Developing children's play with coding toys

Marianne Undheim, associate professor in pedagogy, University of Stavanger

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According to Alan Bishop (1988), playing is one of six fundamental mathematical activities. For young children, playing is in itself important – play has intrinsic value. This text focuses on how to develop children's play with coding toys in early childhood education and care (ECEC) settings.

Playing with Rugged Robot

In the video, three 5–6-year-old children are playing with a robot called Rugged Robot on the floor in an ECEC setting. The children have played a lot with Rugged Robots in the past and they know how to code it as they attend an ECEC setting where the robot is always accessible. They can therefore pick the robot up and use it whenever they want to – both indoors and outdoors. In the video, we can see how the children combine Rugged Robot with Duplo bricks and other toys when playing. The children have for example built a car park out of Duplo bricks for the robot (photo 1).

"Faster!" the boy who has coded the robot cries, while he adjusts the path the robot is taking. He "follows" the robot and clears away blocks and other things that are in the robot's way. He has learned from his own experience that the robot needs a clear path to drive. We can hear the children talking together about what is happening – and what is going to happen. They suggest different solutions, for example when the robot approaches a bump and one of the boys says: *"Drive over the bump"*. *"Yes"* says the other boy. The robot continues straight ahead over the bump and to the corner. *"Parked! Perfect!"* is shouted as the robot reaches the corner.

Photo 1: The boy on the left is building a parking lot for the robot out of Duplo bricks. The boy on the right is clearing away bricks and other objects that are in the way of the robot. Foto: Glen Musk

How children learn to use digital technology

Susan Edwards and Jo Bird (2017) have researched how children learn to use digital technology. They found that children's first encounters with digital technologies are characterized by exploring and problem-solving. In this phase the children test out the different functions. This is an important phase. Therefore, it is important that the educators give children time and possibilities to explore the robots by posing problems and trying out different solutions at their own pace – while at the same time being present and helping the children when needed. As children learn how the technology "works" – in this case the robot – they can use the robot on their own in more complex play worlds.

In the video, we can hear the children explaining how to code the robot and how they know how far it can move. They count, measure and point – and discuss how many times they have to press the buttons on the top of the robot. Notice how the children collaborate, suggest different solutions through adjusting both the robot and the parking lot accordingly, in order for the robot to go where they wanted it to drive. *"It has to go all the way in here,"* one of the boys says. It is clear that the goal is important to the children.

Both the process and the goal is important

When children play with robots and other coding toys, it is often necessary to consider and discuss different scenarios and approaches. Sometimes the children plan the robot's route in advance, other times they discuss and explore different solutions together while they are playing with the robot. While playing with the Rugged Robot, we see that the children define the goal together, during the process while they are coding the robot. They communicate verbally through conversations and nonverbally through body language, including gestures and pointing. It is clear that both the process and the goal are important to the children. For example, we can see that one of the boys expresses that he was satisfied with the Rugged Robot even though it needed a little extra help to get into the parking place: *"It was just right,"* the boy says as the robot drives into the car park. *"Only here, here it was a little bit wrong,"* one of the other boys says. We can clearly see that he wants to try again. He moves the robot back and recodes it.

Summary

Problem-solving is a central part of children's play with coding toys. Bishop's (1988) mathematical activity of playing involves children engaging in both problem posing and problem solving through imagining different "**what-if**" scenarios. The examples in the video show that there are many ways to code the robot to go where the children want it to go. Sometimes the children just click on the buttons to try things out – other times they take a more systematic approach and measure and count before clicking the buttons.

When children have time and possibilities to play with the robot the way that they want, they can code the robot, test and try again – as many times as they like. They can explore different solutions and create magical play worlds with the robot.

References

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Corresponding author

Marianne Undheim, Department of Early Childhood Education at UiS, e-mail: marianne.undheim@uis.no