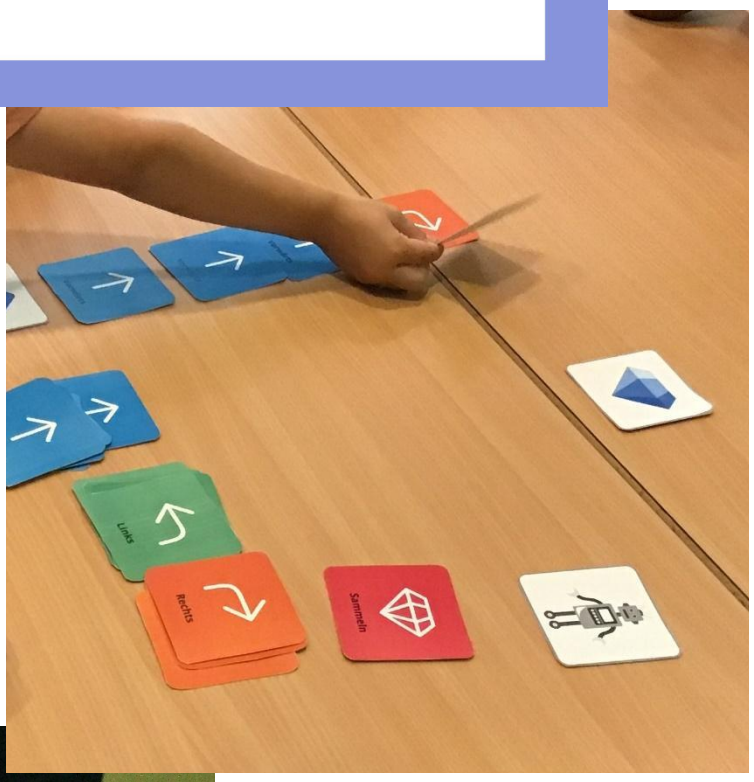
DA #31

Germany

Analog & Digital Coding Games



Analog & Digital Coding Games

An idea from:

JFF-Institut für Medienpädagogik, Germany
tested with **Integrationskindergarten Westendstrasse, Munich, Germany**

Age: 5-6 years

Keywords: #numeracy #coding #computationalthinking #sound

Key question:

- How does a robot work?
- What language does a robot / computer understand?
- What new terms and words do we need to describe and try out programming a robot?
- Is it possible to program a robot yourself and use an easy programming language?

General objectives:

- Learn to use "visual programming languages".
- Building basic cognitive and mathematical skills through problem-solving learning.
- Train orientation and structuring skills: systems of order, ability to classify also seriate, comprehension of position, shapes, and proportions.
- Be active, creative, develop new things through coding and implement your own ideas.

Time: 3 activities of 30-40 minutes each for a total of about 2 h

Materials

At school	At home
• cards or sticky notes • pens or marker • possibly a printer • tablet • possibly a projector	• piece of paper (DIN A3) • small cards or small sticky notes • ruler • pens or marker • tablet • possibly little toys or figures

Software/ Apps:

loopimal	**Ronjas Roboter**
Objective: Coding, sequencing, and composing music **Media:** Tablet (iOS) **Link:** https://apps.apple.com/de/app/loopimal-by-yatatoy/id964743113 **Alternatives** Daisy the Dinosaur https://apps.apple.com/us/app/daisy-the-dinosaur/id490514278	**Objective:** Coding and sequencing **Media:** Tablet (iOS and android) **Link:** https://play.google.com/store/apps/details?id=air.de.meineforscherwelt.RobertasRoboter https://apps.apple.com/de/app/ronjas-roboter/id904256013 **Alternatives** Die Maus https://play.google.com/store/apps/details?id=de.wdr.maus&hl=de&gl=US https://apps.apple.com/de/app/diemaus/id932310976

Short Presentation

There are various games and exercises to introduce children to the topic of coding, to promote their mathematical skills and expand knowledge about computers.

First, the children deal with simple commands that can control a robot to achieve a goal. A self-made algorithm-map and paper-cards can be used for this purpose. To train the movement of the body in a space, to estimate distances and to plan actions in advance, children can play a fun offline programming game with their parents or siblings at home. As a third step, children can learn about apps that use visual programming language and can be used to control a robot or an animated character in a game. The apps include logic puzzles and allow children to create music and dance moves.

Step by Step

Step 1

At school

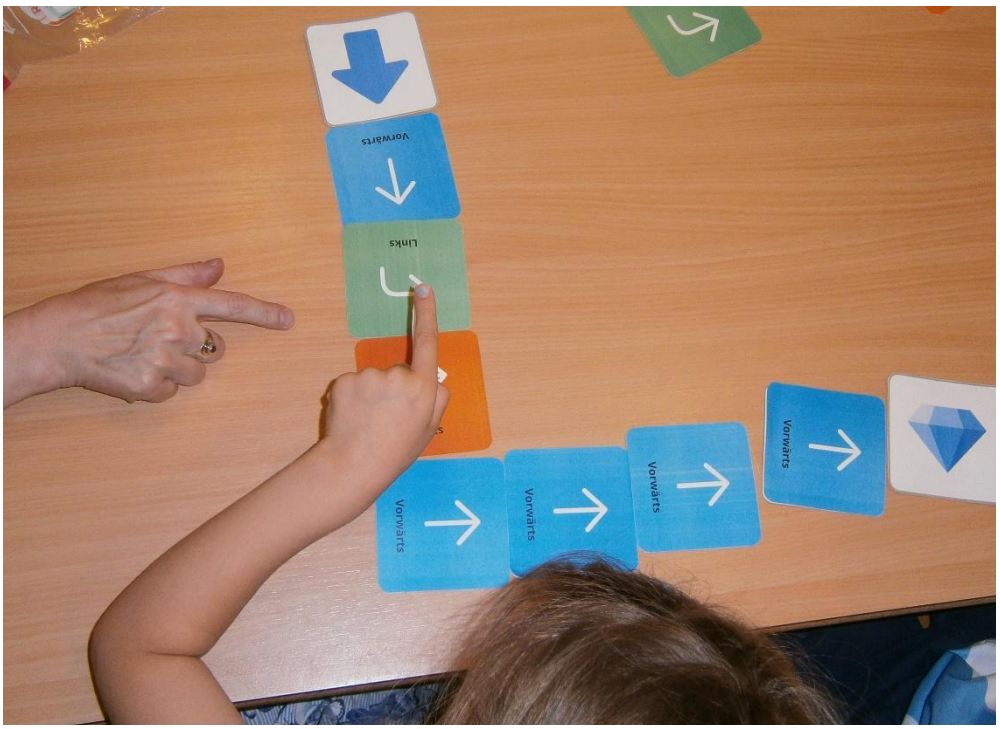
Group: 3 or 6 children, 3 children working together + 1 teacher

Preparation: Print or draw 21 cards with commands (9x forward, 4x turn right, 4x turn left, 1x collect, 1x treasure box, 1x robot, 1x start).

The educator displays the material and explains the game: children can guide a robot through a physical grid to a treasure using directional commands.

There are 3 roles in the game: designer, programmer, tester. The **designer** places the treasure box and the starting arrow on the grid. The **programmer** places the command cards next to the grid to guide the robot to the treasure. The **tester** starts on the starting arrow and follows the command cards to move the robot through the grid and collect the treasure.

The children play three times, rotating the role after each turn. If the robot doesn't get the treasure, the children must debug or fix the code as a team effort.



For distance learning

Create a coding game at home.

Preparation: Parents and children get a big sheet of paper and draw a grid of four-by-four squares (5 cm each).

Take small sticky notes and draw 21 commands (9x forward, 4x turn right, 4x turn left, 1x collect, 1x treasure box, 1x robot, 1x start).

Variation: Children can use favorite toys for the treasure and robot (Lego-figures, PlayMobile objects).

How to play: The child places the treasure box and the starting arrow on the grid. Then start to place the command notes next to the grid to guide the robot to the treasure. After placing the commands, the robot follows the commands step by step, moving through the grid and collecting the treasure.

If the robot doesn't get the treasure, parents and child must debug or fix the code as a team effort.

Step 2

At home

Parents and children "programming each other" (Play together)

Children and parents are allowed to program each other to walk through the room. One child is the robot, the adult is the programmer or vice

versa. The programmer makes the robot walk around the room by pressing different "buttons":

- Tapping on the right shoulder means "a quarter turn to the right."
- Tapping the left shoulder means "a quarter turn to the left."
- Tapping the middle of the back means "walking straight ahead" (one step is tapping once).
- Tapping on the lower back means "stand still".

The robot can only execute the programmer's commands. The programmer must make sure that the robot does not collide with any object.

Variation: Start and destination is predefined - the programmer must give the appropriate commands so that the robot lands at the destination.

Step 3

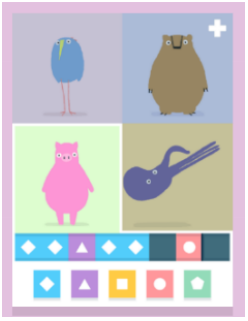
At school

Try out coding with apps

Group: 3-5 years (4 children)

Loopimal
Loopimal is a building tool with animations and sound effects. With the app children can build loops, create sequences, and compose music.

The teachers give the children different roles like programmer (choose the commands in the app by drag and drop) and tester (dancing the moves of the animals) in turns.



Group: 5-6 years (4 children)

Ronjas Roboter
The robot of Ronja must find its way through the garden, but first it has to be programmed. Three commands are enough to navigate the robot through the garden. There are special commands for obstacles. Operation is very simple. It gets tricky on long paths, where you can sometimes lose orientation.

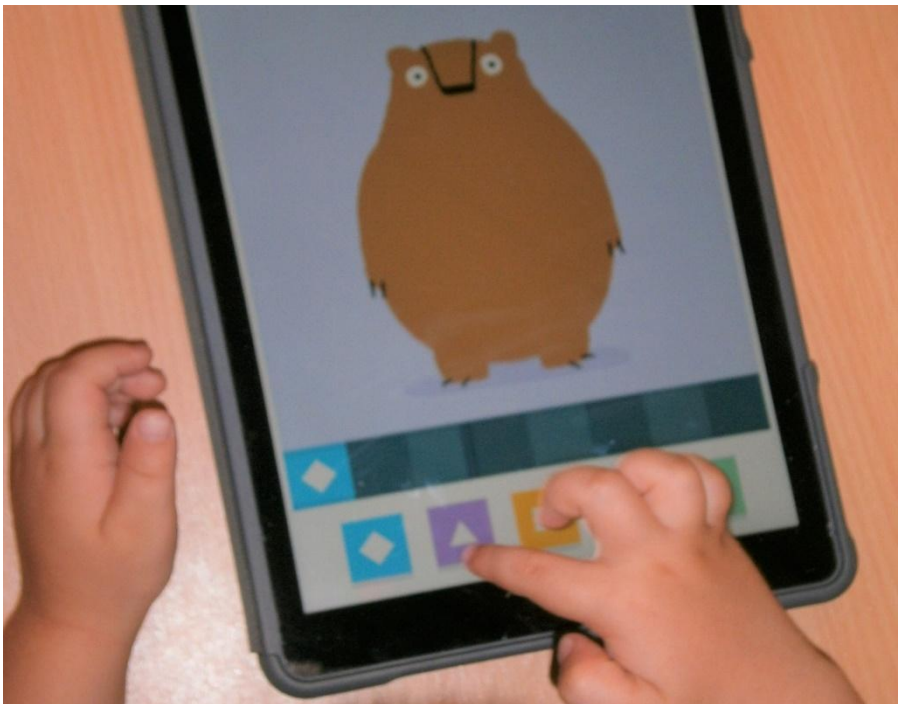
Two children use a tablet together to try out the coding game. In the app, a vocal introduction explains the rules and functions of the game. The children can use the app on their own accompanied by the teacher.

For distance learning

Parents can download apps with coding games for children on the tablet or smartphone

Loopimal, Daisy the Dinosaur, Ronjas Roboter, Die Maus

Parents and children select the app and start the game together. Then the child can try out the game accompanied by an adult. If there are any questions, the child can ask for help directly. Adults and children can take turns and play rounds with Ronjas Roboter together or have a dance party with Loopimal or Daisy the Dinosaur.



Conclusion

Presence	Virtual
The cards of the analog coding game for the children are duplicated and placed in each group in the kindergarten by the educators so that children can choose to play with it freely. The coding apps and tablets are also available to all educators to give children the opportunity to try out coding games if they are interested. Instructions for the coding games and links for the apps are provided to parents in a short hand-out. All activities of the project are suitable to be tried out by adults and children together at a parents' event in the kindergarten and to learn more about the topic of coding and numeracy.	To share the Digital Atelier activities a short version of the step-by-step-instructions and a template for the coding-cards from the kindergarten are sent as a PDF via email to the parents.