LEGO MINDSTORMS®
education

- Getting started with NXT
- Using RCX, ROBOLAB and NXT

LEGO® MINDSTORMS® Education
The NXT generation

ACTIVE ROBOTS

Introducing the NXT generation

In 1998 the LEGO® Group revolutionised the world of educational robotics with a pioneering product concept – **LEGO® MINDSTORMS®**

Today LEGO MINDSTORMS for Schools is used in more than 25,000 educational institutions worldwide from primary schools to universities.

Now, an exciting new generation of MINDSTORMS robots is ready to help students with ICT, science, maths and D&T concepts – through a natural, step-by-step learning process that enables team-working, creative thinking, and hands-on problem-solving.

The new LEGO MINDSTORMS Education features the latest in robotics technology along with increased functionality. It is now easier to use and has more possibilities than ever before.

LEGO MINDSTORMS Education key features:

- NXT intelligent programmable LEGO brick with inbuilt simple, on brick programming facility and pre-loaded programmes
- Bluetooth™ wireless technology
- Exciting new software includes simulations of progressive student tasks and interactive step by step guidance to programming
- Interactive Servo motors with built in rotation sensors
- New Ultrasonic Sensor and Sound, Touch and Light Sensors
- For PC (Windows® XP) and Apple® Mac® (OS X) computers
- Easy classroom management with handy storage solution and rechargeable battery system with A/C plug
- LEGO Technic building system
- KS2 Guide and Robotics projects available for in-class and extended school use.

'With LEGO MINDSTORMS students experience how to apply their knowledge in a practical way – and they get to see the results of their work immediately. This is incredibly motivating'.

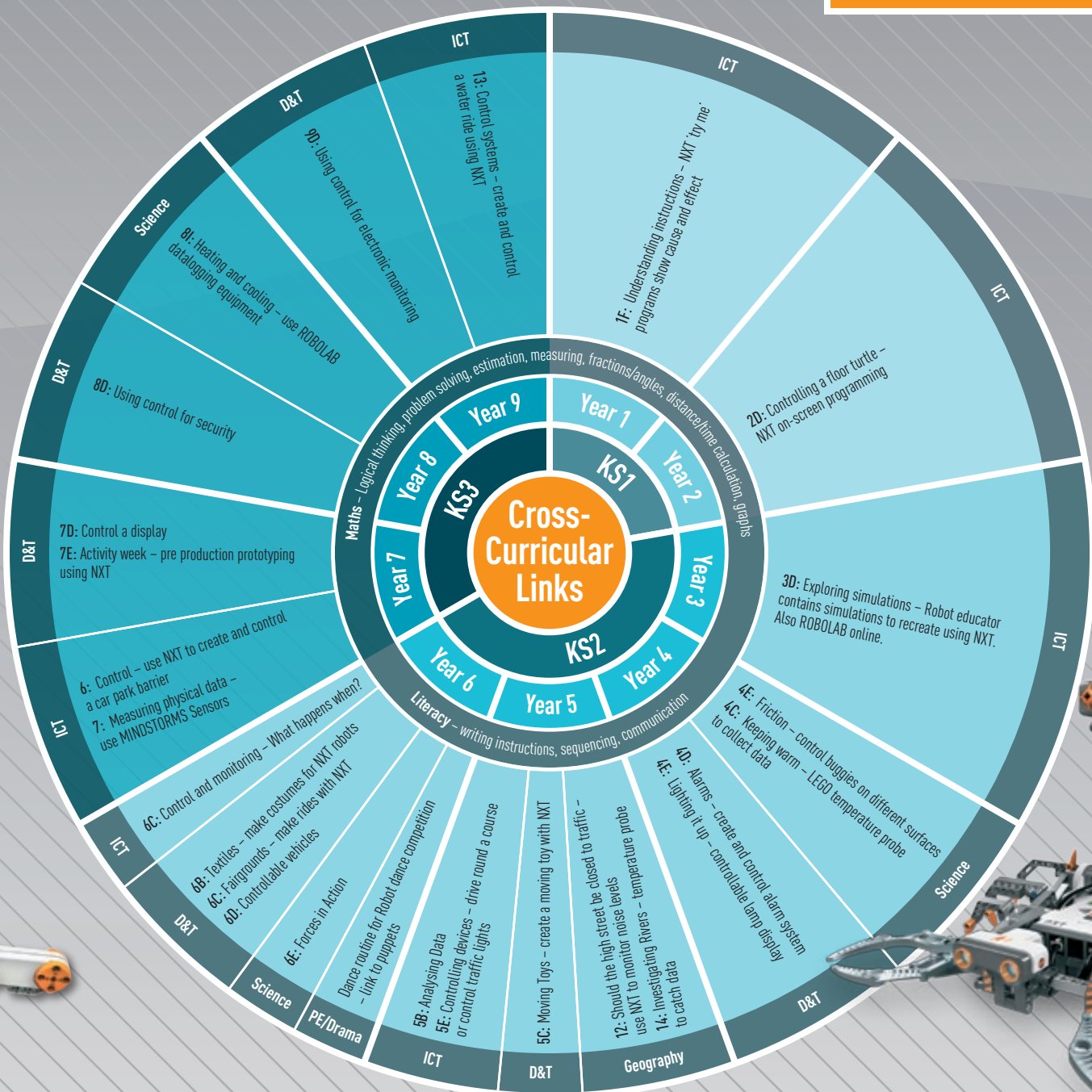Louise Erratt
New Lodge School, Dorking

LEGO® MINDSTORMS® Education in the Curriculum

Flexibility and built in progression enables access to learners of all ages and apply skills from across the curriculum.

With curriculum-relevant teaching activities, MINDSTORMS Education is designed for an educational setting and is great for whole class teaching with the Interactive Whiteboard, group work and personalised learning.

> "The product addresses the need for control ICT products in KS2 and KS3 but has the range to be well used at KS4 and A level. Because the product has a customisable interface it can be adapted to different age ranges. In addition it includes complex programming concepts which would challenge pupils at the top end of KS5."
>
> Sheila Mackenzie
> Advisory Teacher, Hertfordshire

Cross-Curricular Links

KS1
- Year 1 — 1F: Understanding instructions – NXT 'try me' programs show cause and effect
- Year 2 — 2D: Controlling a floor turtle – NXT on-screen programming

KS2
- Year 3 — 3D: Exploring simulations – Robot educator contains simulations to recreate using NXT. Also ROBOLAB online.
- Year 4 — 4E: Friction – control buggies on different surfaces; 4C: Keeping warm – LEGO temperature probe to collect data; 4D: Alarms – create and control alarm system; 4E: Lighting it up – controllable lamp display; 12: Should the high street be closed to traffic – use NXT to monitor noise levels; 14: Investigating Rivers – temperature probe to catch data
- Year 5 — 5B: Analysing Data; 5E: Controlling devices – drive round a course or control traffic lights; 5C: Moving Toys – create a moving toy with NXT
- Year 6 — 6C: Control and monitoring – What happens when?; 6B: Textiles – make costumes for NXT robots; 6C: Fairgrounds – make rides with NXT; 6D: Controllable vehicles; 6E: Forces in Action; Dance routine for Robot dance competition – link to puppets

KS3
- Year 7 — 7D: Control a display; 7E: Activity week – pre production prototyping using NXT; 6: Control – use NXT to create and control a car park barrier; 7: Measuring physical data – use MINDSTORMS Sensors
- Year 8 — 8I: Heating and cooling – use ROBOLAB datalogging equipment; 8D: Using control for security
- Year 9 — 9D: Using control for electronic monitoring; 13: Control systems – create and control a water ride using NXT

Maths – Logical thinking, problem solving, estimation, measuring, fractions/angles, distance/time calculation, graphs

Literacy – writing instructions, sequencing, communication

ICT · D&T · Science · PE/Drama · Geography

Both the LEGO Mindstorms Education Base Set (9797) and Education Resource Set (9648) may be required to create some of the robots shown.

Introducing the NXT range

9797
LEGO® MINDSTORMS® Education Base Set

Enables groups of 2–3 students to build and programme real life robotic solutions. Includes the programmable NXT brick, three interactive servo motors, a range of sensors, including ultrasonic and sound, a rechargeable battery, connecting cables and enough LEGO bricks to build one model at a time. The set includes building instructions.

2000077
LEGO® MINDSTORMS® Education NXT Software

A powerful easy to use software designed to work with the NXT brick. The software, powered by LabVIEW, is icon based and incorporates a Robot Educator step by step guide to programming, from beginner to advanced levels with simulations. The software is also capable of programming the NXT brick to work with former MINDSTORMS sensors and motors with the help of convertor cables. The software pack includes a digital user manual and is licenced for a single user.

2000078
NXT Site Licence Agreement

The site licence allows LEGO MINDSTORMS Education NXT Software to be used on any compatible computer at the purchasing institution. It is necessary when installing the software onto more than one computer. It is an agreement only and requires purchase of 2000077 MINDSTORMS Education NXT Software.

9648
Education Resource Set

A wide variety of additional elements for extended robot activities. Plenty of extra standard elements such as beams, axles and connectors and special elements such as a crane hook and tread wheels. A great supplement to 9797.

D50001
## NXT User Guide and ICT Curriculum Scheme of Work

A UK Specific guide taking teachers and pupils through the setting up, programming and handling of the new MINDSTORMS Education NXT in the National curriculum at Key Stages 1 and 2. The guide provides activities, term plans and solutions to ensure that the control aspect of the ICT curriculum is delivered in a fun and easy way.

2009797
Introduction to Robotics

Great for out of school activities, this CD provides up to 16 hours of tuition divided up into 8 easy to use projects. Developed by Carnegie Mellon University's Robotics Academy, it is a step by step guide to robotics engineering using the MINDSTORMS Education hardware and software. Includes presentations and video clips, worksheets and teachers materials.
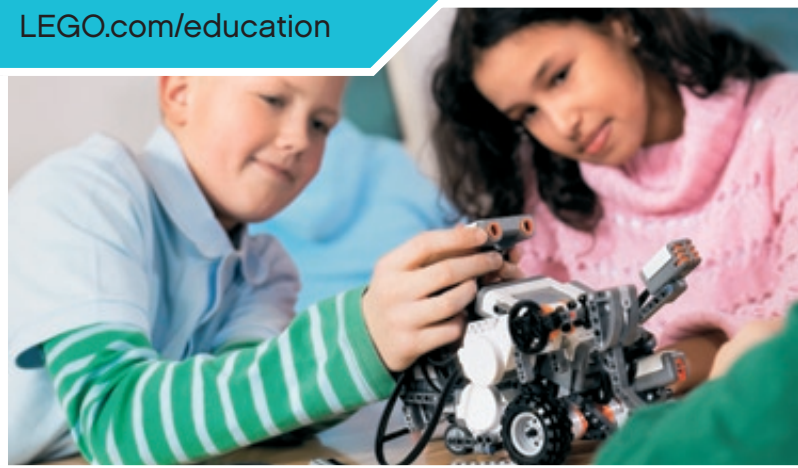
9841
Intelligent NXT Brick

Programmable 32-bit brick, including Bluetooth™ wireless communication and USB port. Programmable dot matrix display. 4 input, 3 output ports. 6-wire digital platform. 8 KHz loud speaker.

A number of simple pre-defined programming commands can be used directly on the brick. More advanced programming requires software pack 2000077. Requires 6 AA batteries or the 9798 Rechargeable Battery.

9843
Touch Sensor

Using the NXT brick, the touch sensor detects pressure. It is also able to count single and multiple presses. A LEGO cross axle can be attached to the sensor button. You will need a connector cable which is included in the 9797 Base Set.

9844
Light Sensor

Using the NXT brick, the light sensor is able to sense light or dark as well as light intensity in a room. It is also able to measure light intensity in colours (grey scale sorting). You will need a connector cable, which is included in the 9797 Base Set.

9845
Sound Sensor

Using the NXT brick the sound sensor is able to measure noise levels in both dB and dBA. It can also recognise sound patterns and identify tone differences. You will need a connector cable, which is included in the 9797 Base Set.

9846
Ultrasonic Sensor

Using the NXT brick, the ultrasonic sensor is able to detect an object and measure its proximity in inches or centimetres. You will need a connector cable, which is included in the 9797 Base Set.

9847
USB Bluetooth™ Dongle

The Abe USB Bluetooth adapter enables wireless communication between your PC or Mac and the NXT device. The Abe USB Bluetooth adapter is supported by Microsoft Windows XP (with Service Pack 2) and Apple Mac OS X (10.3.9 and 10.4).

9842
Interactive Servo Motor

Servo Motor with built-in rotation sensor that measures speed, distance and reports back to the NXT. This allows for motor control within one degree of accuracy. Several motors can be aligned to drive at the same speed. You will need a connector cable, which is included in the 9797 Base Set.

9798
Rechargeable Battery

Lithium battery with A/C plug. Designed for use with the 9841 NXT brick. Capacity: 1400mAh. Estimated recharge time 4 hours.

Charger available (see 9833).

'Opportunities for students to develop higher level thinking skills is limitless due to the variety of tasks, range of inputs and control aspects'

Mike Grocott
Callington Community College

9833
Charger (9V)

9 volt charger suitable for both the RCX, and NXT Rechargeable Battery.

Bridging the RCX generation... to the NXT

Everyone's excited about the new LEGO® MINDSTORMS® Education NXT but what if you've invested in ROBOLAB™ and the RCX?

No worries, LEGO Education have issued a new version of ROBOLAB to ease the transition to NXT.

USB

ROBOLAB 2.9 software will allow you to program both the RCX and NXT (via USB). It also features new firmware to allow users faster processing, more motor speeds, improved programming functions and more.

Meanwhile ROBOLAB users who are ready to get started with the NXT technology will be able to work in a familiar environment to create programmes for the NXT brick from basic Pilot to high-end Inventor, and data logging programmes.

The 9797 NXT Base Set includes converter cables for the existing sensors and motors to allow inter-operability between the two.

So existing RCX users can continue to deliver the ICT, D&T, science and maths curriculum as before. But the ROBOLAB 2.9 and NXT combination also provides a great opportunity to introduce personalised learning and extension activities within the classroom which maximise the additional benefits of the NXT.

Robotics is big

Both the LEGO MINDSTORMS for Schools and LEGO MINDSTORMS Education generations are ideal for use in after school club environments and competitions, where youngsters have time to explore and invent their own robotics solutions.

Many schools use MINDSTORMS in their after school clubs as well as in the classroom, which means that their students continue to improve their skills after school hours.

Every year thousands of young enthusiasts around the world compete in building and programming robots. One of the robotic competition forerunners is FIRST® LEGO® League (FLL) and today it's one of the world's biggest robotics competitions.

FLL
FIRST LEGO® League

For more information and to participate in the fun, intense and challenging FLL visit **www.firstlegoleague.org**

LEGO® MINDSTORMS®
for Schools

LEGO Education will continue to support existing users of the MINDSTORMS for Schools and ROBOLAB platform until the end of 2009.

For full details of the products available contact your dealer or visit www.LEGO.com/education

LEGO MINDSTORMS™
F O R   S C H O O L S

200069
ROBOLAB™ 2.9 Software and User Guide

This latest upgrade to the ROBOLAB software platform allows users to communicate with both MINDSTORMS platforms; the RCX and NXT bricks. Version 2.9 is equally as capable as version 2.5 but includes new features such as floating point maths calculations. The software pack includes PDF user manuals and resource materials. This version does not support Bluetooth™ wireless technology.

2000096
ROBOLAB™ 2.9 Upgrade Site Licence Agreement

The upgrade site licence agreement allows ROBOLAB 2.9 software to be used on any compatible computer at the purchasing institution.
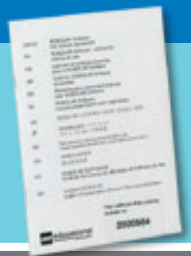
Other RCX products

9794	Team Challenge Set
9649	Technology Resource Set
9709	RCX Programmable LEGO Brick
9891	9V Angle Sensor
9758	9V Light Sensor
9911	9V Touch Sensor and Leads
9889	9V Temperature Sensor
5225	9V Motor with Gear Reduction
9783	Infrared Transmitter (USB)
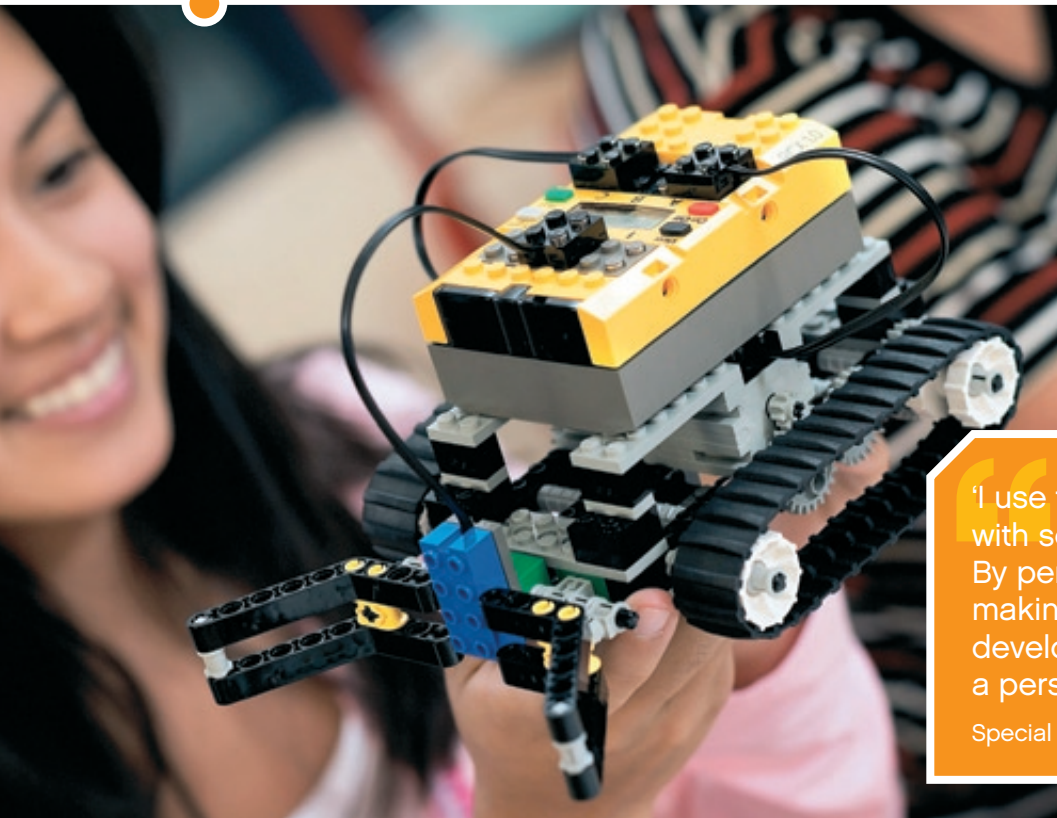
'I use the robots with pupils with severe learning difficulties. By personalising the robot and making it into a character, pupils develop their abilities to imagine a perspective of 'someone else'
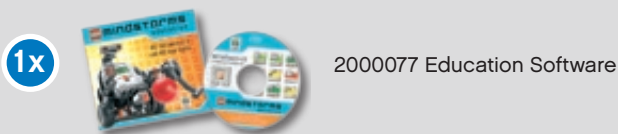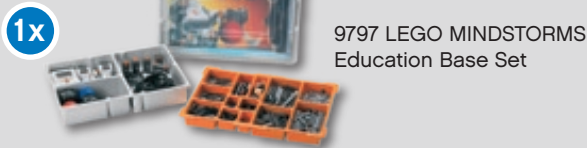
Special Needs Teacher

What will you do NXT?

Thinking of bringing LEGO® MINDSTORMS® Education NXT to your classroom? It's easy to get going with our classroom solutions.

Getting Started Set
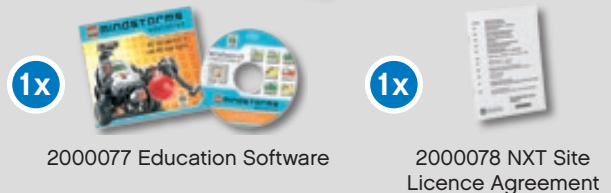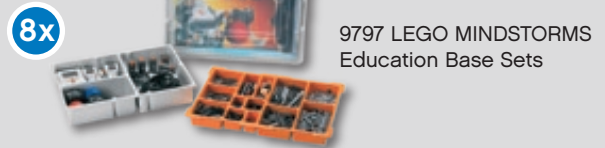
Ideal for a group of 2–3 students. Includes:

1x   9797 LEGO MINDSTORMS Education Base Set

1x   2000077 Education Software

1x   9833 Charger

To extend the building activities, we also recommend you purchase:

1x   9648 Education Resource Set

Classroom Set

Ideal for a classroom of 24 students. Includes:

8x   9797 LEGO MINDSTORMS Education Base Sets

1x   2000077 Education Software

1x   2000078 NXT Site Licence Agreement

8x   9833 Chargers

To extend the building activities, we also recommend you purchase:

3x   9648 Education Resource Sets

'Because its technology and children love technology – they just want to attack it, grab it with both hands and start working.'

Simon Williams
Science and IT teacher
New Lodge School, Dorking

More information

To learn more about the new **NXT** range and to order LEGO MINDSTORMS Education products, please visit **www.active-robots.com** or call **01761 239 267**

ACTIVE ROBOTS

Recognised dealer of LEGO Education