Teacher Education Design Principle + code:	15. Teacher education should promote teachers' use of group work to support children's inquiry processes and creative learning. **TE:GWork**
Specific Teacher Outcome(s):	15.1 Teachers should have knowledge of the value of collaboration for inquiry and creative thinking and learning. 15.2 Teachers should be able to purposefully use a variety of patterns of collaboration, shifting between individual and collaborative activity over time, to support children's inquiry processes and creative learning. 15.3 Teachers should be able to organize group work, aligning ways of grouping children, task design, teaching and assessment strategies in different ways to promote collaboration amongst children in science and mathematics. 15.4 Teachers should be able to use resources and teacher intervention appropriately to foster collaboration in science and mathematics.
Factors linked with:	**P: Collab;** **P: Dialog;** **M: Var;** **M: Expl;** **P: Collab;** **P: Scaff;** **G: SmallG;** **A: Strat**
Type of material (image – interview (int) – classroom extract (class):	Classroom extract (Class)
Originating from:	
Country report :	D4.3 UK (England)
Case:	Case 11
Episode:	Balancing pens
Teacher:	Emily
Age Group:	5-6
Selected episode present in D4.4 Appendix	Yes

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) for research, technological development and demonstration under grant agreement no 289081.

This classroom extract focuses on a 'Weighing' activity (outlined below) that took place at the weighing table as just a small part of the wider lesson consisting of a carousel of measuring activities including 'Filling Boxes', 'Capacity of a Jug', 'Building Towers' and 'Measuring Length using a Metre Stick'. The extract also includes part of whole class plenary at the end of the session. It illustrates the play-based approaches emphasised by Emily, and her concern to foster alternative ideas and reasoning through dialogue and collaboration.

The tasks were planned to allow problem solving in mathematics. Children were provided with a wide range of materials to support their inquiries. The children worked in pairs and were encouraged to collaborate, to talk and discuss together. The tasks were designed to promote questioning and reflection on what happened and why.

The activities were carried out in mixed ability groups in a rotation over two consecutive days. A particular feature of Emily's approach to learning and teaching is that children are organised into mixed ability groups for classroom activities. Children are allocated talk partners (the children are paired with another child who they are asked to discuss things with and also work with in the classroom) and these are changed each week. When the children come in on Monday they have a new talk partner. Small working groups are then made up of three pairs of talk partners.

Variety of materials

The weighing table was set up with a range of materials and equipment, including small pens, Berol pens (larger), small animals, paintbrushes and a balance scale to be shared between two children. The children were asked to use the balance to find out how many of each object was needed to weigh 100gms. They had a worksheet to fill in as they went along. On the worksheet they had to record the object and how many of that object weighed the same as 100gms.

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) for research, technological development and demonstration under grant agreement no 289081.

Children working collaboratively

Two children, Neil and Henry, were using Berol pens to weigh how many pens would balance 100gms. They were working collaboratively. They were having difficulties in getting the scales to balance.

Neil: It's not balancing.
Henry: Put on another one.
Neil: But now it's too heavy.
Henry: Take one off.
Neil: It's still not balancing. It doesn't make sense.

Henry offered an alternative idea - that they use smaller pens to balance the 100g weight. Prompted by Neil, he explained his suggestion and his estimation of how many would be needed.

Henry: Let's try the mini pens they will work better.
Neil: Why?
Henry: Because they are smaller.
Neil: It isn't 100.
Henry: Think we will need 30 to balance the 100g weight.
Neil: This is too little because they weigh nothing. 100gms is not heavy.
Henry: It's 39 that's right. 39 is 9 more than my guess.

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) for research, technological development and demonstration under grant agreement no 289081.

Opportunities for formative assessment and for fostering children's reasoning through teacher questioning

Teacher: Which would you use – there is a choice of unifix, a ruler or a metre ruler?
Child Grace: Metre stick
Child Sarah: *(disagreeing)* The bedroom is bigger than a metre stick. Cubes would be better because there were lots and you could use lots of them. It would be better if you had 2 rulers. It won't stay like that if not enough sticks.
Teacher: What would choose if there were enough sticks?
Child Audrey: Using a metre stick isn't good because when you get to 10 then you have to go back to zero.

The discussion in the plenary provided Emily with valuable assessment information to inform future planning. In evaluating the session she suggested that it was not clear that the children understood how to use a metre stick to measure longer lengths.

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) for research, technological development and demonstration under grant agreement no 289081.