

Teacher Education Design Principle + code:	6. Teacher education should provide pedagogical content knowledge to stimulate inquiry and problem solving in science and mathematics education. TE:IBSE
Specific Teacher Outcome(s):	6.3 Teachers should be able to recognise the key roles of children’s questioning and existing ideas (both implicit and explicit) of science and mathematics. 6.5 Teachers should be able to foster opportunities for children’s agency and creativity in learning in inquiry and problem solving – in particular the importance of children making their own decisions during inquiry processes, making their own connections between questions, planning and evaluating evidence, and reflecting on outcomes.
Factors linked with:	P: Agency; P: Ques; P: R and R; LA: Ques; LA: Plan; LA: Obs; LA: Equip; LA: Connect
Type of material (image – interview (int) – classroom extract (class):	Classroom extract (class)
Originating from:	
Country report :	D4.3 UK (England)
Case:	Case 10
Episode:	Cars and Ramps
Teacher:	Jennie
Age Group:	3-4
Selected episode present in D4.4 Appendix	No

Planning of resources and teacher questions to foster inquiry

This episode took place in the outdoor area outside the classroom. Two ramps were set up alongside each other. The ramps consisted of two lengths of white guttering with blue ladder-like supports at each end with rungs, so that the height of each end of the guttering and therefore the slope of the ramp could be varied. Alongside there was a box containing a range of vehicles of various sizes. The activity was left out all afternoon for children to come and go and there was plenty of space and time for children to follow their own ideas and interests. Chioma's planning for the session identified key questions that staff could ask to 'promote sustained shared thinking' including: 'What is happening to the car? How can it go faster/slower? Which car do you think will go fastest/slowest? What do you think will happen if..?' Key vocabulary that might be introduced was also identified for example 'fast, faster, fastest, slow, slower, slowest, ramp, high and low' to support children in articulating their observations, predictions and explanations.

Children make decisions about how to use materials. Teacher questioning fosters observation, comparison and explanation.

Initially Zared and Rosalie were working alongside each other.

Zared: Look [he puts a new car on the ramp] – fast really fast.

Chioma: Why do you think that one went fast and Romilly's slow?

Zared: [Gesturing with his hands] – Sideways does not go.

Chioma: What happens if you change it?

Zared: It goes fast.



The car sideways on the ramp goes slowly

Rosalie: That one really fast.

Chioma: Look how fast it went – what about other cars?

Rosalie: [She tried a truck on the steeper slope.] Went faster on this one.

Chioma: Went faster on the first ramp than on the second ramp?

Rosalie: Faster on second.

Chioma: Why do you think?

Rosalie: Because really high?

Later on another group of children, Diana, Aiden and Daniel tried out a range of larger vehicles including a fire engine and a bus. These did not travel so smoothly down the ramps - as they wobbled or got stuck. The children tried to solve these problems by varying the height of the ramp and shaking it to make the vehicles move.

For example Aiden tried a bus on the ramp commenting '*it turns over – turned again – it makes a rattling noise*'. Aiden tried it on the lower ramp and it wobbled slowly down. He then repeated again the wobbly bus, several times, down the steeper ramp.



Aiden trying the bus on the ramp



Diana trying the fire engine

Diana tried the fire engine. It went really slowly. She then moved the ramp to horizontal.

Aiden tried his bus on the horizontal guttering and said '*Bus needs pushing*'. He lifted up the guttering to bump the bus along. He then lifted up the guttering to a higher slot and the bus went down by itself.

In another period of exploration that drew in a large group of children, Hilton and Inanna started a race. This part of the episode focused again on the height of the ramps. Hilton had a fire engine with his ramp set to the highest possible slope and Inanna a little green car. Her ramp was on a lower rung. Deanna (a Learning Support Assistant) asked '*Who do you think is going to come first?*' Hilton predicts '*my one*'. They noticed the fire engine came down first.



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