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CASE STUDY 1

Case Study Learning Activity: K—Grade-3—Picture Sort, page 34

Key Understanding 2: There are special words and phrases we use to describe how likely we think things are to happen.

Working Towards: Matching and Comparing Phase

TEACHER'S PURPOSE

I noticed that many of the students in my Grade 1/2 class used words like “impossible” and “no chance” in their everyday talk, but I wondered what distinctions they made between possible and impossible events. Children often hear adults say things like “I do not have a chance of winning the lottery,” even when they have a ticket. I realized that students may not often be exposed to the real meaning of impossibility as referring to things that cannot happen. I decided to provide an activity that could stimulate discussion about what is possible and what is not.

ACTION AND REFLECTION

The students and I spent some time cutting out pictures from magazines. I made sure the collection depicted a wide range of events, including some that seemed to me to be obviously impossible.

I suggested that we create a collage on the bulletin board under two headings: Possible (can happen) and Impossible (cannot happen). I held up several pictures and asked students to think about whether what they saw in the picture could really happen in real life. “Is it really possible for a cow to jump over the moon like that, or is it impossible? Why do you think that?”

Pairs of students took piles of cuttings and sorted them into the two categories. They were to tell each other what they could see happening in each picture, then decide if it should go in the cannot happen pile or in the can happen pile.

Erin had an advertisement for milk that showed a drawing of a cow in a busy city street. She insisted it went in the cannot happen pile, while her partner Jason argued that it should go with the can happen pictures. I asked Erin to explain why she thought it impossible.

“Because cows have to live on farms, not in the city. There is no grass to eat,” said Erin. Then I asked Jason to explain his reasoning. “It might have fallen off a truck or something,” he said. “A truck crashed and some cows ran off, I saw it on television.” Erin seemed to be focusing on what should happen, rather than what could happen, while Jason seemed to have a more conventional way of reasoning about what is possible.

I planned to later ask the students to re-sort the collection of possible events into those that must happen and those that might happen. They could then begin to understand certainty in chance as a general concept that included all the things that cannot happen as well as all the things that must happen. Knowing that these ideas are difficult to grasp, I initially focused only on the cannot happen/can happen categories.

DRAWING OUT THE MATHEMATICAL IDEA

I asked a “what if” question to draw out the distinction further. What if it was a tiger? Erin was sure that would also belong in the cannot happen pile, because tigers live in a zoo and they can kill people. Interestingly, Jason switched his decision to cannot happen.

“I have only seen a tiger in a zoo, or it could be in a circus but they would not let a tiger be there,” he explained, pointing at the picture. I realized Jason’s *judgements* were based more on direct personal experience than on what might be possible, with the result that his reasoning seemed to be inconsistent.

The personalized ways Erin and Jason made their judgements were what I expected, but I decided to help them extend their ideas about impossibility. I asked Rachid, who was sitting at the next desk listening to the conversation, what he thought. (Because of an earlier conversation with Rachid, I guessed he would be able to give a more conventional explanation.)

“No, it has to be in the can happen pile. It is just standing there in the picture. It is not driving a car or anything impossible. Cows and tigers could be standing like that anywhere, any animals could be,” explained Rachid.

Erin was not really convinced; her ideas were still focused on what normally happens—cows and tigers do not belong in the city. Jason, though, was ready to be swayed by Rachid’s explanation, and expanded on the idea. “And lions and elephants and pigs—they would be ‘can happen’ as well. They can get there, maybe on a truck or something. It is only silly things in ‘cannot happen’—animals cannot drive cars, they cannot talk, they cannot play baseball.” He had taken on a more general notion of impossibility.

CHALLENGING CURRENT IDEAS

I then asked another question to further challenge their understanding: “What about if it was a dinosaur just standing there, not doing anything silly?” Jason hesitated, looking at Rachid for guidance. Rachid, though, was quite sure about this situation as well: “Dinosaurs got extinct and they are only bones now so it has got to be a cannot happen thing.” Jason was happy to agree.

I asked Rachid to tell the whole class his reasoning about Erin’s and Jason’s picture, and I went on to reinforce this more conventional way of thinking about impossibility. There was opportunity to revisit the language when the collage was in place, and we began to try to separate the Possible group into those things that might happen and those things that must happen.

I helped Jason notice and resolve an anomalous or conflicting idea without correcting him or simply telling him how to do it. Jason resolved his own cognitive dissonance, thereby constructing his own correct knowledge.
