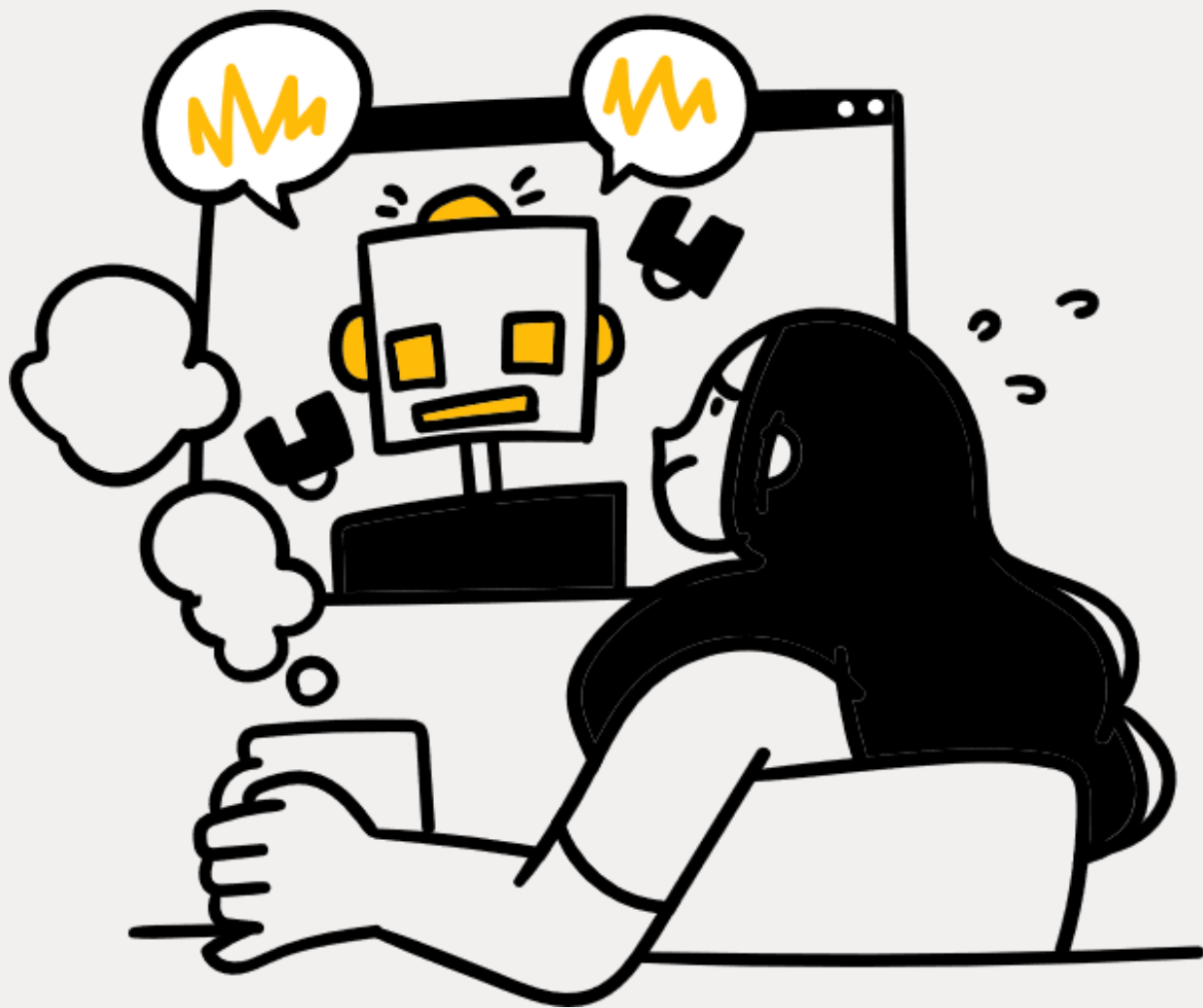


Developing 21st Century Skills with Coding Tools



Why coding tools?



In today's digital age, technology plays a pivotal role in shaping the way we teach and learn. Here, we will highlight some benefits of incorporating coding tools into the bilingual classroom. From improving problem-solving abilities to enhancing creativity and critical thinking skills, coding offers a unique and dynamic approach to both language and 21st century skills development that transcends traditional methods.

Papert's "Mathland"

Seymour Papert argued that for children to learn logical-mathematical concepts (such as those in code) from an early age, they need to be exposed to them in an environment that is relevant, engaging, and connected to real-world contexts. This rich environment is what he called "Mathland".



Children are encouraged to explore these concepts through immersion in play, experimentation, problem-solving and critical thinking.

In "Mathland", concepts are not presented as abstract ideas or formulas but rather as meaningful, contextualized experiences that learners engage with in a hands-on, experiential manner... much like what happens in any good language learning environment.

Examples

1) A space with plenty of LEGO bricks for learners to create freely or solve problems.



Foto de [Kelly Sikkema](#) na [Unsplash](#)

2) An environment with computers for them to create and experiment through code.



Foto de [ScratchEd](#) Team on [Flickr](#)

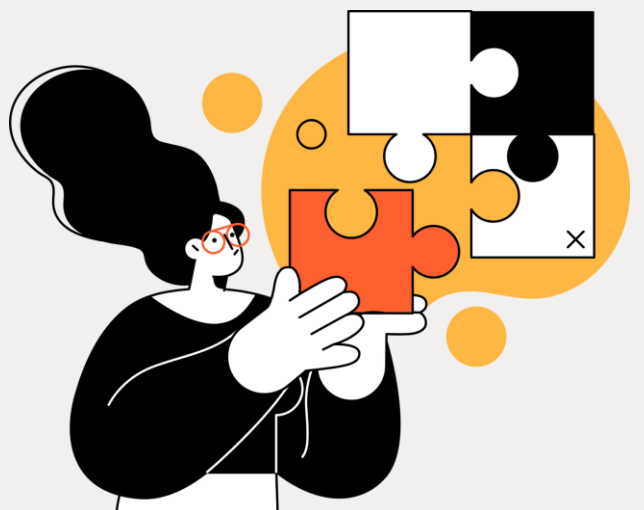
Object-to-think-with

An "object-to-think-with" is like a special toy that helps children learn and solve problems. When they play with it, they're not just having fun, they're also using their brains to figure things out. And by doing so, they create special and affective memories of these events and of what they learned.



For example, imagine a child has a toy car with different parts they can take apart and put back together.

As they play with it, they're not just learning about how it works and how the parts fit together, but also how to solve problems when things don't work the way they expect.



Examples

A set of LEGO bricks is an example of a **concrete** “object-to-think-with”. When learners play with them, they're not just building cool stuff, they're also learning about things like spatial reasoning, and even basic engineering concepts.



Foto de [Phil Hearing](#) na [Unsplash](#)



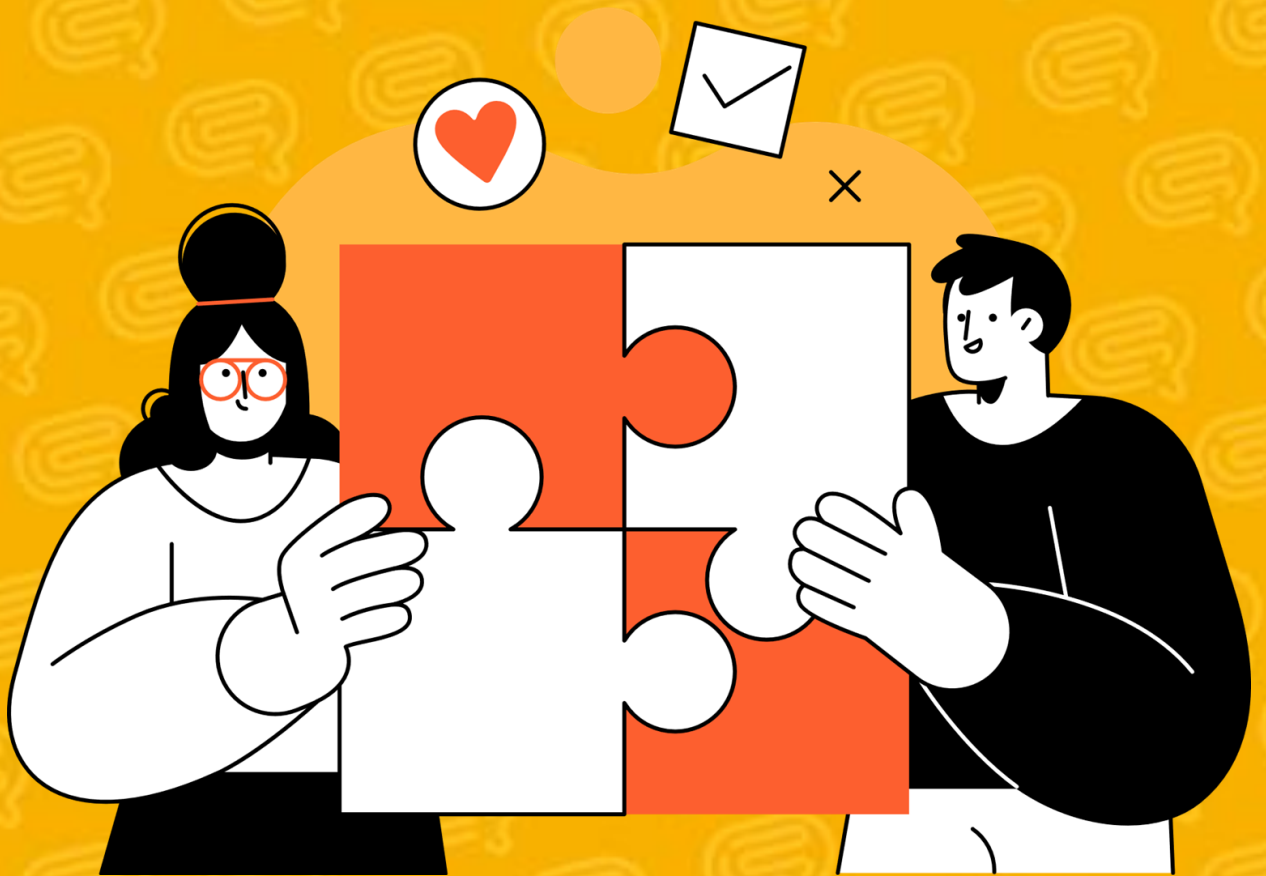
As children mature and develop, an “object-to-think-with” may become **abstract**, such as a virtual cat on a computer that responds to whatever is “spoken” to it using code.

The role of languages

Seymour Papert explained that coding is communicating to a computer in a language (i.e. code) that it and the child can both ‘understand’.



And learning languages is one of the things children do best! Our challenge is to overcome both the shortage of formal materials (e.g. coding tools, lesson plans and materials, computers, etc.) and our own cultural block as well.



**Putting it all
together**

Tips for teachers

1

Use coding tools to expose learners to meaningful and context-rich challenges. Create an environment that is engaging and connected to real-world contexts so that children will want to use code to solve problems.

2

Promote the use of coding tools as objects-to-think-with, allowing learners to explore, manipulate, and experiment. By interacting with these tools, they can construct their understanding of abstract concepts in a meaningful and experiential way.

3

Plan coding activities that help learners to use their English to communicate and solve problems, since many features of coding tools are only available (and much better understood) in English.

Tips for teachers

4

Use coding tools to present learners with age-appropriate challenges and puzzles that require problem-solving and critical thinking skills to solve.

5

Incorporate coding activities that encourage learners to work together to solve problems and create projects. Assign projects where they must communicate to achieve a common goal.

6

Encourage learners to express their creativity and innovate. They can explore different coding options and personalise their projects e.g. games or animations.

By incorporating these tips, you can help bilingual learners develop essential 21st-century skills such as problem-solving, critical thinking, collaboration, communication, creativity, and innovation.



References

- Papert, S. (1980). [Mindstorms: Children, Computers, and Powerful Ideas](#). 1ed.
- Papert, S. & Solomon, C. (1971). [Twenty things to do with a computer](#).
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