

Reasons to Reason: Upskilling for the future

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Reasons to Reason

Upskilling for the future

Why reasoning?

Conjecture 1: more.

Conjecture 2: rapidly changing world.

Conjecture 3:

Conjecture 4:

- We need to remember less, but understand
- Reasoning is essential to stay ahead in a
- Reasoning is the key to problem solving.
- Reasoning is the currency of the future.

Can you guess my number?





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Can you guess my number?



Can you predict my number?



Can you *predict* my number?

Talk to the person next to you ...

- •Do you think it is a small number?
- •Perhaps it is a really big number?
- I wonder if it is a whole number or a decimal number?
- Do you have enough information yet?





NO

Clue 1: it is a 2-digit whole number. 10 - 99 Clue 2: both digits are different. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 10 – 49; not 11, 22, 33, 44 Clue 3: it is below 50. 13, 17, 19, 23, 29, 31, 37, 41, 43, 47 Clue 4: it is a prime number. Clue 5: it is my daughter's current age. ??? Clue 6: the digit in the tens place is a 1. 13, 17, 19 Clue 7: most used number worldwide over the past 3 years.



What knowledge did you need to solve the problem?

What skills did you need to solve the problem?

What reasoning skills were you using?



wondering

questioning

being logical

being systematic

altering



speculating verifying questioning wondering noticing justifying classifying correcting being logical generalising checking predict comparing altering

Important to identify the skills you were using/need to use.

These skills are generic; they apply to many different problems.

being systematic

Will learners need to predict numbers in the future?

Maybe... we don't actually know what they will need predict ...

... what we do know is they will need to use skills of reasoning to solve problems we have not yet considered!

The skills needed for the future are changing





Skills

Knowledge

The skills needed for the future are changing





Knowledge

Skills

What will the workforce of the future look like?

- are well versed in a variety of skills.
- have the ability to think critically.
- solve problems quickly.
- come up with creative solutions.
- have a deep understanding of technology, and how to use it in meaningful ways.
- communicate effectively.
- can innovate.

Composed of people who:

More than ever before, living and working in the 21st century requires the "four Cs" – creativity, critical thinking, communication and collaboration.

Jobs increasingly require problem solving skills ... Today's 15-year-olds who lack advanced problem solving skills face high risks of economic disadvantage as adults.

A good learner is a flexible learner who can use and combine strategies.

Opportunities to develop the reasoning skills and habits of self-directed learners and effective problem-solvers need to be prioritised.

OECD 2016

OECD 2014

Next 50 years?



Green superpower

Sustainability

Emission reduction

Growth of Artificial Intelligence

Next 50 years?

Emission reduction Growth of Artificial Intelligence Green superpower **Sustainability**

- So what will these jobs look like in the future?
- What skills will our learners need?

We all reason every day!

- What to eat?
- What to wear?
- Which route to take to work?
- Which car to buy?

- Why do we do this?
- To make better decisions.To be better informed.



Another opportunity to reason

Paul is looking at Linda

Linda is looking at John

Paul is married John is not married

Is someone who is married looking at someone who is not married?

Yes No **Credit: Hugh Mercier** How and Why we Reason

Paul is looking at Linda

Linda is looking at John

Paul is married John is not married Linda is married or not married

Is someone who is married looking at someone who is not married?

Yes No

Paul is looking at Linda

Linda is looking at John

Paul is married John is not married Linda is married or not married

Is someone who is married looking at someone who is not married?

No Yes

Paul is looking at Linda

Linda is looking at John

Paul is married John is not married Linda is married or not married

Is someone who is married looking at someone who is not married?

No Yes

Paul is looking at Linda

Linda is looking at John

Paul is married John is not married Linda is married or not married

Is someone who is married looking at someone who is not married?

Yes No

Paul is looking at Linda Linda is looking at John

Paul is married John is not married Linda is married or not married

Is someone who is married looking at someone who is not married?

Yes No

Can only solve this problem through reasoning!

- We can't tell

Paul is looking at Linda Linda is looking at John

Linda is married of not rarried Is someone who is married boking at someone who is not married? Yes No

- We can't tell

Why so many incorrect responses?

Cognitive overload.

 This type of problem uses skills that are not prevalent in our current lives/education system.

- We often default to putting up barriers:
 - we don't have enough information;
 - we tend to lean to our confirmation bias;
 - we will find arguments to support our initial reaction.

So, what is the function of reasoning?

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Reasoning helps us to debate ...

... not in a negative, aggressive way, but in a challenging, supportive way.

Reasoning helps us to predict situations.

We want our learners to have the skills to be able to reason, to debate, to consider different viewpoints, to listen, to reflect and to draw their own conclusions – whether they are right or wrong.

Reasoning allows learners to get a deeper understanding of the problem and therefore present possible solutions.

Interesting results – before and after collaboration

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Studies show that learners are much better at reasoning when they are able to talk to each other.

Reasoning together rather than reasoning on your own is better so you can work with people who can challenge you.

Working collaboratively means that individual biases can be compensated for, any mistakes can be corrected.

So, what do teachers think about reasoning?

All teachers, when I asked them if their lessons included reasoning said yes.

I asked them for examples.

What is the **difference** between thinking and reasoning?

According to a group of teachers I interviewed:

Thinking can be open-ended, abstract, no particular end point

> Thinking can be everyday thoughts, uncoordinated

Reasoning is purposeful, a logical progression

Reasoning is a form of thinking

Working definition of reasoning

Reasoning is thinking ...

... but it is thinking in a logical, purposeful, goal-directed way.

Upskilled the teachers

Frameworks for reasoning.

Reasoning rubrics.

Reasoning glossary.

Reasoning examples.

Explored pedagogy that both supported and hindered reasoning.

We provided a toolkit of ideas to promote a culture of reasoning in the classroom.

Reasoning is not confined to:

- a subject;
- an age group;
- a policy.

Ensure all lessons include an element of reasoning.

Consider the tasks we set learners so they draw on both knowledge and reasoning skills.

Encourage learners to explain their thinking.

Provide opportunities where there is more than one solution.

Challenge learners to consider different perspectives.

Finally

ENKAN SCHOOL 2023 **UPSKILLING** IS THE FUTURE OF EDUCATION

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Education plays a key role.

It builds the skills and capacity a country needs in its future workforce.

This is an opportunity to become a superpower for education.

Reasoning is your gateway to becoming a superpower.

Reasoning is the currency that will help learners to:

- develop logical, analytical thought; \bullet
- think 'outside the box'; \bullet
- consider different perspectives; \bullet
- develop agency so they are ready for the future.

Upskilling for the future: reasoning is the future!

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KEYNOTE SPEAKER

REASONS TO REASON: UPSKILLING FOR THE FUTURE

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