Year Two Report: Build and Test

Penryn Creativity Collaborative
Action Research Report

Research Question:
How do creative pedagogies in the geography classroom lead to deeper understanding of geomorphic processes?

Lead Action Research Teacher:
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Creativity Collaboratives Network Partner:
Cornish Lithium

Penryn College
"Achieving through Challenge"

Cornish Lithium

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

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https://penryn-college.cornwall.sch.uk/creativity-collaboratives

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 Southwest 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

This action research project took place in Penryn College, an 11-16 school on the south Cornish coast, England. A lively, thriving and oversubscribed school, Penryn College prides itself on offering the very best for their students.

This action research project involved Year 9 (aged 13-14) pupils of mixed ability and prior attainment in Geography lessons at Penryn College. It was led by Liz Westhead, Head of Geography.

The project explored the use of creative pedagogy, namely imagination and playful experimentation, within physical geography lessons on tectonic hazards as well as river processes and the ways in which they shape the landscape, to develop creative skills and deeper understanding whilst embedding memory in Geography.

The role of the industry partner, Cornish Lithium, was to give context for the use and development of creative skills within a real-world industry setting. Discussion with Cornish Lithium focused on how they work in the organisation to help inform how we can use creative pedagogies in the geography classroom to build the skills young people will need in potential future careers. The creative skills wheel data collection tool (see description below) was used to help guide the conversation, so that this could be compared with the student's reflections using the same tool.

DEFINITION OF TERMS

- Geomorphology is literally the study of the form or shape of the Earth, but it deals principally with the topographical features of the Earth's surface. It is concerned with the classification, description, and origin of landforms. (Britannica, 2013).

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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 in particular on the dimension of 'Being imaginative and playful'. Data emerged in relation to other dimensions of creative skills as well, including dialogue and collaboration, honing and developing an idea, and empowered action.

- **Being imaginative and playful:** This is the ability to utilise imagination, to improvise playfully, and to generate and try out possibilities: as with possibility thinking, it is the ability to go beyond an understanding of 'what is' to consider instead 'what might be'. "Play is the most natural way in which people of all ages, and particularly children, learn and make sense of the world." (Robinson, 2022, p.76).
- **Dialogue and collaboration:** Drawing in notions of dialogue, questioning, communicating and collaborating, in both verbal and embodied ways.
- **Honing and developing an idea:** This combines the skills needed to develop creative ideas, incorporating aspects of self-reflection together with development of techniques and understanding of the rules, and the persistence needed to progress creative ideas and actions.
- **Empowered Action:** Foregrounding pupils' own agency in creative action, as a skill this includes the ability to take risks and question accepted ideas, the capacity to be immersed, and the ability to act on creative ideas. (Definitions from Crickmay, Childs & Chappell, 2023).

Creative Pedagogies

The research drew on the Penryn Partnership Creative Pedagogies Framework developed during Year 1 of the Penryn Creativity Collaboratives programme (Crickmay, Childs & Chappell, 2023). This framework used two prior reviews of creative pedagogies: Cremin & Chappell's (2019) systematic literature review of 30 years of empirical research on this topic, which identified a series of seven features characteristic of creative pedagogies, and Chappell et al.'s (2016) review which identified a series of eight features of creative transdisciplinary science and arts teaching. This action research explored two of the identified 'creative pedagogies':

Empowerment, autonomy and agency

Learners and teachers both have a sense of agency and are allowed to express themselves. Students are empowered to act independently and with agency (exerting power), developing and trying out their own ideas.

Risk, immersion and play

- Teaching/ facilitation creates space for these three processes to occur
- A trusting space is developed in which mistakes are possible and failure can be accepted

Creative Skills Wheel

The 'Creative Skills Wheel' which is a data collection tool that was 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. During this project it was used to support student reflections across a number of different methods as described below.

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AIM OF THE RESEARCH

Following the COVID-19 global pandemic periods of working from home and social distancing, upon return to school students had missed opportunities to play and develop social and creative skills. This may have an impact on students' learning and well-being in the secondary classroom, so this research was a response to the need for students to play and socialise as part of their learning which was absent for a significant time period.

> *"Children have a powerful and innate ability to learn. When left to their own devices, they explore options and make choices that we cannot and should not make for them. Play is not only a fundamental aspect of learning, but also a child's natural expression of it and a critical aspect of developing curiosity and imagination. In the case of play, the most effective action a school can take is to stand aside and let it happen.""...yet it is far too often trivialised and even reprimanded in school environments."*
>
> (Robinson, 2022, p. 76).

This project aimed to develop creative skills by:

- Using imagination and play when learning physical geography
- Exploring ideas and expressing understanding in novel ways
- Making connections and learning intuitively through playful experimentation
- Valuing the thought involved in the process of testing and play as much as (or more than) the outcome or final product (Lucas & Spencer, 2017)

The specific issues the study tackled:

- How does imagination lead to the ability to go beyond a simple understanding in Geography lessons?
- How does risk, immersion and play lead to a deeper understanding of knowledge in the Geography curriculum?
- How does play aid secondary school students with embedding memory?

Culminating in the research question:

How do creative pedagogies in the Geography classroom lead to deeper understanding of geomorphic processes?

METHODS AND PARTICIPANTS

The group for study was a class of 25 Year 9 (aged 13-14) students in Geography lessons about tectonic hazards and river processes. All 25 students (13 boys and 12 girls) took part in the lessons, including all creative pedagogy and reflection. However, data was only collected and analysed from 17 students (6 boys and 11 girls) for whom consent was given. The class is comprised of students with a mixture of abilities and prior academic attainment. There are 3 students with dyslexia and 5 disadvantaged pupils, 3 of whom are eligible for free school meals.

What Happened?

The project lasted 17 weeks. Although the data was predominately collected during 11 weeks of the Spring term (January to April 2023), initial introductions to Creative Skills and Pedagogy had started at the end of the Autumn Term (November 2022), therefore extended the project across 25 weeks in total.

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The project consisted of several lessons within that time which employed creative pedagogies, as described in the framework in Crickmay, Childs & Chappell (2023):

- Empowerment, autonomy and agency
- Risk, immersion and play
- Possibilities
- Generating and exploring ideas
- Group work and collaboration
- Problem-solving

How are people and places affected by earthquakes and volcanoes? is the enquiry question for the sequence of lessons on tectonic hazards. To start with, the class learned about the movement of tectonic plates. Students were given novel materials (Oreo cookies) to model the four different types of plate boundaries: constructive, destructive, collision and conservative, including the hazards created by the plate movements. Photos and videos of the pupils' work were taken by the pupils themselves on their iPads and were analysed by the researcher teacher, Liz Westhead.

Towards the end of the sequence of lessons on tectonic hazards, the whole class learned about the ways in which hazard risk can be reduced in the event of a volcanic eruption or earthquake, including strategies for hazard resistant design of buildings in earthquake prone areas. Students were then challenged to work in groups to "think like designers," plan a design and then build a model of an earthquake-proof building out of spaghetti and marshmallows with specific success criteria:

- The building must be at least 30cm tall, have 2 stories (floors) and at least 3 hazard resistant design features. It should be able to withstand 'testing' (shaking the table) without collapsing. Give an example of where this building may be found in the world.

Students had mini-whiteboards to draw their design ideas on first and were then able to negotiate their own groupings, additional equipment or materials (e.g. scissors, tape, string, rulers, etc) and timings to create their 'prototypes' or models of earthquake proof structures.

Photos of the pupils' work were taken by Penryn Creativity Collaboratives lead Sarah Childs who was observing, as well as class AR teacher Liz Westhead and the students themselves who also wrote reflections in their own words using the success criteria. All of this data was collated and analysed by Liz Westhead.

Near the start of the next sequence of lessons **How do rivers shape the land and how should they be managed?**, the whole class learned about river processes: erosion, transportation and deposition. They were given mini-whiteboards and pens as well as Play-Doh to illustrate and/or model their understanding of these processes and the different types or ways in which they work. Students reflected at the end of this lesson using the creative skills wheel data collection tool to record their responses, which were then collated and analysed by Liz Westhead.

In the final lesson for this project, the whole class learned about the formation of waterfalls and students were given time, space and a choice of classmates and materials to work with to model the process of waterfall retreat forming a gorge over time. Around 15 Students were interviewed in groups of 2, 3 or 4 about their experiences with creative pedagogy at the end of the final lesson and this was audio recorded, transcribed and analysed by Liz Westhead.

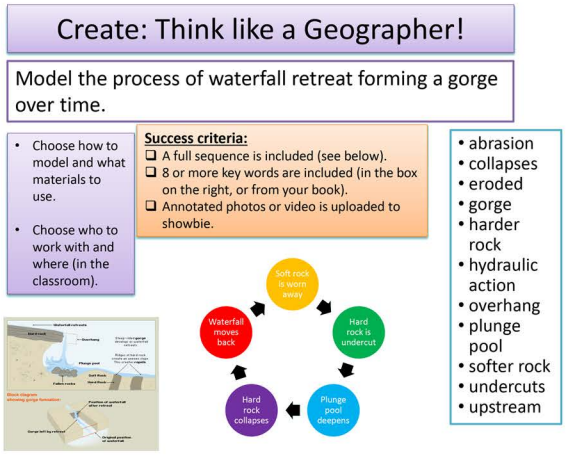


Figure 1: Waterfall Modelling instructions

DATA ANALYSIS

Data analysis was carried out via immersion in all data, followed by transcription of selected audio and film-based data. Students' written reflections were collated, as were their reflections indicated on the creative skills wheel data collection tool. Photographs were coded 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. This is written up below in this report.

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

Creative Skills

The data was analysed in relation to the Penryn Creative Skills framework, and provided evidence for students using / developing the following creative skills:

Dialogue and collaboration

There is some evidence for collaboration between students in pairs and small groups towards a shared project and some students spoke about this in interview.

> *"Ideas. Two different people who work together and visualising what you've been learning during the class."*
>
> (Year 9 student, focus group at the end of action research)

In addition, several photographs show students working together in small groups, such as this example (Figure 1) of three students sitting around a desk covered in LEGO pieces which they are selecting and putting together. They are collaborating to create a model of a waterfall to show how it forms and creates a gorge over time. They also appear to be deciding how best to represent this with the information and materials available in front of them, for example, the iPad and work in the exercise book.

Figure 2: Year 9 students working together with LEGO as part of their lesson on waterfall formation.

Below is a transcript of two students working together to discuss how they're going to express their understanding of waterfall formation. This is an example of how the students are using dialogue and collaboration to hone and develop their ideas, as well as deepening their understanding of physical processes which form a waterfall (geomorphology).

Student A:	Right so okay, so yeah, like you said, the waterfall will erode and then we can draw it...
Student B:	Are we drawing it going further upstream or not?
Student A:	We should draw it from, like above, where you can see the whole river.
Student B:	Oh okay, yeah.
Student A:	And then we can do an arrow for where the steep-sided gorge...and then we can just write...on this one, though, we can say how it completely collapses eventually because of the undercut of the ledge and...and then it's like back to square one, it's eroding further back.
Student B:	Yeah. Okay. No, that sounds good. So just...keep drawing and then write about how it keeps going further and further upstream. 'Cause of the hydraulic action?

Honing and developing an idea

There is further strong evidence for honing and developing ideas. All of the student text regarding the earthquake proof building design is reflective, showing they're analysing and evaluating against the success criteria which shows they understand the ways of working in Geography and what happens when these are used properly or not. Students articulate really clearly what worked well about their structure in terms of how strong or stable it was, how tall they were able to build it as well as being really specific about the design feature they've included and where in the world this type of design would be suitable (mainly based on the cost and level of development, but also thinking about places that are prone to earthquakes and are also built-up or have a high population density). They understand the rules and that they have consequences. Students are clearly thinking about how to improve their ideas and work.

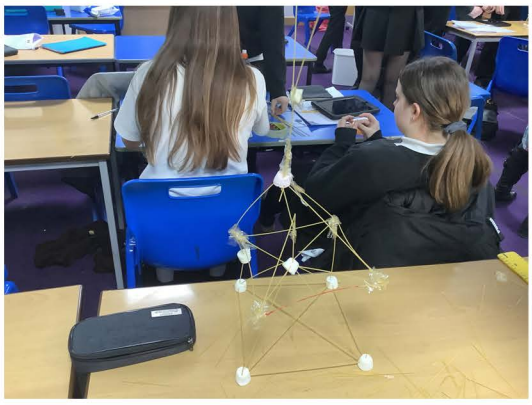


Figure 3: Photo of an earthquake proof structure designed by year 9 students using spaghetti and marshmallows during the lesson on managing tectonic hazards.

Student reflections:

"ours was 68cm over double the size needed. it had 2 stories and had strong support, in the middle we had a marshmallow holding it up and even when a lot of the support snapped it still stood up because of the way we kept it together, we believe it would probably be found somewhere like Nepal, next time we would probably make the support thicker."
(Year 9 student written reflection at the end of the lesson on managing tectonic hazards)

Figure 4: Photo of a year 9 girl with an earthquake proof structure designed by her group using spaghetti and marshmallows during the lesson on managing tectonic hazards.

Student reflections:

"Height: 92cm Success: ours survived the table quake despite wobbling a lot it had a good support beam through the middle of the structure. I was quite flexible and therefore allowed it to not collapse and withstand the earthquake Features: we included a steel beam and also a lot of cross bracing. It was 2 stories tall and might be found in Japan. Improvements: If we used all of the marshmallows and put several bits of spaghetti where there might have only been 1."
(Year 9 student written reflection at the end of the lesson on managing tectonic hazards)

Empowered action

Several students mentioned in interview about how they felt when working on a creative task being empowered to take ownership and learn in the way that suits them, as well as how this also gives a sense of equality. They particularly seemed to enjoy being given choices in how to approach the task, using different materials and different ways to express themselves as well as relative freedom in terms of time and space. I think this also links to the way in which immersion occurs when students are given the freedom to play as they are naturally allowed to evolve in their thinking and learn intuitively.

Student reflections:

> *I think using creative activities to learn in geography is helpful because it means I can learn in different ways and work out which ways work best for me to help me remember the information.*
> (Year 9 student written reflection at the end of the lesson on river processes)

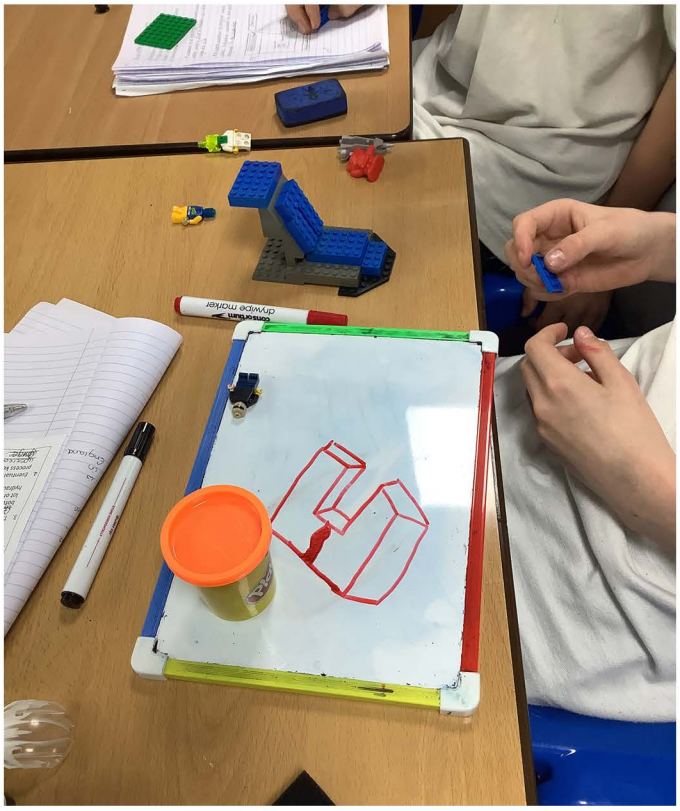


Figure 5: This photo shows a simple 3D drawing of a waterfall/gorge on a whiteboard on the table, as well as a LEGO structure and a pot of Play-Doh, with two students collaborating to model their ideas and develop their understanding of waterfall formation.

Being imaginative and playful

There is relatively strong quantitative evidence for being imaginative and playful, as when students were asked to reflect by marking the areas on the creative skills wheel that they felt they had used in their learning, most of the marks were within the 'being imaginative and playful' section, particularly 'using imagination' being the strongest within this section. As a result, I decided to focus one of my interview questions around being imaginative to get some qualitative evidence to support this. Students mentioned the fun and engaging elements of creative thinking, as well as enjoying the opportunity to be imaginative.

> *"I think being able to use lots of different materials means everyone can learn in their own way and be imaginative. "*
> (Year 9 student, focus group at the end of Action Research)

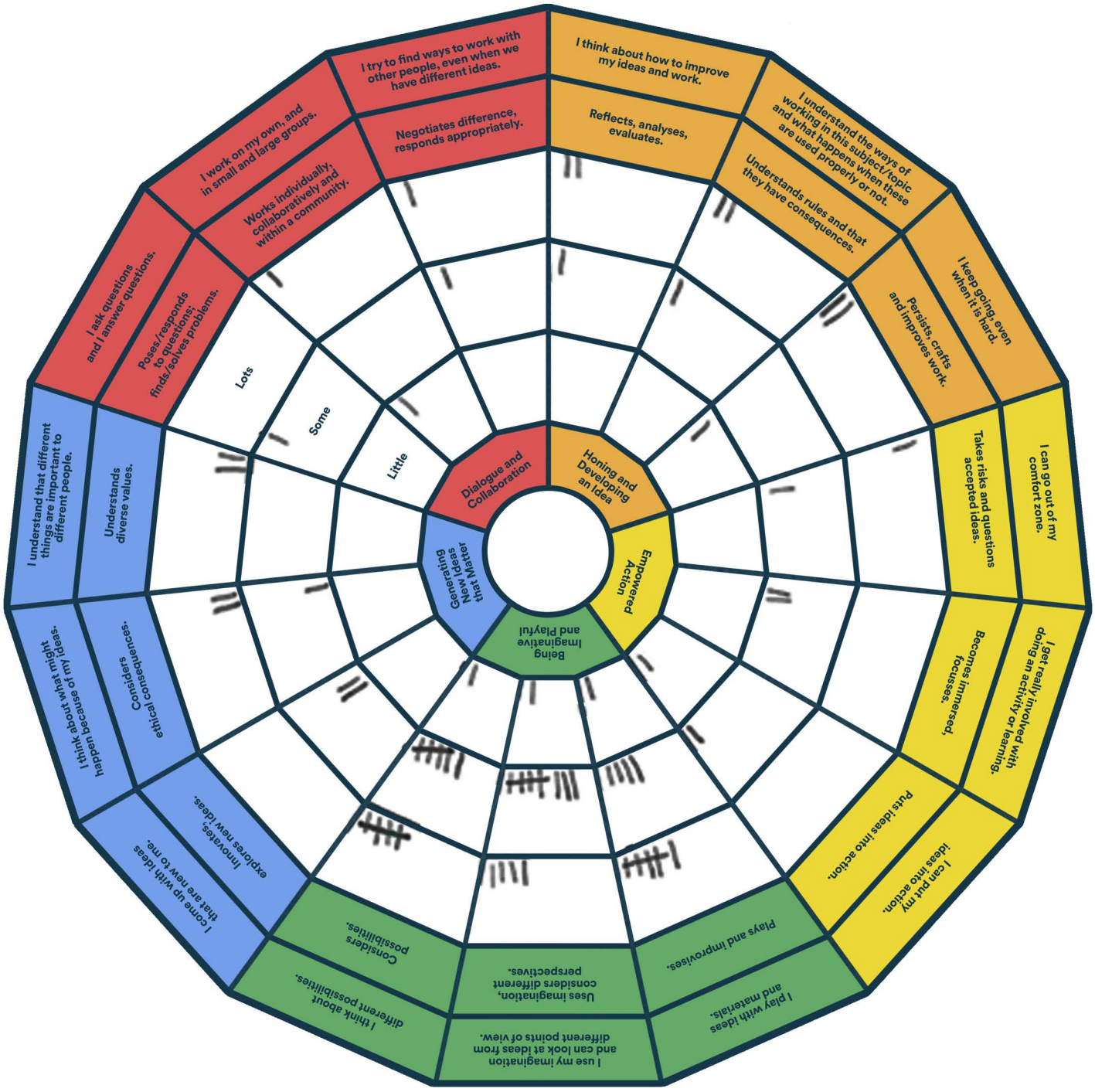


Figure 6: **Creative Skills Wheel Data**

Students used this creative skills wheel to reflect on their classroom experience by marking the areas they felt they had used in their learning. This is a composite of all their feedback, showing the 'being imaginative and playful' section as having the strongest response overall.

Creative Pedagogies

There is strongest evidence for Risk, Immersion and Play of all the creative pedagogies, as this was the main area of focus for this research. Through the use of playful experimentation as a pedagogy, students then responded in varying degrees of risk taking and immersion. Most students took the opportunity to work collaboratively, although some preferred to work alone, but alongside another classmate. However, the key element that seemed to emerge through creative pedagogy was empowerment as pupils felt a sense of freedom to choose their own groups, materials and ways of working within the rules and objectives of the lesson. Furthermore, many students commented on how this way of working (creative pedagogy, playful experimentation) helped them to solve problems and explore ideas and possibilities.

> *"I think it's really good because you can, like, experiment with the different, like, materials. So like we had Lego today. And also we've used, like, the spaghetti and the Oreos, which is really fun because you have fun whilst you're learning and it's really nice using the different materials 'cause each week it's like, 'Oh, how are we going to do this? How are we going to work this out?' And working together to work out how to do the learning."*
>
> (Year 9 student, focus group at the end of Action Research)

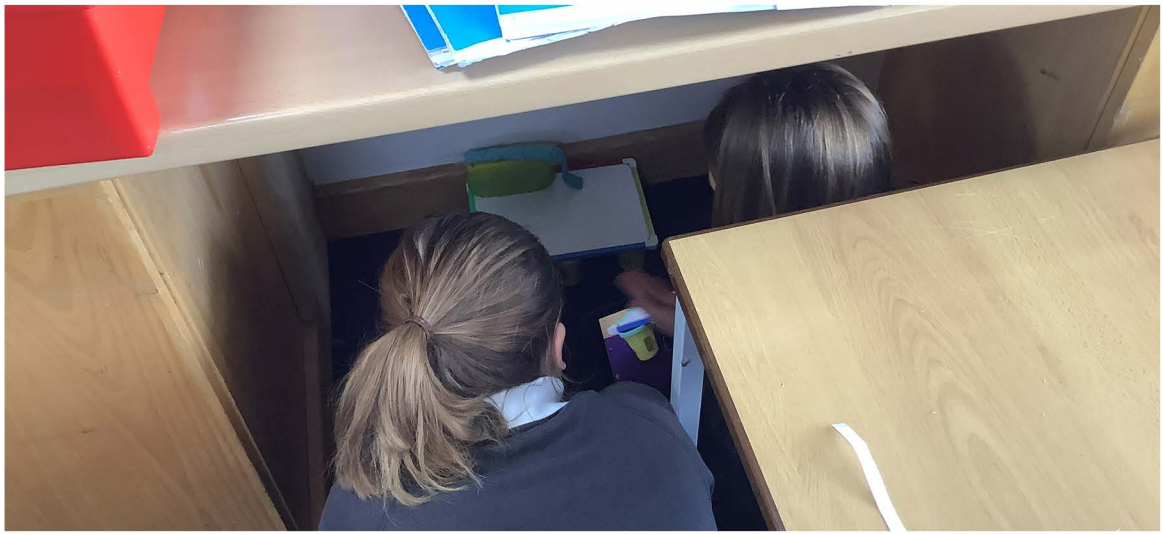


Figure 7: Filming waterfall Play-Doh
(Photo saved as: Filming waterfall playdoh)

In figure 7, two students are crouched under the desk with a Play-Doh model on top of a whiteboard which they're filming on an iPad. These students are collaboratively constructing a series of moving images of their waterfall model narrated with landform descriptions and explanation of the processes that formed them. They appear completely immersed in this activity as they seem incredibly focused and commented in interview on how they were really in the right mindset.

> *"I think it's really good because you can, like, experiment with the different, like, materials. So like we had Lego today. And also we've used, like, the spaghetti and the Oreos, which is really fun because you have fun whilst you're learning and it's really nice using the different materials 'cause each week it's like, 'Oh, how are we going to do this? How are we going to work this out?' And working together to work out how to do the learning."*
>
> (Year 9 student, focus group at the end of Action Research)

EMERGENT FINDINGS

Evidence of Deeper Understanding of Geomorphic Processes

Having felt empowered through creative pedagogy, immersion and play, students articulated their learning really deeply. They could develop their descriptions, explanations and evaluations of the learning confidently, both verbally and in writing despite many of them implying at times that writing is a barrier to their learning or deeper understanding.

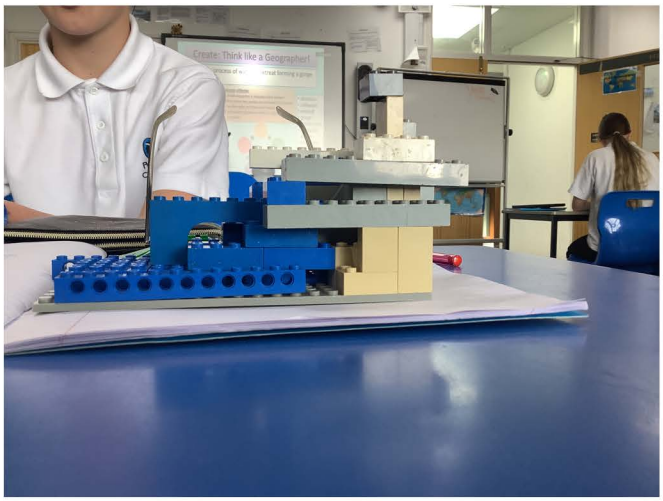
There is particularly clear evidence for well-developed explanations of the formation of waterfalls through a variety of erosion processes over time, leading to the ultimate formation of a gorge. The evidence can be seen in the students' written reflections, verbal feedback, voice and video recordings of their work and in photographs.

Student Reflection:

> *"I learned how a river eventually erodes away the ground turning into a waterfall and that after a while the waterfall erodes so much earth that it creates an undercut under the water fall which eventually collapses which then forces the waterfall to move further upstream to create a deep pit with extremely steep walls called a gorge."*
>
> (Year 9 student written reflection at the end of the lesson on waterfall formation).

Waterfall Gorge Video

Students created a video showing a series of models made by using different colours of Play-Doh on top of a whiteboard. Two students can be heard narrating the steps of waterfall formation over time using detailed explanations full of geographic vocabulary. The students were completely immersed in using their iPad app skilfully to show each new stage of the waterfall leading to the formation of a gorge.



This is where the softer rock has eroded and formed an undercut of soft rock this undercut has been eroded by abrasion or hydraulic action this is where the water falls at high speed into the plunge pool. Over time the hard rock above the soft rock that has been eroded by the undercut the hard rock will collapse this process will continue to happen as it moves upstream leaving a rock formed gorge

Figure 8: shows a LEGO waterfall model on the table in the classroom with a detailed piece of writing explaining waterfall formation using a variety of geographic vocabulary accurately. I wonder how this explanation has developed and whether it would be as detailed and thorough without having the opportunity to collaborate, discuss and play with the ideas in making the LEGO model.

DISCUSSION AND IMPLICATIONS OF THE PROJECT AND FINDINGS

The experience of this project has certainly convinced me not only of the value, but also the moral imperative of embedding creative pedagogy and skills into my own classroom practice and sharing across the geography department specifically. This will lead to further development of our subject specific curriculum, particularly in the implementation so that although the students will learn the same topics and information, the pedagogy that we use will include much more creativity in order to build students' creative skills. The class that I've focused on in this project has already become better behaved and focused, as well as more immersed in their learning by having a regular 'diet' of creative pedagogy. I can only imagine how this will become better developed for our secondary school students who regularly engage in creative pedagogy from the start of year 7 right through their 5-year curriculum journey.

In addition to developing a deeper understanding of geography, students are engaging in more memorable learning through creative pedagogy, whilst also developing the creative skills needed for future careers. As a teacher, I fully appreciate what a risk it is to allow students the freedom to be imaginative and play with ideas, experiment with different materials and work in groups. We're under pressure to deliver a knowledge rich curriculum and achieve good GCSE (General Certificate of Secondary Education) exam results in school, which can make it difficult to find the time and space to allow for creativity to flourish. However, I've not been at all deterred by my experience in this research project. I think the students have found that learning creatively is 'stickier,' meaning that they remember more and feel less disadvantaged by individual barriers to learning, as they're empowered to make choices for the way they learn best.

For my school going forward, I also think that it is really important to recognise the student voice reflections around empowered action as well as equality. Students' individual and social well-being is supported and developed through the use of creative pedagogies. They appreciate when their thoughts and thinking processes are validated by giving them the time and space to experiment with ideas and show their understanding in creative ways as so many feel disadvantaged when their learning is focused mainly on completing written work. Particularly in our school context with a high percentage of pupils eligible for free school meals (17%) and on the record of need (special educational needs and disabilities), the sense of equality and collaborative practice during creative lessons promotes social well-being and cohesion within our community.

I'm also excited about sharing my findings and practice more widely across the Humanities faculty (as Head of Faculty from September), as well as in whole school CPD (Continuing Professional Development) workshops. I would like to impress further on students and teachers how creative pedagogy can help to develop more flexible knowledge which can be more easily translated into different contexts and in terms of curriculum, make more links across topics and subject disciplines over time, building more robust and adaptable mental models in students' memories. Finally I feel my findings could inspire positive curriculum development more widely in secondary schools, working with my cohort of Geography trainees and their mentors, in my role as Cornwall SCITT (School Centred Initial Teacher Training) Geography subject leader, as well as in CPD with other subject leaders.

REFERENCES

Britannica, The Editors of Encyclopaedia. *"geomorphology".* Encyclopedia Britannica, 21 Oct. 2013. https://www.britannica.com/science/geomorphology Accessed 18 May 2023.

Cornish Lithium. https://cornishlithium.com

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

Lucas, B. and Spencer, E. (2017). *Teaching Creative Thinking.* Crown House

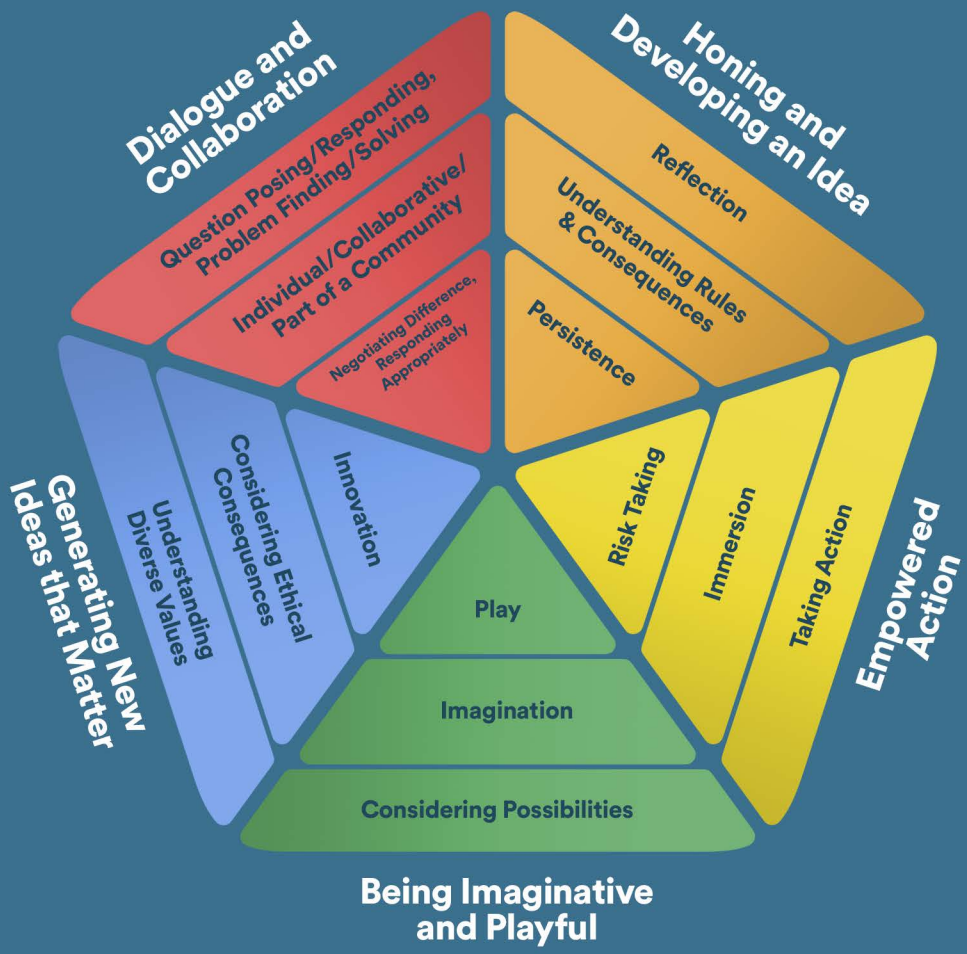
Penryn College Geography Curriculum pathway
https://penryn-college.cornwall.sch.uk/subjects/ks3/geography

Robinson, K & Robinson, K (2022)
Imagine If... Creating a Future for Us All. Penguin

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?"



Penryn College "Achieving through Challenge"

University of Exeter

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