Research
Based
Curricula

Using Social Robots at the Children's Hospital

Key Stage 3

Maths

2021

heppSY

BROUGHT TO YOU BY RBC ACCESS ED

For Teachers
RBC Guide

Learner aims

The Research-Based Curriculum aims to support student attainment and progression by providing classroom resources about cutting-edge research at local universities. The resources are designed to:

- ✓ promote intellectual curiosity in all KS3 students
- ✓ stretch and challenge students to think about content that may be beyond the confines of the curriculum
- ✓ develop core academic skills, including critical thinking, metacognition, and written and verbal communication
- ✓ Encourage students to view these subjects as engaging, worthwhile and inspiring for continued and further study

Content

The programme represents a unique collaboration between universities and schools. Trained by AccessEd, PhD Researchers use their subject expertise to create rich resources that help bring new discoveries and debates to students.

The Research-Based Curriculum packs offer four units suitable for KS3 students. The lessons (units) span a range of exciting and interdisciplinary topics related to English, Maths and Science. Each pack includes four hours of teaching and practical, student-led activity content, supported by a student pack and teacher notes. All packs are available online and free of charge for teachers at select schools.

Each Subject Pack contains:

1. Four chapters that function as subject 'lessons'
2. Questions and practical activities to check and reinforce understanding
3. Challenge activities and extra reading
4. Study skills, tips and guidance at the back
5. Model answers pack (this document)

For Teachers
Using the RBC packs

Suggested school use

These resources are designed to be used flexibly by teachers. They can be completed by students individually or in groups, inside or outside the classroom. In order to achieve the best possible outcomes for students, it is recommended that these packs are delivered with teacher support.

Delivery options

Classroom discussion and curriculum support

These curriculum-linked packs and their activities, as well as the Final Reflection, can be great structures for in-class discussion or debates, if a final written Reflection isn't possible. They are also ideal as an alternative for a written assignment. These packs supplement curriculum learning with additional case studies and extra-curricula working examples.

Homework activities and parent/carer-led time

Questions can be set as homework activity for students, either following an RBC chapter delivered during a lesson, or as an independent reading and study task. Questions can also be set for parents and carers to lead with their children.

Lunch Club

The resources can be completed in small groups across a series of weekly lunch clubs or after-school clubs online or in person. Groups can reflect on their learning by presenting a talk or poster on the subject matter at the end of the course.

Research challenge

The resources can be used to ignite curiosity in new topics and encourage independent work. Schools could hold a research challenge across a class or year group. Pupils could choose their own difficulty level and final presentation format – essay, presentation, video, etc., and submit individually or in small groups, with a final celebration event.

Transition project

Resource packs can function as 'transition' projects over the summer, serving as an introduction to the next level of study between KS3 and KS4. Students could present their reflections on the experience in a journal.

For Teachers
Why RBCs and EAL support

Using an RBC coursebook to provide EAL support leads to benefits for both your school and the individual students.

Increased academic achievement

When students feel supported – and when they are helped to understand and use the language of topics that support their curriculum learning – they are more likely to achieve at the expected level (or above). EAL students who have had appropriate support often do well alongside monolingual students in school, due to their perseverance and higher-level abstract thinking skills that come from speaking more than one language.

Higher self-esteem

A consequence of feeling supported and being properly included in lessons is higher self-esteem and self-confidence for the student.

Helping to eliminate inequality

RBC coursebooks support teachers to tackle achievement gaps and build life chances. EAL resources which support classroom learning help students to have equal opportunities and achieve well.

Stronger learning environments

Bilingual and multilingual students often have strong working memories and attention spans (see Adescope, Lavin, & Thompson, 2010). This helps build a strong learning environment and encouragement amongst the rest of the class. Students in diverse groups have an enhanced ability to think creatively, and to use higher-order cognitive thinking skills.

Different perspectives

Students with different language skills bring differing cultural experiences to the classroom, supporting all students to better understand other perspectives. Additional learning resources can help all students feel valued in the classroom, with diversity of all kinds being celebrated.

For Teachers
Supporting EAL learners

Various strategies can be used to meet the differing needs of EAL learners and help them achieve at and above age-related expectations. Below are some suggestions on how to use these packs with EAL learners.

Classroom organisation

- Place EAL learners in pairs or groups with supportive pupils who are language role-models. This is important for developing language and understanding new subject-related words.
- Make available and encourage learners to use age-appropriate bilingual and English dictionaries and thesauruses for clear definitions, pronunciation, and translation.

Differentiation

- Repeatedly check understanding of topic, learning aims and objectives and what to do in a task.
- Provide learners with subject-specific vocabulary and structures, and check understanding of the language involved in carrying out activities.
- Provide learners with a list of instructions they are likely to encounter in their subject and ask them to translate them into their language. For example, common instructions in Science could include: what do we want to find out, what equipment do we need, how can we show our results, what is the conclusion etc.
- Encourage EAL learners to research new words and create their own vocabulary lists using the bilingual word list templates provided for each chapter in the Student packs.
- Provide model answers, gap-fills, or speaking and writing frames for students to complete with or without word banks for extra support.

Further resources

https://www.learningvillage.net/more_info

https://www.bell-foundation.org.uk/

For Teachers
The RBC for EAL learners

Support and stretch responses

Look out for stickers throughout this booklet which indicate different model answer responses to cater for mixed student level and attainment. These include:

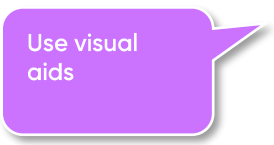
- **Support:** Responses and techniques for students who might require further support.

- **Stretch:** Responses and techniques for students to be further challenged and stretched in the activities they do and responses that they give.

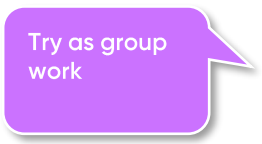
Tips for delivering activities and model answers

Throughout this booklet you will see stickers with 'tips' for ways to engage students and strategies to support them in answering questions and completing activities.

Stickers include:



- **Use visual aids:** For EAL students who are struggling to process the spoken language, visual learning can be helpful. Use labelled images and videos to illustrate the answers so that everyone understands the references.



- **Try as group work:** Group work can increase student engagement and gives EAL learners the chance to practice speaking in a less intimidating context. This gives learners the chance to learn from one another.

- **Students use their first language:** Using first language can be a useful foundation to build on – it gives students an opportunity to compare words and sentence structures and understand more quickly. Particularly with new subject content, this can help students relax and engage with concepts at a higher level.

- **Give additional thinking time:** Allow additional time or space for processing new or more complex topics where required.

Unit One
Model Answers

Answers

Activity 1

Robot	Tally	Frequency
Pepper	I	1
Nao Robot	IIII	4
Huggable	II	2
Pleo	I	1
Paro	I	1
Ivey	I	1
SanElf	I	1
Total		11

Activity 2

a) How many robots were found? 7
b) What is the **mode**? Nao Robot
c) What is the **mean**? (2 d.p) 11/7 = 1.57
d) What is the **range**? 4-1=3

Try as group work

Activity 3

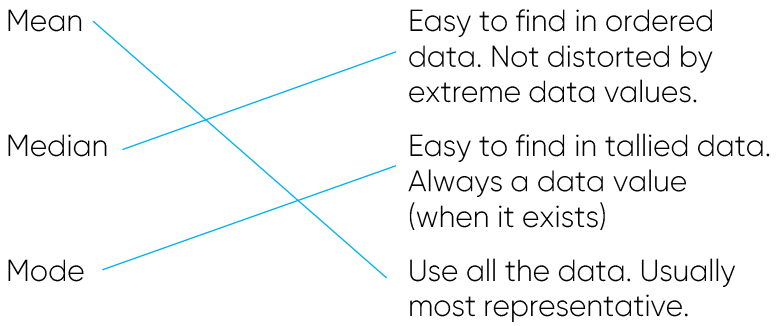
Students draw Nao the Robot.

Unit One
Model Answers

Answers

Activity 4

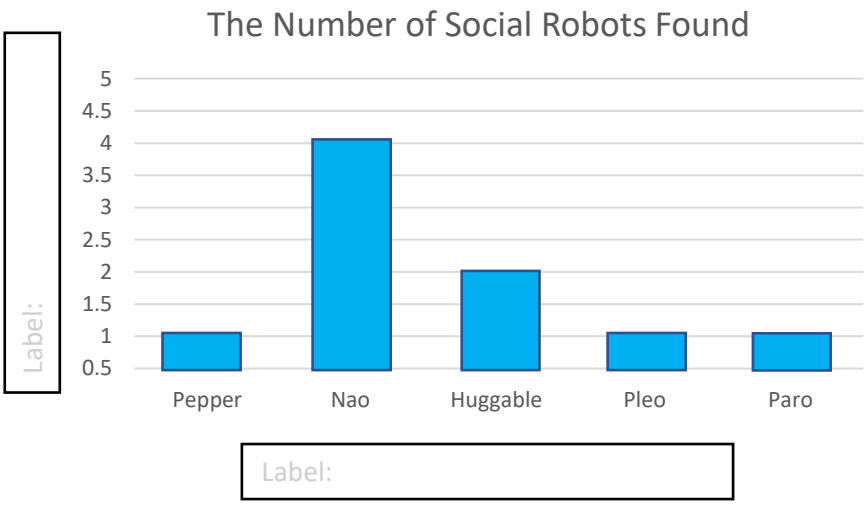
Try as group work



Activity 5

Support answer:

Provide students with extra information e.g. diagrams to give clues



Unit One
Model Answers

Answers Challenge Activity

Try as group work

Participants	Frequency (f)	Mid-interval value (x)	fx (f times x)
$0 < P \leq 20$	4	10	40
$20 < P \leq 40$	2	30	60
$40 < P \leq 60$	3	50	150
$60 < P \leq 80$	1	70	70
Total	10		320

Workings:

Total Participants: 40 + 60 +150 + 70 = 320

Number of studies: 4 + 2 + 3 + 1 = 10

Estimate the mean: 320/10 = 32

Answer: 32

Stretch answer:

Find resources and videos on frequency tables on YouTube and BBC Bitesize, e.g.:
https://www.bbc.co.uk/bitesize/guides/znhsgk7/revision/6

Unit Two
Model Answers

Answers

Activity 1

Use visual aids

a) 41/100
b) 0.41
c) 59%
d) 59/100

Try as group work

The Nao robot can dance, sing, read books, tell jokes and ask questions.

Support answer:

Use different words or descriptions to simplify the context or use the students' native langue to explain concepts.

Activity 2

$\frac{20}{50}$ $\frac{6}{15}$ $\frac{4}{10}$ $\frac{10}{25}$

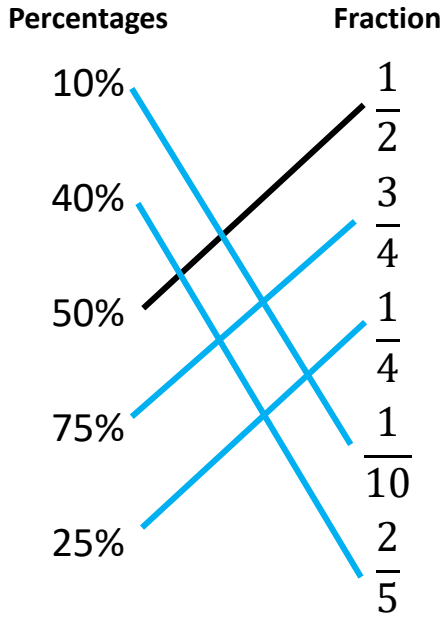
Support answer:

Prompt students to discuss the topic with friends and those they live with.

Unit Two
Model Answers

Answers Activity 3

Try as group work



Challenge Activity

	Person 1	Person 2	Person 3	Person 4	Person 5
Percentages	10%	40%	50%	75%	25%
Decimals	0.1	0.4	0.5	0.75	0.25
Fraction	$\frac{1}{10}$	$\frac{2}{5}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{4}$

Unit Three
Model Answers

Answers

Try as group work

Activity 1

Dancing, singing, reading books

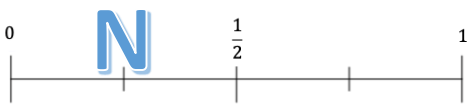
Support answer:

Prompt students to discuss the topic with friends and those they live with.

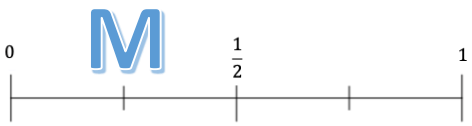
Activity 2

a) Pepper

b) Nao



c) Miro



Challenge Activity

Here are a few names of robots students can research:

- KASPER
- Paro
- Pleo

Unit Four
Model Answers

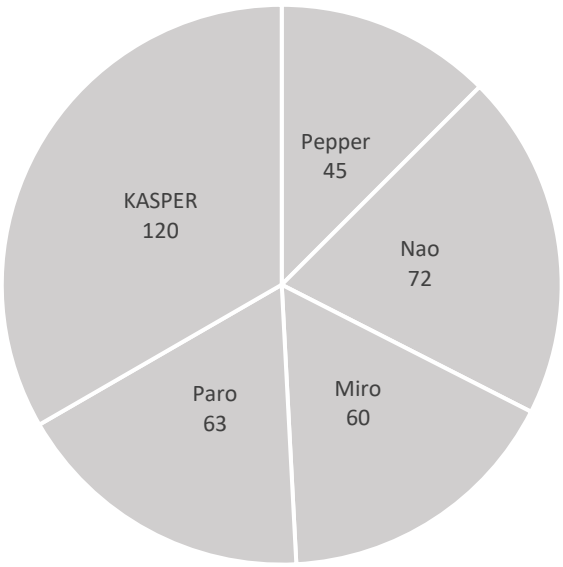
Answers Activity 1

Try as group work

Robots	Frequency	Angle
Pepper	15	45
Nao	24	72
Miro	20	60
Paro	21	63
KASPER	40	120
Total	**120**	

Use visual aids

Give additional thinking time



Unit Four
Model Answers

Answers

Activity 2

a) Paro
b) Pepper and Kasper
c) 180

Support answer:

Use different words or descriptions to simplify the context or use the students' native langue to explain concepts.

Stretch answer:

Use some of the links provided on page 54 of the coursebook for additional information and extension work. Ask students to express their opinions or discuss in a class debate why some robots may be more popular than others.

Activity 3

Try as group work

Nao	Frequency	Angle
Dance	8	264
Sing	7	126
Books	5	90
Total	**20**	

Challenge Activity

Encourage students to work together. Direct them to the website links in the coursebook. Suggest that they discuss their chosen topic with a friend of family member.

Final Reflection Activity Further Guidance

How can social robots decrease the anxiety levels of children visiting the hospital?

Encourage students to go and watch videos of social robots interacting with people

Students may consider the following:

- Social robots can act as buddies for children who need to stay in hospital for a long period of time. it can be programmed to dance, talk, tell stories and play games.
- It can encourage children to relax when in hospital and help explain some of the things that are happening in the hospital
- Social robots are unique and offer a range of activities, depending on the robot. Some are humanoid robots, others are animal-like robots. Some talk and others don't.
- Social robots can reduce anxiety by saying nice words to the children in hospital.
- Animal-like fury robots can be nice and soft to cuddle.

Hold a group or class discussion on which social robots may be the best in a hospital setting and why.

Use visual aids, for example print out photos of the robots

Here is the list of the social robots that are mentioned in the course book

- Pepper
- Nao
- Miro
- Huggable
- Pleo
- Paro
- Ivey
- SanElf
- KASPER

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