

Lesson Plan

Title: "Robotics and the Gender Problem"

Authors: LeTME: Department of Early Childhood Studies, University of Thessaly.

Curriculum links: Mathematics, STEM

Gender Equality Charter Mark category/subcategories: Attitudes and Relationships, Communities.

Learning outcomes:

- To learn about different kind of robots and how perceptions of gender change the way human are creating robots.
- To change gender stereotypes in robotics.
- To consider critically the need for ethical laws for robotics.

Gender equality (and/or other) concepts:

- To challenge perceptions on fixed gender identity, in relation to children's engagement with uncertainty, risk, problems and mathematics as a masculine school subject.
- To create opportunities for discussion and take action on issues concerning gender in the context of social norms and hierarchies in daily and school life.
- To encourage children towards challenging gender stereotypes in the realm of activity work and play and to support them feel confident that every activity is potentially open to them.

Concepts: hybrid gender identity, stereotypes, subject choices, mathematics, size and number, infinity, probability.

Key vocabulary: Robotics, Robots, Gender Roles, Gender Stereotypes, Ethical Laws.

Age group: 9-12 years old (primary school)

Lesson Plan Development:

Starter Activity	Time	Resources needed
<p>Step 1: Show children pictures of different robots, without giving them any information. Try to show different types of robots with different elements.</p> <p>Ask them what they think about these robots. What is their mission? What could be their names?</p>	10min	List of different robots here .

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<p>Step 2: Ask children to draw a robot. Ask them to think what this robot will look like, what work or missions will it be programmed to do, what name they want to give to. Children must think about how the robot features will relate to and support the work they have assigned to the robot they draw.</p> <p>Discuss with children the following aspects of the robots they draw:</p> <p><u>Name</u> <u>Anatomy.</u> Most likely the children will draw humanoid robots, with features that are used to give the robot a male or female appearance.</p> <p><u>Colours</u> <u>Extra cues.</u> If no cues are present on a robot, ask how the children perceive the robot, as male or female (people tend to perceive the robot as male)</p> <p><u>Character, Gender, Ethnicity, Age, Ability.</u></p> <p>If you notice that children work and talk using gender stereotypes, try to clarify their thinking with them. For example, do children think that the implementation of care robots affects mainly women? What gender might a care robot be, and why? Do they characterise care robots as mainly female? Who might need a care robot and why? Do they consider that care robots deal more often with old women or old men in their homes? Could gender be male, female or neutral for the care robot, and why?</p>	10min	Colours, papers in size A4 or bigger
<p>Step 3: Ask children to exhibit their drawings and to present the specific features of their robots. Children need to argue why the particular features they draw will help the robots to do the particular work they have imagined. Support children to think about the robot, so that the robot features will correspond to the work they want the robot to do.</p>	30min	Organisation for a classroom exhibition of the drawings.

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<p>This activity can end with a concept map for the whole class where the teacher can gather together main ideas around the children's arguments. E.g. robots that do domestic work need to have this and this, robots that do missions in industry must have this, etc.</p> <p>Here one needs to be aware of not underestimating or undervaluing domestic work at the expense of industrial work. Support children to think of the complexities and the value that all of these contexts have.</p>		
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Main activities

Activity 1: Valkyrie, the female robot	Time	Resources needed
<p>Step 1. Show children Valkyrie, the NASA robot, without giving them any information about it. Ask them what they think about it. What is its mission? What could be its name? Challenge their current gender stereotypes, providing them with information about Valkyrie robot.</p> <p>For example: <i>'Valkyrie is an advanced humanoid designed robot from NASA in 2013. Valkyrie, named after female figures in Norse mythology, is electrically powered, has a swappable battery and series-elastic rotary actuators in arms and legs. She is covered in soft fabric. Her mission is to operate in degraded or damaged human-engineered environments. NASA hopes to eventually send Valkyrie into space, to the moon, and to Mars.'</i></p> <p>Ask children what they think about this new information.</p> <p>Step 2: In a second stage, ask children to draw what is most important about Valkyrie for them. Afterward, create a whole class concept map about gender in robotics.</p>	45min	<p><i>'Most robots, especially humanoid robots, are generally viewed as either genderless or male, and this is especially true when it comes to robots designed for utility. Valkyrie will be competing against robots like ATLAS and THOR, which are unambiguously male names that happen to evoke ideas of strength and power. But why can't robots with unambiguously female names evoke strength and power as well?'</i> (more information about Valkyrie here)</p>

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Activity 2: Performing the theatre of the oppressed about robotics	Time	Resources needed
<p>Step 1: Guide the children to give a short performance.</p> <p>For example: One child is a robot and another one is a human. The robot's mission is that every time it sees a human it opens the door for him/her. However, at some point the robot stops doing this, or half-opens it (something that is dangerous for the human).</p> <p>Discuss with children why the robot acts like that, what the human should do?</p> <p>In a second stage, the performance will then be repeated. At any time, any audience member can call out 'freeze', come up on stage and take the place of the central character, in order to try to change the series of events.</p>	30min	This performance is based on the idea of 'The Theatre of the Oppressed', you can find more information here .
<p>Step 2: Have a second performance. This time a child is a girl and another is a boy. Use the same series of actions but with a different storyline.</p> <p>For example: The pair of children are constructing a robot. The boy says to the girl that he will be the designer and she will search for the right elements to give them to him. The girl, at first, agrees to this. However, at some point she asks to change the roles.</p> <p>Discuss with children if this distribution of roles is fair, how the girl felt, what the boy should do?</p> <p>Repeat the performance, as in the previous case.</p>	30min	
Activity 3: Creating our own robots	Time	Resources needed
<p>Step 1: Encourage children to work in mixed gender pairs and build their own little robot.</p> <p>For example, an easy, basic idea is a robot made with just a cup with marker legs that vibrates and spins due to the motor being</p>	30min	Cups, markers, glue, scissors, motors, batteries, papers, etc. Find more information about how to construct your robot here .

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<p>off balance. As it jiggles around on a piece of paper it makes interesting geometrical designs. This is a nice unthreatening activity to start with. It involves hooking up a simple DC motor to a battery.</p> <p>Be aware of gender role discrimination in children's pair work. For example, see if the boys are taking a more active in the construction role, or if the responsibilities are equally distributed between the pair. What is your robot's name? What is its mission? How you decided to use these colours/elements/cues etc.? What was your role in its construction?</p>		
<p>Activity 4: Ethical laws in robotics</p>	<p>Time</p>	<p>Resources needed</p>
<p>Step 1: Watch a part of the movie 'Robots'. Support children to think and discuss the need for laws for robots. What could be our basic motive for this?</p> <p>Ask children what are the functions and work that robots can do? Could robots do anything and everything? If so, could they also kill humans or kill themselves?</p>	<p>20min</p>	<p>Movie 'Robots'.</p>
<p>Step 2: Discuss and support children to realize this basic dilemma, then, start to unpack the need for ethical laws, laws that allow humans to protect their lives, relations and resources.</p>	<p>20min</p>	
<p>Activity 5: Creating our own laws</p>	<p>Time</p>	<p>Resources needed</p>
<p>Step 1: Support children to try and create their own laws. Write them down. What laws would you create to protect robots and humans? What should be our basic motive in this? Who do we want to protect with these laws?</p> <p>Afterwards, read the 'Three Laws of Robotics' (often shortened to 'The Three Laws' or known as 'Asimov's Laws'). (Explain to them that they are based on a fictional story.) What do they think about these laws?</p> <p>Discuss the first law. Create connections with the right to be protected.</p>	<p>45min</p>	<p>Three Laws of Robotics: <u>First Law:</u> A robot may not injure a human being or, through inaction, allow a human being to come to harm. <u>Second Law:</u> A robot must obey the orders given it by human beings except where such orders would conflict with the First Law. <u>Third Law:</u> A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws.</p>

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		<p>More information about Asimov's Laws here. More ideas about the 'Right to be Protected' here.</p>
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... you may repeat the activities as many times as your lesson plan necessitate

Reflection / Evaluation

Ask children to work in mixed gender pairs and create their own story based on laws of robotics. They can use the robots they made in previous activity and present to the classroom a short robot-theatre piece. At the same time discuss with them and try to evaluate how their perceptions of gender in robotics and gender roles in their cooperation have changed or not.

Suggested follow-up activities	Time	Resources needed
Watch the movie 'ROBOGIRL'. Discuss gender stereotypes in robotics education and how the heroine challenged them.	30min	Movie 'ROBOGIRL'
Create your classroom's ROBOLAB (to exercise your STEM capacities) and be aware of active participation by all, in your lab	School year project.	

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