Teacher Education Design Principle + code:	9. Teacher education should enable teachers to make best use of and assess the various modes of expression and representation of science and mathematics learning to support inquiry and the development of creativity. **TE: Multimodal**
Specific Teacher Outcome(s):	9.1 Teachers should be able to make best use of children's preferred forms of expression and representation of their science and mathematics ideas to support inquiry and their creativity development. 9.3 Teachers should be able to select and use different approaches for and forms of recording children's ideas and learning in science and mathematics at different stages of the learning process and for various purposes, including to support children's reflection and reasoning processes.
Factors linked with:	**P: Express;** **P: R and R**
Type of material (image – interview (int) – classroom extract (class):	Classroom extract (class)
Originating from:	
Country report :	D4.3 UK (England)
Case:	Case 10
Episode:	Volcano
Teacher:	Jennie
Age Group:	3-4
Selected episode present in D4.4 Appendix	No

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Using questioning to elicit children's ideas at each stage in the activity

This session focused on an experiment called *Volcano* in which warm water, red food dye, baking soda and vinegar were mixed together in a large plastic water bottle. Materials for the session were prepared in advance with the additional equipment of measuring spoons and a funnel to aid to aid the mixing processes and a large washing up bowl in which to stand the water bottle and catch the eruptions from the 'volcano'. For safety reasons the activity was a teacher demonstration carried out with a group of children sitting round a table. As the different ingredients were added together the teacher, Karin used questioning to elicit children's ideas at each stage in the activity, sharing her own excitement and lack of certainty about what might happen.

For example at the start of the activity children offered predictions:

Nash: It might go everywhere.
Zena: Will explode – go all round.
Karin: Do you think it will go in our face?
Zena: In the bowl.
Calvin: Think it will go in sky – there is going to be a hole in the roof.
Mabel: Might melt.

Adding baking soda to the mixture

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Adding vinegar

Watching the bubbles

As the vinegar was added children were very excited. There was much laughing, screaming and commentary, for example:

Zena: It's going up and falling down.
Nash: Everything is making it erupt from the bottle into the container.
Karin: Cloe can you explain it?
Cloe : Makes the fresh air come out.

Drawing as a context for dialogue and reflection

At the end of the activity both Karin and the children together made drawings to record what they had seen. This allowed further opportunity for dialogue and reflection.

Drawing the volcano

Nash's drawing

Karin: Zena what do you like about this?
Zena: Red at the bottom and pink at the top – bubbles at the top get pink.
Karin: Charity, what do you notice?
Charity: I liked the bubbles coming up.
Karin: Pearl, what did you like?
Pearl: Bubbles.

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Karin: What about the bubbles?
Pearl: White now – look a bit soapy.
Nash: Like it when the bubbles explodes.

Discussion fostered growing interest and attention in both staff and children.

Children and staff observing the volcano

Conversations with children about their drawings after the session underlined their excitement and gave insights into their observations. For example Nash said:

'All came out of the top and flowed right down - because put baking powder and the vinegar and all poured out the top – and the teacher put food colouring and it came into the container in the bottom – so it went into the container to make it come out very lots of bubbles. And it erupted - that's what happened'.

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