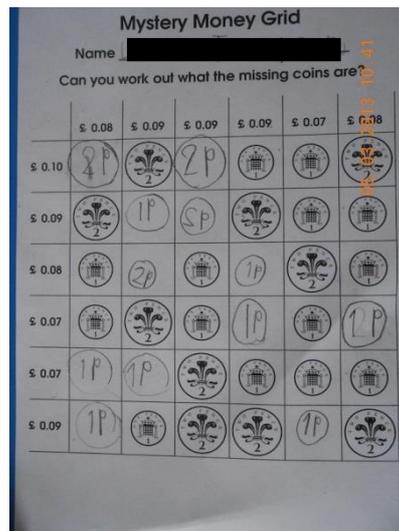


Teacher Education Design Principle + code:	7. Teacher education should familiarise teachers with a range of formal and informal inquiry- and creativity-based learning, teaching and assessment approaches and strategies and their use in relation to authentic problems within the areas of science and mathematics. TE: CreatInqPed
Specific Teacher Outcome(s):	7.9 Teachers should be able to use different assessment approaches and strategies and in particular those that involve children in the assessment processes, such as peer and self assessment, dialogue and feedback on progress, in the early years science and mathematics classroom. 7.10 Teachers should value and be able to make use of varied forms of assessment evidence (including children’s portfolios, individual or group records of activities), both to promote creative learning, through reflection and discussion in science and mathematics, and explicitly to inform teaching and longer term planning.
Factors linked with:	P: Dialog; A: Strat; A: Peer/Self; A: Evid.; A: Form
Type of material (image – interview (int) – classroom extract (class):	Interview
Originating from:	
Country report :	D4.3 UK (Scotland)
Case:	Case 19
Episode:	Counting Money
Teacher:	Mary
Age Group:	5-6
Selected episode present in D4.4 Appendix	No

Two children Murray and Corey were working, largely independently, on a worksheet-based problem-solving task, called the 'Mystery Money Grid', whereby they had to work out the missing coins in each row and column. There were meant to be six coins in each row as well as in each column. The children were supplied with a number line and small pots of plastic coins they could use to help them explore and solve the problems on the worksheet.

In this extract opportunities for assessment are provided through the observation of Murray's talk and action in completing the Mystery Money Grid and during an interview following the activity. This provided insights into his developing thinking and prompted self evaluation.



The worksheet for the 'Mystery Money Grid'

Observation of Murray's talk and actions indicated the strategies he was using to solve the problem

Murray was found counting coins on his worksheet using the 'pairing' counting strategy whereby he was using two fingers to count and add the value of two more coins at a time. For example, the third row was comprised of 1p, 2p, 1p, 1p, 2p and 1p coins – in that particular order. He started counting backwards by pointing two fingers at the last 2p and 1p coins and said 'three'. He then moved his two fingers to the two 1p coins in the middle, and said 'two'. Then, he started from the end of the row again. Still pointing his two fingers at the last two coins, he said 'three' [adding the last 1p and 2p coins] ... 'five' [after adding the two 1p coins in the middle] ... 'and eight' [after adding the remaining 1p and 2p coins from the beginning of the row].

In the fourth row of six coins with the total value of 7p, it comprised of a 1p coin, a 2p coin, a 1p coin, a missing coin, a 1p coin, a missing coin. Murray was counting backwards from the end of the row using just one finger this time: '1p, 2p, 3p, 4p, 5p, 6p.' [Incorrectly thinking that one coin, regardless of its value, represents 1p] He later said: 'It needs to be 7p, so one of them has to be a 2p. I'm gonna go with a 2p at the start [i.e. at the end of the row].'

Murray was drawing a 2p coin at the end of the row, and then a 1p coin in the middle of the row. His row now looked as follows: 1p, 2p, 1p, 1p, 1p, and 2p. When Murray was asked how much money he had in the row, Murray he was once again employing employed his pairing strategy to work out the

total value of the six coins. Pointing his two fingers at the first 1p and 2p coins, he said '3p'. Then, pointing his two fingers at the two 1p coins in the middle, he said '5p' [having already mentally added the 2p to the previous 3p]. Pointing his two fingers at the last 1p and 2p coins, he said '8p'.

When Murray was asked how many pence he had too much, given the total target for that row was only 7p, Murray was immediately seen checking his calculation using his pairing counting strategy again. He did this by very quickly moving his two fingers along the row from the beginning to the end of the row, covering two coins at a time. Pointing at the last 2p coin, he said, 'So we'll need to make that one a 1p'.



Murray's counting strategy

There was also a degree of collaboration during this activity, for example, when Corey spotted Murray counting his row of coins using his fingers, Corey said: 'You don't need to use your fingers. There you go, Murray', whilst pointing at the number line, to which Murray responded 'I don't need one. You have it.'

In addition to the number line, children were also supplied with small pots of plastic coins where they could use to help them explore and solve the problems on the worksheet. At one point, Murray and Corey were seen comparing two long rows of coins.



Murray and Corey conducting their own investigation

Reflective discussion as a context for assessment and for child self evaluation and learning

In the interview after the activity the researcher asked them to explain what they were doing. Corey said they were trying *'To see which one chained the most'*. And when asked whether they were doing it to help them with their work on the worksheet, they said no as according to Murray – *'counting money is more interesting'*.

In the middle of the interview, Murray abruptly asked the researcher if he could do something quickly. He said *'I'm going to count my money'*. With two 50p coins and six £1 coins, he started putting them in a straight row: *'50 [50p coin] ... adds one [£1 coin] is 51 adds one [£1 coin] is 52 ... adds one [£1 coin] is 53 ... adds one [£1 coin] is 54 ... add one [£1 coin] is 55 ... add one [£1 coin] is 56 ... add one 50 [50p coin] is ... [...] Is it 106? I know what I can do!'*

Murray decided to count a new set of coins, putting each of the following coins in a straight row: 50p, 50p ('100'), 50p ('150'), £2 ('152'), £1 ('153'), £1 ('154'), £1 ('155'), £1 ('156'), £1 ('157'), £1 ('158'), £1 ('159'), £1 ('140'), £1 ('141'), £1 ('142'), £1 ('143'), £1 ('144'), £1 ('145'), £1 ('146'), 20p ('What's 146 plus 20? 166'), 1p ('167'), 20p ('187. What's 187 adds 20 is 220'). While it was not apparent from his arrangement of the coins whether Murray necessarily associated bigger size with bigger value, it was clear that he did not make any distinction between the pound and pence units.



Murray's first attempt at counting how much money he had by putting both pence and pound coins in the same row

Self-evaluation prompted by the invitation to check his answer

However later when asked by the researcher how he could check the answer, he exclaimed: *'I'm not right. I'm not right. They are pound coins!'*, whilst pointing at the £2 and £1 coins and rearranging all the coins. This time he was grouping and counting only the pence coins first, then counting the pound coins later. For the pence coins, he had three 50p coins, four 20p coins, and one 1p coin, totalling *'231p'*.

Murray whispered to Corey: *'Let's count all the pounds and pences altogether and see how much it makes! [...] We just put all the pounds altogether and all the pences altogether. I need to count my pounds first though.'* With one £2 coin and fifteen £1 coins, Murray correctly worked out the total sum of *'£17'*.



Murray's second attempt at counting how much money he had by sorting pence and pound coins into two groups

When asked why he changed his technique, Murray said *'Because it makes sense'*.

When asked to add up the two amounts (i.e. 231p and £17), Murray said *'I have to start with the highest number. 231 adds 17 will be 248!'* When asked whether the total would be in pence or pound, he said *'pences and pounds? [...] I don't get it'*.



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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.