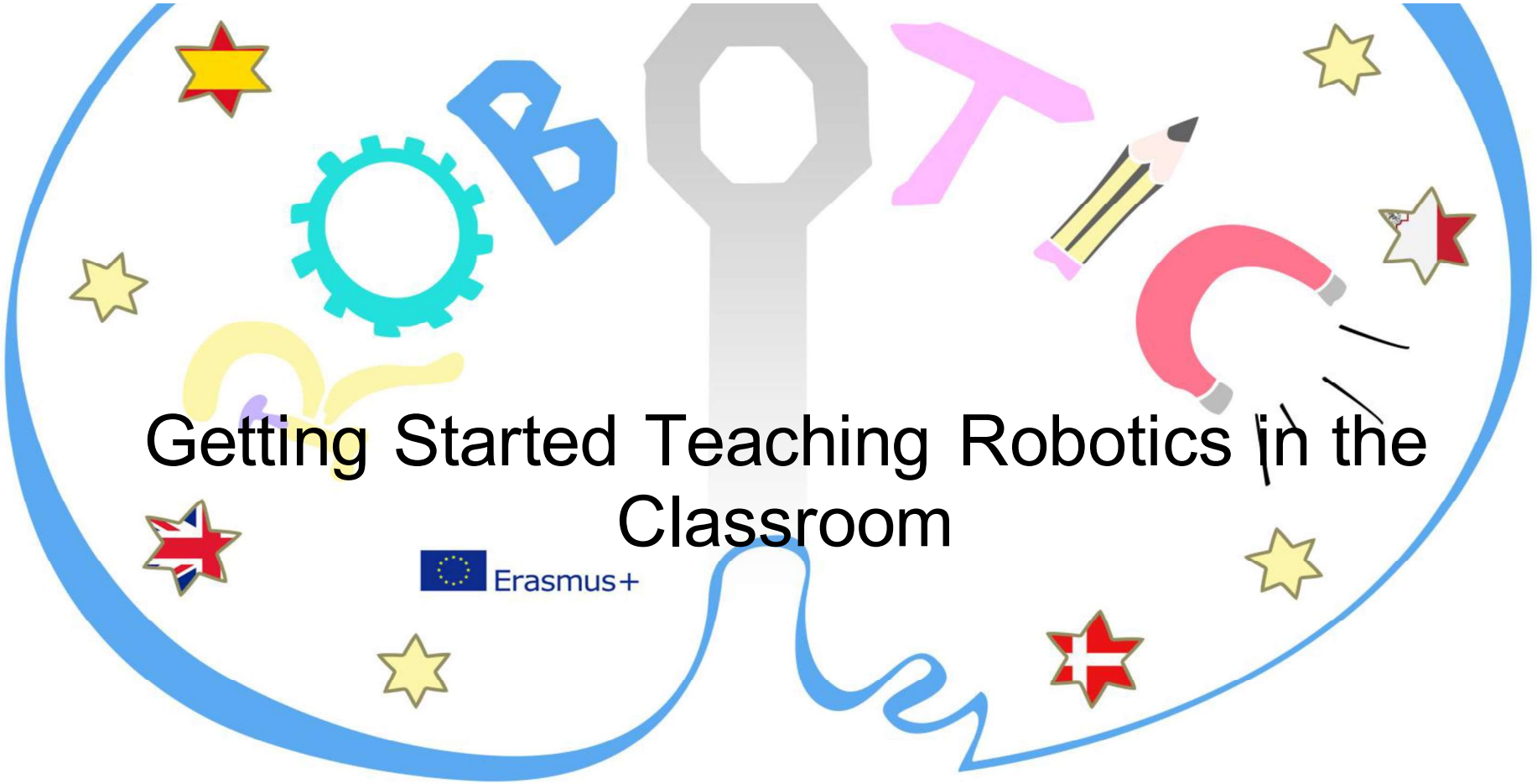
Robotics for the 21st Century



Getting Started Teaching Robotics in the Classroom

Erasmus+

Outline

- Why Robotics?
- Getting started with staff
- Getting started in the classroom
- An overview of progression of skills
- A word about teamwork (group skills)
- A few ideas to get you going
- Questions

Why Robotics?

- In England, the programmes of study require that by the end of Key Stage Two pupils can:
  - design, write and debug programs that accomplish specific goals,
    - including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
  - use sequence, selection, and repetition in programs; work with variables and various forms of input and output
  - use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

Why Robotics?

- In other words:
  - Design to a brief
  - Be a problem solver
  - Learn to work logically
- We already teach this with computing, and yet...
  - Robotics also incorporates other curricular areas such as Science, DT, Maths and English
  - With teamwork in robotics, children must work together to accomplish their tasks
  - Robots are fun, engaging and (crucially) provide the **real-world application** the curriculum demands

Getting Started With Staff

- You need to convince senior management
  - Most of the equipment comes with ready-made lesson plans, project ideas and further resources
  - Your school will be on the 'cutting edge' of teaching children the skills they will need for 21st Century life and work
- You need buy-in from staff
  - They will worry, but they already have the skills they need (these will range across a continuum of skills)
  - Train them first
  - Encourage fun for them to learn too

Getting Started in the Classroom

- Children are your best advocates!
- Make it fun
- Robot assembly takes longer than you think…
- Language of coding should be embedded from an early age
- Debugging (problem solving) must be encouraged from EYFS upwards

Getting Started in the Classroom

- When you get to coding, start with achievable goals (get the robot to move forward)
  - Then gradually increase the challenge
    - Get the robot to move forward 1m, 90cm, etc
    - Get the robot to move 30cm, then turn
    - Challenge with a set course or obstacles to navigate
- Get creative with them
    - Equipment is not always required (pen and paper programming)
    - Play robots (all ages) where one person is the robot and must only do exactly what their 'programmer' tells them – can they get around the room without crashing into tables?

Progression of Skills

Curriculum Progression Map: Robotics skills

	EYFS	KS1	Lower KS2	Upper KS2
21st century skills: teamwork, collaboration, digital literacy, communication, creativity				
Key Skills	Physical manipulation Following instructions Solving simple step problems (e.g. get from A to B)	Precise, unambiguous instructions Create and debug simple programs Predict behaviour using logical reasoning (e.g. if I follow these instructions where will I get to?)	Following algorithms Use sequence selection and repetition Solve problems by decomposing into simple parts	Following and generating algorithms Debugging Programming, monitoring and controlling products Use variables of input and output

Teamwork (getting along)

- Challenges for us as teachers:
  - Group sizes
  - Limited supply of 'hardware'
  - Cloning ourselves
- Challenges for them:
  - Learning how to work with others
  - Wanting to 'do it all'
  - Lego Heroism

Teamwork (getting along)

- Create roles and assign a 'rota'
  - Engineer
  - Mechanic
  - Programmer
  - Troubleshooter (Debugger)
- Ensure that roles rotate regularly so that every child can experience every part of the design, programming, debugging and iteration of the project.

A few ideas to get you going...

- In EYFS and Year 1, try using floor robots for phonics (program the robot to the sound 's')
- Robot storytelling: The robot visits story elements on the map in the correct order (sequencing); or to tell a story (creative)
- In LKS2, try a floor robot Dance Competition: can the children create a routine for their robots (two or more robots dance in sequence)
- All ages: Robot Obstacle Course – can you get your robot safely through? Or...
  - Be the Robot: no need for equipment; get the children to 'program' a person, telling the algorithm for navigating the classroom/hall/playground; the 'robot' only does what it's told (amusing and good for debugging when it goes wrong)

A

Robotics for Primary Schools
in the 21st Century

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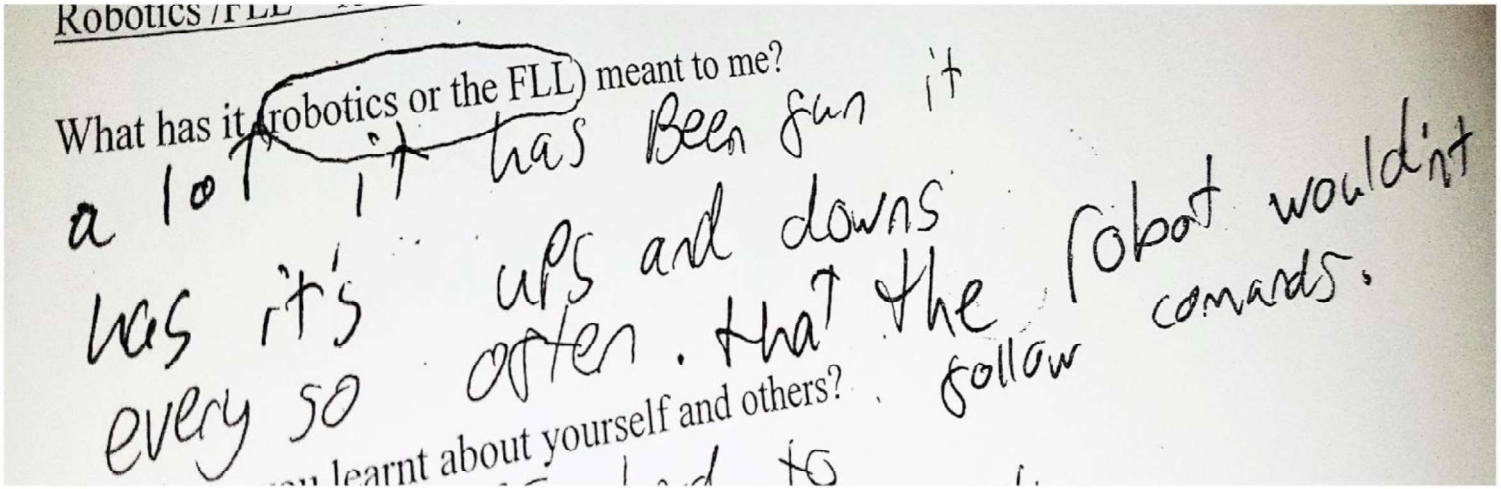
Bluebot Challenge 1

Get from the start position to the finish position WITHOUT using the forward button

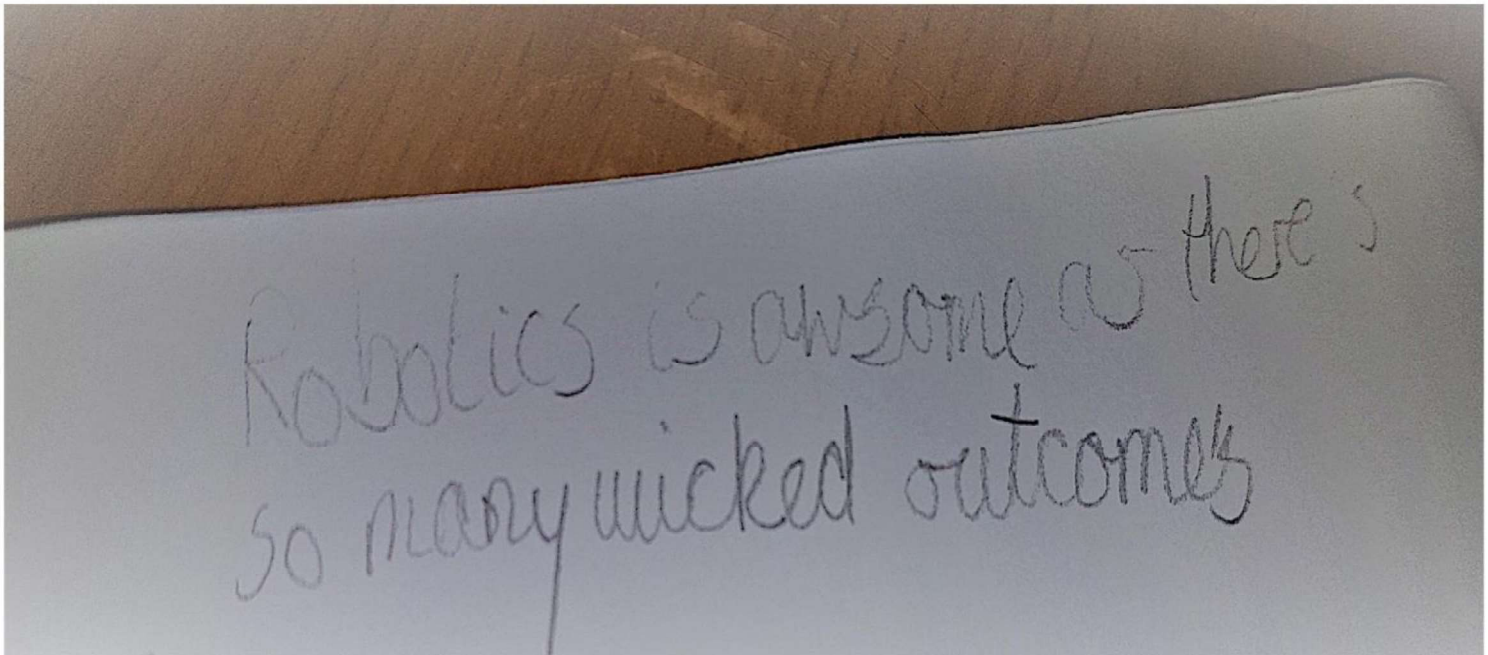
What is the fewest possible number of moves you can do it in?

What the children say

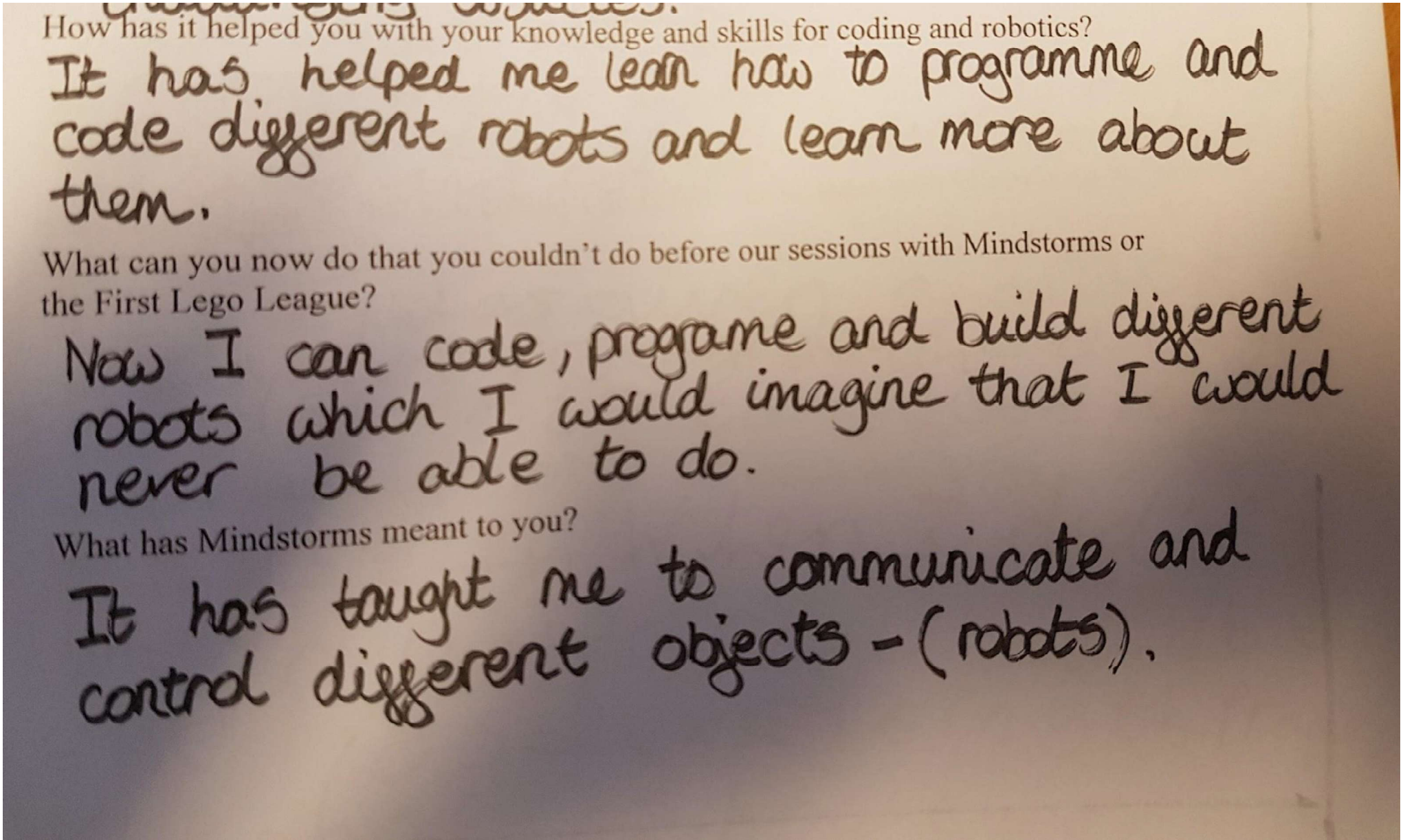

Robotics / FLL

What has it (robotics or the FLL) meant to me?

a lot it has been fun it
was it's ups and downs
every so often. that the robot wouldn't
learnt about yourself and others? follow comands.


Robotics is awsome as there's
so many wicked outcomes

What the children say



How has it helped you with your knowledge and skills for coding and robotics?

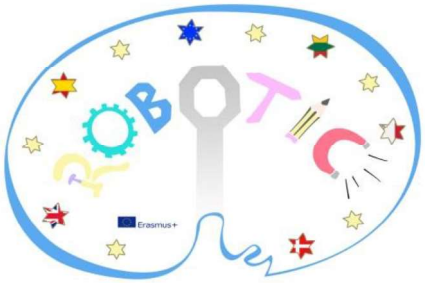
It has helped me learn how to programme and code different robots and learn more about them.

What can you now do that you couldn't do before our sessions with Mindstorms or the First Lego League?

Now I can code, programe and build different robots which I would imagine that I would never be able to do.

What has Mindstorms meant to you?

It has taught me to communicate and control different objects - (robots).



Questions?