The children were told their area and created a mood board using the children's quotes and ideas. I think this would have worked better if the children also drew their own pictures or wrote their own ideas etc – but the class teachers were unfortunately pushed for time.

5: The four children selected from the beginning then shared the mood board with a partner class as a practise for presenting to the leadership team.

Unfortunately, this was as far as we got. The aim was to feed back to the leadership team, action our ideas and then re-evaluate the outside area.

How well did we achieve our aims?

I definitely saw an improvement in participation from my least confident children. Not all Class Teachers reported finding the same; however I think if the aims and methodology

behind the research had been better shared, their approach to the research may have been different, resulting in different findings.

I cannot say I saw an accelerated increase in children's ability to think creatively, although some children are more creative (was it the research or natural progression...?) however I do feel like more children are able to evaluate in everyday situations. I also feel like the results may have been different by the end of the research as we missed a vital chunk at the end.

We have definitely created a classroom of openness and acceptance and children are a lot less dismissive of 'silly' suggestions and are now justifying why a suggestions would not work which requires a higher level of cognition, which is great.

What was the impact on pupils?

More children are fully engaged in whole class lessons, as I believe they no longer feel unsure about volunteering ideas etc.

Beckie Wright, Class Teacher (Humanities and RE subject leader) Orchard Primary School.

Using the rainforest to encourage critical thinking: The Raglan Schools, Enfield

What did we want to achieve?

I wanted to give children an opportunity to think about the rainforest in a different way. Firstly, to think about different sides of the argument about chopping down the rainforest and why some groups may be in favour of this. Secondly, I wanted them to take on a role that may have been different to their own.

How did we go about it?

The class had already had several lessons on the rainforest. I decided to change the final lesson so it had more potential for critical thinking. I started by showing the class a picture of a rainforest that had been burnt down and asked them to say what they thought the picture was of. I also asked them to think about how it made them feel. Then they had to sort cards as to whether it was a positive impact of the rainforest being chopped down or a negative impact. This was followed by a role-play on whether a road should be built through the rainforest. I used WWF resources for this. There were seven groups, local people against the road, logging workers, environmentalists, the logging company, the Government, indigenous people and local people in favour of the road. Each group had to tell the others what their role was. A series of statements were read out, to which each group had to respond to. There were also some secret messages going to and from the logging company and government. The role-play ended with a public meeting to discuss whether the road should be built.

How well did we achieve our aims?

Lots of children really enjoyed the role-play and taking on a role that may well have had an opposing view to their own. Although they found it hard to understand their role and what do initially, once I had gone round each group and explained they really got involved. There was a lot of good discussions about whether the road should be built, with children addressing each other directly and either agreeing or disagreeing with each other. A lot of good language was used, such as 'I believe' and 'in my opinion'. Lower Ability children found the role-play hard and didn't really say or join in very much.

What was the impact on pupils?

For the higher ability children it was a good opportunity for them to think about different viewpoints to their own. They also could discuss issues in a very open way.

I would definitely reconsider how I plan units of work to encourage more critical thinking. In terms of the whole school, it will need to be introduced slowly. Younger children, whilst having good ideas, can find it hard to express their own or other people's viewpoints and often find it difficult when there is no right or wrong answer. I would also need to think about how lower ability children could access this work more easily.

Caroline Freedman, Class Teacher, The Raglan Schools, Enfield.

To enhance critical thinking in geography: Russell Scott Primary School

What did we want to achieve?

We wanted to introduce critical thinking to Year 5 and particularly give it a Geography focus. The children have not had any previous lessons in critical thinking and an introductory session which linked to their interests and learning was planned for. We hopefully wanted them to see the links between critical thinking in Geography and critical thinking in other subjects. This would then enable the children to apply critical thinking strategies across the curriculum.

How did we go about it?

Before the session, the children were asked what they thought critical thinking was and had to record their responses on a post-it note.

As the children were already interested and engaged in the weather, in particular the names given to storms, I devised a critical thinking activity where children would be able to discuss how and why storms are named, firstly by researching it using a newspaper article. The children had to read their article in learning partners and discuss the key things they found. They discussed what answered their initial questions of 'How and Why are storms named?' Then they had to think about other things they had learnt from the article and anything else interesting they had found. They had to highlight them in the text. Once they had highlighted key areas, we discussed what we had found as a class. After addressing our initial questions, following on from pupil discussions, we also discussed other areas where human names might be used. We looked at the following questions:

- What could we name the next storm?
- Should we give human names to other natural threats?
- Pets shouldn't have human names! Do you agree?
- Would you describe humanity as important or insignificant?

The children worked in learning groups to answer these questions and give reasons for their answers. They use post-it notes to record their responses and they were able to make their way around the classroom to answer the others. Once they had completed the questions, the children were able to go back around and read what other people had put. They then had the opportunity to think about how this compared with their views.

As a class, we then discussed and debated the new questions, thinking about them critically. The children were able to share their initial ideas and other children were able to question them, which in turn got the children to question themselves.

When the session had been completed, the children were asked to link back to the original focus of the lesson. The children were asked what critical thinking was. They all wrote their answers on a new post-it and compared it to the one they had written at the beginning. The children then shared what they had learned about critical thinking and how they could use it in other lessons and areas of the curriculum.

How well did we achieve our aims?

This session was completed in both the Year 5 classes. One by myself and one by my colleague. The classes had different responses and thoughts throughout the session. Both classes came up with simple ideas linked to critical thinking (mainly linked to using your brain and thinking about ideas) at the beginning of the session. However, they differed when linking critical thinking back to the tasks they had completed.

One class thoroughly engaged with the task and carefully thought about their responses to each question posed. As they were given plenty of time to discuss and debate their answers, it gave them lots of time to think critically about what they were asked. Furthermore, it gave the children plenty of time to think critically about their own answers. Were they right? Could something else impact on the response they had given? For example, when looking at the naming of storms, we looked at the naming of other inanimate objects (as this was something suggested by a child). This prompted lots of discussion about natural threats and pets. They debated many ideas such as natural threats having the name of the person who discovered it (to give them credit) and not naming storms after humans as we could name a whole host of things (as humans discover a lot of things).

As the lesson was set up in a non-threatening environment, where every opinion was valued but could be challenged, the children were able to critically evaluate their own and others responses without feeling they had got something wrong. When asked to think about what critical thinking was at the end of the lesson, they had a better understanding and more ideas about it. They could also see how critical thinking could be used in every lesson. For example, when examining a picture in Literacy.

The second class which took part in the lesson, struggled to think critically. They could not see past their own initial responses. When getting feedback from the class teacher, it was decided that they needed more work on general thinking skills and looking at different points of view.

What was the impact on pupils?

The pupils were all engaged as it was something they were interested in and had asked about. They loved being able to 'think outside the box' and suggest reasons why certain things might happen. They also liked the fact they could discuss their answers and challenge other peoples in a non-threatening environment. They also liked the fact they could change and develop their initial ideas if they wanted to. Because of this, every child felt they had succeeded. Also, they were able to see progress in their learning by having plenty of opportunities throughout the lesson to revisit their original thoughts and responses.

As this was the first explicit critical thinking session, it was important to discuss the links to other subjects and the children were able to identify ways in which this type of session could be used. They also discussed how it could be used to further geography learning.



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Other outcomes

The session made me think about how critical thinking can be used across the curriculum to help develop a range of skills, for example, debating. I have already shared my practice with my year group partner and I will be sharing it with the rest of the staff as part of the new geography curriculum. Due to the feedback from my colleague, thinking skills in general needs focusing on across school. However, hopefully by sharing the activities I have done, staff will see that they are simple to do but incredibly beneficial. This was only a simple introduction to critical thinking, but something which could be incorporated into lessons easily.

School context

The school is a two form entry school in Tameside. The colleagues which are involved are the UK2 phase.

Katie Ashton, Middle Leader, Russell Scott Primary School.

Using critical thinking to analyse data: Thelwall Junior School, Warrington

What did we want to achieve?

Our main aims were to think critically and develop awareness of the complexities of the socio-economic status of South American countries, in comparison to the UK, and to enhance/support our current geography topic of 'South America'.

How did we go about it?

Pupils worked in mixed ability pairs to select one South American country to study alongside the UK. We used www.gapminder.org and tracked GDP per capita against life expectancy from 1800-2015. Pupils plotted line graphs to show the relationships of the data over time.

Pupils were asked to explain what they thought the data showed (identify trends and anomalies). They then had to interpret what the data showed and think about their reasons why there were certain trends or anomalies. Finally pupils were asked to pose questions about their data based on their thoughts and findings.

Prior input explored the definitions of GDP per capita and life expectancy plus how to use the website. Pupils had to develop, explain and refine their own ideas and data analysis.

How well did we achieve our aims?

- Pupils really enjoyed the two sessions; they liked the fact that they were using real-life data.
- Pupils considered cause and effect with maturity and in an insightful manner.
- The presentation of pupils' work reflected competence and pride.

What was the impact on pupils?

Pupils were well engaged in the data analysis, discussions and notation of their work. They could clearly explain their task and ideas to the head teacher who came to observe a section of the lesson, and applied learning to a range of scenarios in post-session discussions.

For example:

- Why did Ecuador's suddenly life expectancy stay at 33 from 1800 to 1920?
- Why did Ecuador's suddenly life expectancy rise a lot but Britain's didn't?
- What would happen to Ecuador's GDP if a flood occurred?

- How come there's a lower GDP in Columbia than England?
- Why did life expectancy rise up in the 1930s in Columbia?
- What caused life expectancy to stay straight up to 1920?

- Why did the life expectancy in Venezuela suddenly go up in the 1920s?

- What made the GDP in Venezuela go down in the 1970s to 1980s?
- Why did the GDP per capita in Venezuela stay the same for 100 years?

Other outcomes

I feel that I will make significant efforts to increase the amount of opportunities to use critical thinking across the curriculum. We reflected that critical thinking can fit within pre-existing planning/subject content and why I feel that it can raise standards of pupils work especially in English and maths through all subjects.

School context

Thelwall Junior School is a one and a half form entry school with just over 150 pupils, the vast majority being white British.

Colin Goulder, Year 6 Teacher and Geography/History leader. Thelwall Junior School.

Developing critical thinking through questioning: St Josephs Catholic Primary School, Wandsworth

What did we want to achieve?

Project aim: To strengthen the process of critical thinking in either geography or history through the development of questioning techniques.

Project impact measures:

1. Move the teacher/pupil questioning ratio from 50:50 towards 30:70.
2. Learners show a growth mindset and a higher level of thinking through the use of the types of questions they ask.

How did we go about it? (See attached PowerPoint® presentation to show more detail)

Methodology of project:

3. Through a CPD opportunity, teachers were introduced to a range of techniques for asking better questions.
4. Teachers then selected one questioning technique to use in the classroom for either geography or history.
5. Peer lesson observations were carried out to focus on the teacher/pupil questioning ratio and the types of questions asked by learners and were matched to Blooms Taxonomy.
6. Samples of work were taken to show new learning/thinking that has taken place by the learner.

Project timeline:

November – December 2015: teachers introduced to techniques for asking better questions.

4th January 2016: Whole school CPD on Critical Thinking.

5th -22nd January 2016: Teachers used better questioning techniques with their classes.

School week beginning 5th January 2016:

- Developing a no hands up classroom using the lolly stick approach.
- Learners were introduced to examples of critical thinking questions based on Blooms Taxonomy in history and/or geography.
- LSAs completed a frequency questioning tally chart and a critical thinking question type tally sheet to baseline types of questions asked.

School week beginning 11th January 2016:

- Teachers develop the Pose, Pause, Bounce, Pounce approach in the context of history and/or geography (Key Stage 1 to use daily images as stimulation and Disney characters to reinforce the approach).

- 12th January 2016: Staff meeting to review critical thinking strategies used.

School week beginning 18th January 2016.

- Staff developed thinking time by using the 'Think, Pair, Share' approach in history and/or geography. (EYFS to focus on extension questions e.g. Tell me about...? What do you think about...? How? Why? Learners undertook possible activities like Hot Seating, Role Play, Discussions, Imagery stimulation, Knowledge mind maps etc.).

25th - 29th January peer lesson observations and work sampling.

- Observers focussed on the frequency and types of questions used in the classroom by completing a:
 - Frequency of questions tally chart.
 - Critical thinking tally chart.
 - Collecting work samples to show the progress and impact of critical thinking.

1st – 11th February 2016: Outcomes were analysed and shared in school as a PowerPoint® Presentation, showing where learners progressed against the project's impacts measures.

- The critical thinking group met on Monday 1st February to analyse results and develop a PowerPoint® to share results.
- 9th February 2016: Critical thinking projects shared at a Staff Meeting: how can we move the project forward?
- 11th February 2016: Outcomes shared at the British Council Connecting Classrooms Workshop.

How well did we achieve our aims?

How well did we achieve our aims? (See attached PowerPoint®, Phase 3: initial findings, for further detail.) The project achieved its aims by using three critical thinking strategies. These were:

1. Using images to develop higher order questions.
2. Through the introduction of the no hands up strategy and the use of lolly sticks.
3. Through the development of the Pose, Pause, Pounce and Bounce strategy (PPPB).

Below are our initial findings.

Using images to develop higher order questions

We found geographical and historical photographs and images were very powerful in helping the children develop their higher order questions. At the start of the project, the teacher and their Learning Support Assistants matched the types of questions the children asked against Blooms Taxonomy and at the end of the project they carried out a similar exercise and compared the difference in the type of questions asked. The school's Learning Support Assistants carried these observations at times during a geography or history lesson

unknown to the teacher (See slide 36 for results.). Initial findings suggested that the children were asking higher order questions by the end of the project.

No hands up strategy and the use of lolly sticks

Comments by the teachers suggested the following:

- The children were enthusiastic about the approach.
- It reduced competitive nature of some children to feel that they have to answer questions.
- Lolly sticks kept the children on task.
- It gave all children in the classroom an opportunity to share their thinking and learning.
- It improved the children's listening skills.
- It allowed children the opportunity to think aloud in class in a safe environment.
- The children responded to questions calmly as a result of the approach.

Developing the Pose, Pause, Pounce and Bounce strategy (PPPB)

Comments by teachers on the PPPB strategy.

- The children are positively engaged with the process. Creates excitement.
- It allows children more time to process the question and to think.
- Is good for role modelling answers to the rest of the class.
- Improves the children's listening skills.
- Encourages children to consider alternative thinking and to build on that thinking.
- A greater variety of answers are now given in the classroom by the children.
- Has led to children debating the thinking of their peers.
- Works well with the higher ability children.
- The children's answers can be linked to philosophy – 'I agree...' and 'I disagree...'
- PPPB is not just constrained to geography and history; it has now become successful cross curricular strategy.
- Forces the teacher to wait significantly longer for children to process questions and to think.

What was the impact on pupils?

Impact measure 1: Move the teacher/pupil questioning ratio from 50:50 towards 30:70.

- Initial finding: In 6 out of 7 classrooms surveyed, the pupils were asking more questions than the teacher.

Impact measure 2: Learners show a growth mindset and a higher level of thinking through the use of the types of questions they ask.

- Initial finding: In 5 out of 6 classrooms surveyed, learners were showing a growth mindset and a higher level of thinking through asking higher order questions.

Other outcomes:

At the final stage of the project the initial findings were shared at a staff meeting. Staff were encouraged by the project's impact and as a result agreed that the project would continue throughout the academic year and they put forward some next steps for development:

Possible strategies to engage the learner with critical thinking:

- Set up a good questions board in each classroom.
- Award one member in each class a certificate for being the 'questioner of the week'.
- Link classroom vocabulary walls to develop good questions e.g. Word of the day used to base questions around.
- Develop more P4C style debates as classroom practice and set 'thinking' homework, linked to the question of the week, which encourages children and parents to discuss and share ideas.
- Use questioning to address misconceptions and develop the pupil voice.
- Use talk partners to deepen critical thinking and questioning.
- Run a parent workshop on critical thinking and thinking skills.
- Target groups of children e.g. FSM, EAL, SEND, More Able, with more opportunities to develop their critical thinking and questioning skills to enhance progress.

A teacher from our school summed up the success of the project by saying "These critical thinking strategies are great! I can't stop myself using them beyond geography and history". The project has positively engaged staff and learners with the strategy of critical thinking and as a result, it has been decided that we would extend our practice of critical thinking across all curriculum areas and adopt it as a whole school approach to raise the achievement of our learners.

Download

- Presentation: [developing critical thinking through questioning](#).

Stephen Ellis, Assistant Headteacher, St. Joseph's Catholic Primary School.