Year Two Report: Build and Test

Penryn Creativity Collaborative
Action Research Report

Research Question:
How can children make use of creative skills
(supported by dialogic and collaborative metacognitive thinking)
to design their own scientific enquiry questions?

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Penryn College "Achieving through Challenge"
University of Exeter
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Penryn Creativity Collaborative Action Research Report

This Action Research project is part of the Penryn Creativity Collaboratives.

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CONTEXT

Creativity Collaboratives is a national pilot programme of eight clusters of schools across England who are working together to test innovative practices in teaching for creativity, sharing learning to facilitate system-wide change. The programme, launched in October 2021, is funded by Arts Council England with generous support from the Freelands Foundation. Creativity Collaboratives: Penryn Partnership is the South West pilot for the programme and over the course of three years is focused on exploring one central question:

Does teaching creativity across the curriculum lead to young people who are better prepared for their future in a changing workforce?

The Penryn Creativity Collaborative is led by Penryn College with eight local primary schools and research partner, the School of Education at the University of Exeter. This report presents findings from one of thirteen action research projects which took place during Year 2 of the Penryn Creativity Collaboratives programme. Each action research project was led by a teacher with students from their own school, included a link with a partner from a local industry, and the lead teacher was supported by researchers from the University of Exeter through a programme of training and mentoring.

Full findings from Year 2 can be found in the research report. To cite this report please use:

Crickmay, U. Childs, S. Chappell, K. (2023). *Preparing for a Creative Future: Year Two Report Build and Test* https://penryn-college.cornwall.sch.uk/creativity-collaboratives

THE PROJECT

This action research project involved Year 6 (aged 10-11) pupils at Mylor Bridge Community Primary School in Mylor Bridge, Cornwall. It was led by Matt Collinge, class teacher of Year 6 and Science Lead. Mylor Bridge Community Primary School is a welcoming, safe, happy place to learn; where the ethos of 'Being the Best We Can Be' is valued and striven for throughout all aspects of school life. Our focus is to foster in our pupils: Kindness, Respect, Determination, Confidence, Creativity and Self-Awareness. The main premise of this project was to explore how children could make use of creative strategies to design their own scientific enquiry questions. Our school ethos for the children as scientists is for them to be curious and ask questions so this project was going to be incredibly valuable.

Metacognition is a particular focus for us at Mylor Bridge Primary School. For the action research project, the children were given time to plan how they were going to investigate enquiry questions. However, they were also given opportunities to monitor and evaluate the effectiveness of what they are doing before being able to take this new knowledge and inform their decision of how to progress their understanding further.

Penryn Creativity Collaborative Action Research Report

The metacognition cycle shown in this photo (plan, monitor, evaluate) is shared in all classrooms in our school. The question prompts given on this poster (e.g. have I completed a task like this before?) help children consider their own learning and it is designed to help children view learning as a cyclical process. For example, once they have 'completed' an aspect of their learning, they should be able to refer to and activate that learning when approaching new tasks. In this study, this would be learning from questions and investigations that perhaps did not go as well before using this to inform future efforts. In the action research study, I combined the metacognitive cycle with the Penryn Creative Skills Framework (see below), therefore I understood the metacognitive cycle as directly impacting the dialogic aspect of designing enquiry questions as the children will be able to refer to past attempts and collaboratively decide as to which elements of previous questions are worth keeping and how to best hone their ideas.

In the action research project, children took part in a series of three lessons in which they were able to adopt a play-based approach to the equipment without being given parameters in which to work. This allowed them to design questions and encourage them to be inquisitive and develop a desire to explore their own ideas.

DEFINITION OF KEY TERMS

Creative Skills

The research drew on the Penryn Partnership Creative Skills Framework developed during Year 1 of the Penryn Creativity Collaboratives programme (Crickmay, Childs & Chappell, 2023). The framework defined creative skills in a five-part model, and this action research focused on one section of this model as follows:

Dialogue and collaboration

Drawing in notions of dialogue, questioning, communicating and collaborating, in both verbal and embodied ways.

In the context of this study, dialogue is a pivotal skill since it encourages the children to pose and design their own questions. Collaboration with peers and working successfully in a group is integral to being an effective learner in a primary school setting, particularly in science.

Metacognition is the process of "thinking about thinking" (Muijs, D. and Bokhove, C, 2020) and encourages children to plan, monitor and evaluate their learning as they are working.

AIMS OF THE RESEARCH

This research aimed to explore:

- How children could take ownership of their science learning by designing and asking their own questions
- How children can be collaborative and talk through ideas

One of the main problems tackled with this action research project was whether the children in our school are able to be creative within the Science curriculum. Due to the nature of the curriculum objectives, it is easy for teachers to have pre-planned enquiry sessions where the teacher (and sometimes the children) will easily predict the outcomes. This is not conducive to working creatively and children can sometimes feel little enthusiasm when completing activities in which they know what the outcomes will be. By allowing them to design their own questions, this opens the door for them to encounter outcomes that might not be expected and allows them to think about what this could mean. While this is a preferable style of learning, it has been important to consider how the children can still achieve the objectives of the National Curriculum. It was therefore important to set clear and specific parameters in which the children could work to ensure they remained on task and their findings would be relevant to the learning taking place.

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METHODS AND PARTICIPANTS

Participants for this study came from a class of 20 Year 6 (aged 10-11) pupils. The research focused on nine students in the class who all gave their consent to participate. This project lasted over the course of 10 school weeks and included observations in science lessons, several interviews and different opportunities for the children to work collaboratively in science.

The methods used for this study were:

- Interviews conducted the beginning and end of the research period
- Observations were conducted of three lessons during this time and I also documented students' reflections before, during and after these lessons
- I kept an informal journal during the study to document thoughts and notable events that might contribute to my data analysis
- Photographs
- The Penryn Partnership Creative Skills Wheel: a data collection tool designed for the Penryn Creativity Collaboratives project. Around the edge It includes the five-part definition of creative skills developed during year 1 of the project, with each skill broken down into three detailed sections. Inside the wheel, teachers or students can mark whether they noticed each of the skills being used a little, some, or lots. The Creative Skills wheels were used by the children to reflect on how they felt about their opportunity to be creative in science and two wheels were completed per child (one at the beginning of the project and one towards the end).

Data Analysis

The information was analysed via immersion in all of the data. Photographs were analysed using the See, Think, Wonder technique from Harvard Project Zero. All data was then systematically coded using low level through to higher level coding which led to a thematic analysis. During the data analysis I worked in collaboration with my headteacher. Upon discussing the findings from the methods outlined above, we outlined themes and important points found in what I observed and discussed methods of developing how the lessons were taught in order to maximise the potential for this approach. These regular meetings and discussions have helped keep the project focused on developing opportunities for the children to be creative within the science curriculum and considering how this action research is going to be a driver of positive change in the school following the conclusion of this action research cycle.

Ethical research practice

Ethical research practice was ensured by following the ethical guidelines of the University of Exeter ethics committee which are grounded in the British Educational Research Association (2018) guidelines; protocols involved seeking informed consent for all research activity from all participants alongside careful data protection practices.

MAIN FINDINGS

Posing and responding to questions, including finding and solving problems.

For the first observation I completed, I gave the children the opportunity to create their own question after sharing the knowledge aspect of the lesson. In this case, it was that colours can be created due to refraction. During this lesson, the children were trying to create rainbows using mirrors and clear glasses of water. At the beginning of the lesson, the resources were laid out on the table and the children were given the opportunity to explore their own curiosity without having a preconceived idea of how to find out more. The children enjoyed exploring ideas and talking about why they were trying certain methods. I noted in my observation that the children began asking questions such as "do we have to use all the equipment?" and "does the rainbow have to be on the table?". This posing and asking of questions allowed the children to be creative when it came to working collaboratively in designing enquiry questions.

Examples of enquiry questions that arose from this process were 'how does refraction change the appearance of an object?' and 'how can rainbows be created using refraction?' Questioning was extended through practical activity. Examples below show a girl exploring how a glass of clear water can distort her appearance through refraction (Figure 1) and exploration of how to create a rainbow using refraction (Figure 2).

Figure 1: Girl using a glass of clear water to show how refraction can distort her appearance

Figure 2: Children investigating how rainbows can be created using refraction

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Working individually, collaboratively, and within a community

When we began the research study, the children in my focus group felt they ask questions as well as pose and solve problems at least lots or some of the time. When I interviewed the children about creativity in Science, the children were able to say that they felt that being creative when "doing experiments of your own design" (Paul, Year 6 Focus Group at the end of action research) and that in order to work creatively together in designing questions you need to "tell each other ideas and make a choice as to what you want to do when you have heard everyone's ideas" (George, Year 6 Focus Group at the end of action research). Ringo said that being collaborative is one of the most important skills in order to be a scientist before George extended this answer to "asking and answering questions". It was interesting to hear Paul say that "sometimes it is impossible to answer questions" and that "sometimes you need to continue in different ways" (John, Year 6 Focus Group at the end of action research). The children involved in this research have a clear idea of how they believe creative skills are used in Science and it was clear from their responses that they believed dialogue and collaboration was at the forefront of this creative approach.

Negotiating difference, responding appropriately to others' ideas

When conducting a different observation in a follow-up lesson to our work on refraction and how it can distort images, it was clear to see that the children enjoyed adopting the approach of being able to work on their own questions. The children were able to take their time in trying different methods without having to worry about preconceived ideas. The children were able to discuss ideas and negotiate different ways of trying to distort images. Sometimes, the children disagreed on the best methods but were able to compromise on how they could proceed in ensuring everybody's ideas in the group felt valued and listened to. After experiencing success, the children were incredibly happy and enthusiastic to share their efforts with me and other groups in the classroom. I noted that this reaction and positive feeling towards their learning may not have been present if the learning had been directly led by me and a pre-determined outcome was being sought. This was arguably the most important point that has come from this action research.

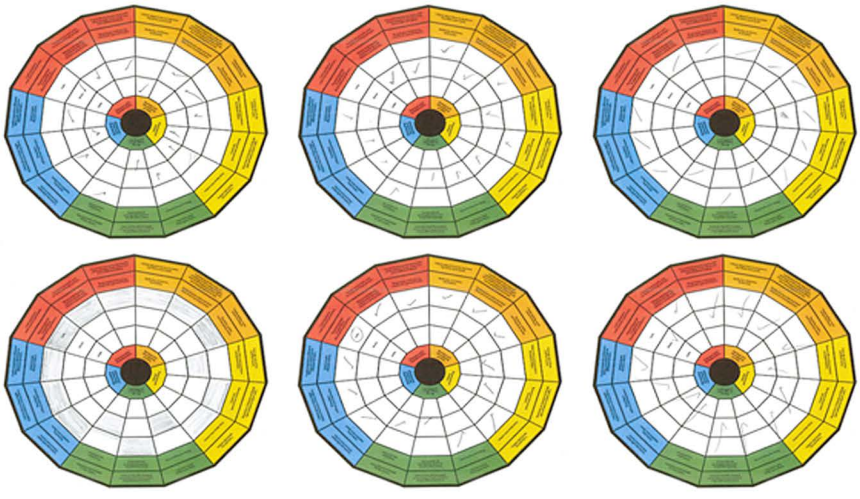


Figure 3: Children's perceptions of their creative skills

These wheels were completed towards the end of the action research period and were asked how confident they were at using these creative skills within a science context. As the wheels suggest, the children felt confident in using the majority of these skills. Upon asking when they felt they used these, the children had varied responses.

Penryn Creativity Collaborative Action Research Report

DISCUSSION AND IMPLICATIONS OF THE PROJECT

The main findings of this project were:

- Children like to have the opportunity to discuss and plan their work prior to starting
- Children require time to formulate, discuss and work on ideas prior to starting
- The children in my group were more inclined to 'have a go' at their own ideas without the fear of failure
- They were initially reluctant to create their own question if they had already seen a model question

This project has been incredibly informative to the planning and preparation of my science lesson planning in terms of considering the timings of lessons and the amount of time required for teaching science in this way. As science lead, I have spent time considering the best way for us to deliver the primary curriculum while still instilling and fostering a love of science. Conducting this action research has made me consider the best way of delivering the inputs to my science lessons. For example, a way I found to be more effective was by placing equipment on the tables in front of the children without revealing a model for the question. This gave the children the opportunity to discuss ideas without having an initial constraint on their thinking.

This action research period has had a direct impact on my school. After considering the data collected and upon reflection and discussion with my senior leadership team, we have outlined how we can use the skills the children have used in these science lessons in other subjects across the curriculum. One of our targets in our School Development Plan for the forthcoming academic year is to develop our curriculum to promote enquiry-based learning and the findings and reflections from this study will inform how we plan this.

Following the completion of this research, a plan for the future is to consider how these findings can be rolled out across the school and I have been able to regularly share updates and findings with the staff in my school formally in staff meetings. The successes and challenges I have encountered working with a small group of Year 6 children will influence how we plan for these changes. For example, as a school we are looking for ways to ensure our children have a chance to take ownership of their learning and be able to take their learning in their own direction. For this, the children are going to need creative skills and the foundational knowledge to apply to self-orientated learning.

A highlight of the study was having the opportunity to work on lesson design and the role this can play when it comes to children working creatively. I am looking forward to lesson planning with this new approach and working with colleagues to offer our children chances to be creative and take ownership of their learning.

One of the main challenges of conducting this research was the initial procurement of consent for the study. Once this had been attained, the main challenge was trying to ensure the lesson design allowed the most effective time for children to be creative. In the process of using this study to inform other subjects, the lesson design will change from science to geography to history so lessons learnt in this study will contribute towards our development plan for next year.

REFERENCES

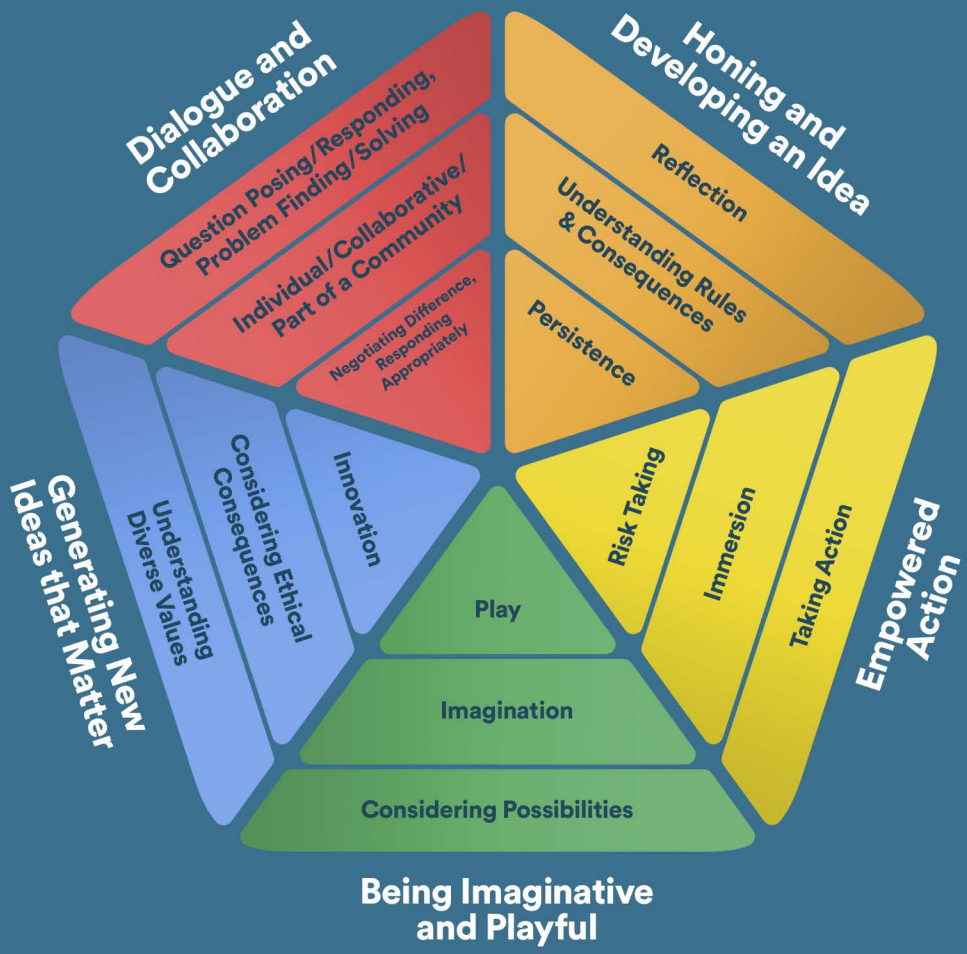
Muijs, D. and Bokhove, C. (2020). *Metacognition and Self Regulation: Evidence Review.* London: Education Endowment Foundation.

Crickmay, U. Childs, S. Chappell, K. (2023). *Preparing for a Creative Future: year one Report Question, Challenge and Explore.* https://penryn-college.cornwall.sch.uk/creativity-collaboratives

Creative Skills

PENRYN PARTNERSHIP

"Does teaching creativity across the curriculum lead to young people who are better prepared for their future in a changing workforce?"



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