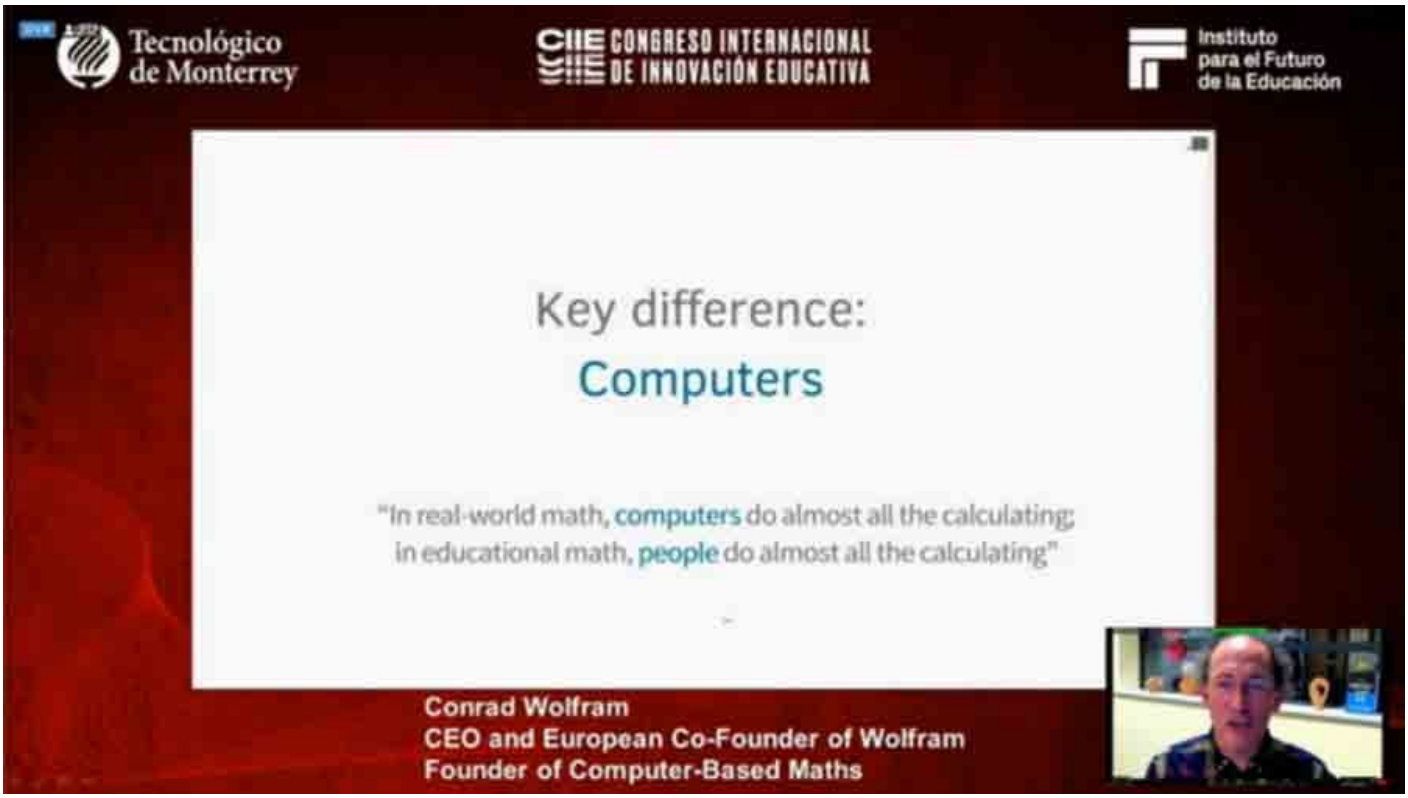
“New mathematics”: expert proposes leaving the solution to computers

“When was the last time you used quadratic equations in real life?” asks British technologist **Conrad Wolfram**, raising a laugh from the audience during his talk at the seventh **International Conference on Educational Innovation (CIIE)**, organized by **Tec de Monterrey**.

*“The response I have received from acquaintances and friends is: ‘**Never**. Except when I have to teach it to my kids.’”*

Wolfram smiles as he says that the **problem** with the current **process** of **teaching mathematics** is that it forces students to go through a lot of areas of math and tells them that this is essential.

*“In **real-world** mathematics, **computers** do **almost all of the work**, but in mathematics classes, people do all the work,”* Wolfram said.



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An evolution which avoids mathematics

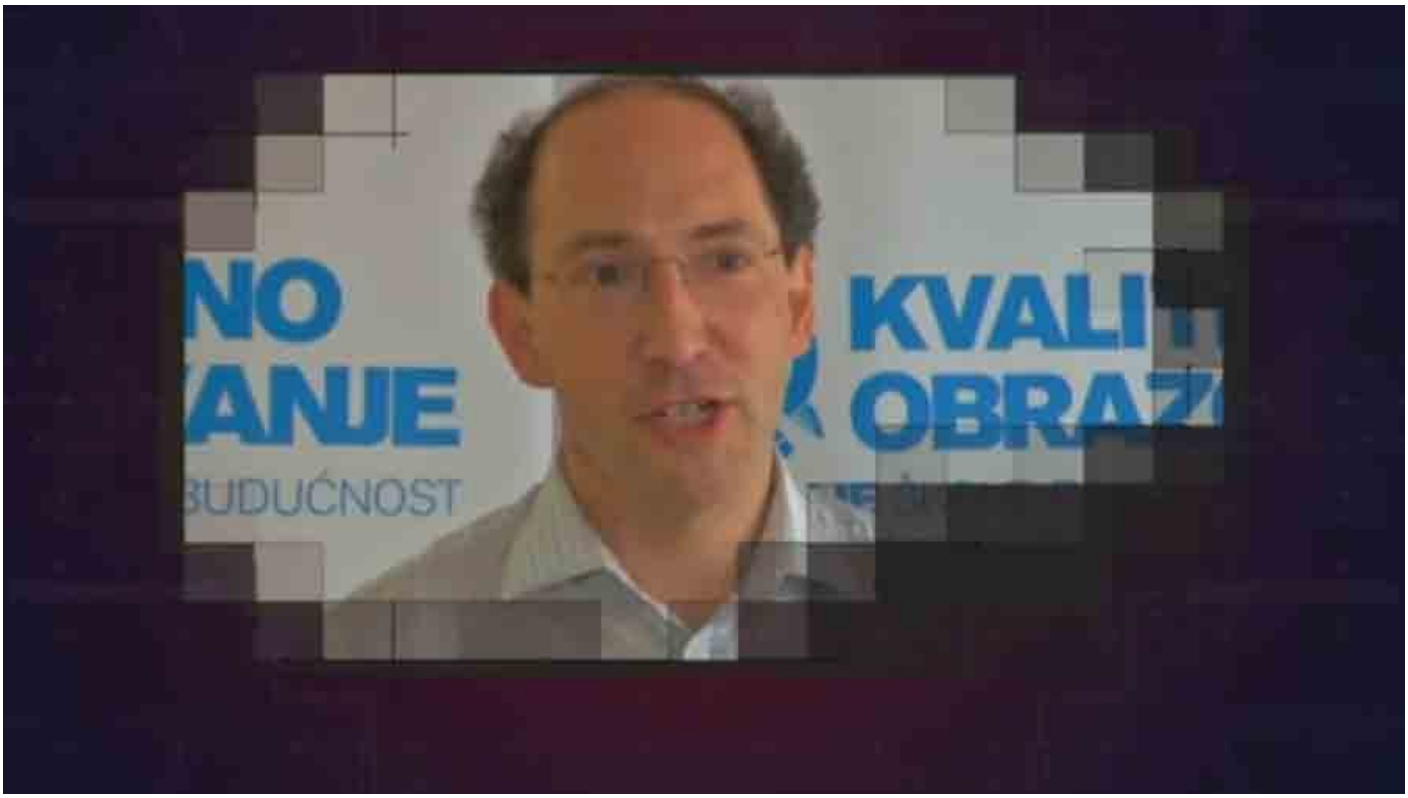
What Wolfram proposes is **replacing** the long **manual process** and **allowing students** to better understand **problems** and apply their **solutions** to the **real world** by using **computer-based mathematical thinking**.

Wolfram says that **mathematics** has **evolved** through the use of **computers** in areas such as health and biology. Despite its **importance** in **contemporary life**, he believes that **mathematics** in education has **undergone few significant changes**.

He mentions that mathematics is a **4-step process**: first you **define a question**. Then, that question is written in a **way** that **can be calculated**. What follows is a **process of calculation** and **resolution**. Finally, the **results** are **interpreted**.

However, the expert mentions that **mathematics education** focuses heavily **on step 3**, the calculation and **resolution process**, in which students solve long equations by hand.

*“Why do we **force students** to do this? Why can't we **get** them to **use** the technology they already have?”* asks Wolfram.



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Computer-based mathematical thinking

The **solution** offered by the British expert is to let **computers do** the work in **step 3**, **manual calculations**, so that teachers and students **can focus on understanding** and **defining the problem**, and identifying the information required to solve it.

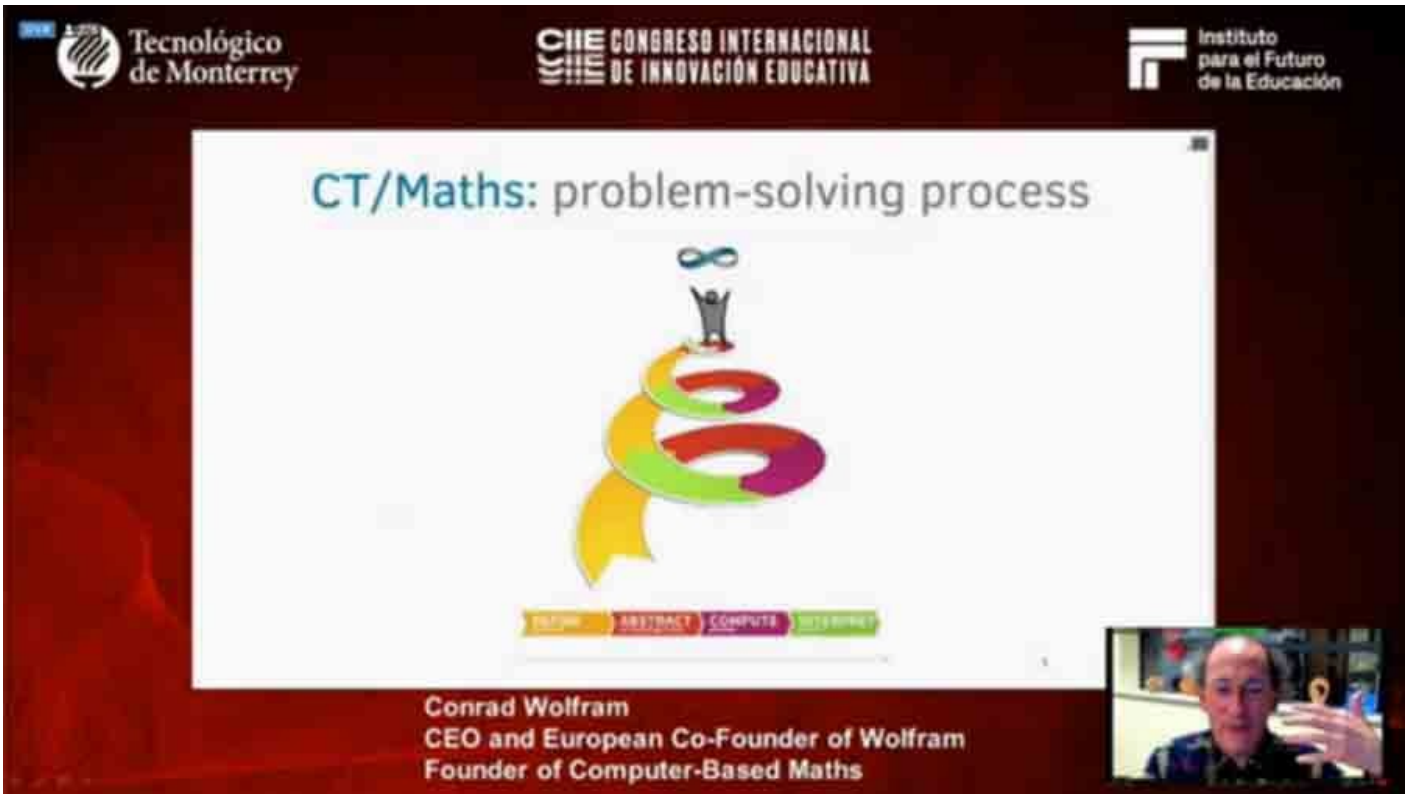
That **information** can be turned into **codes**, **diagrams**, or **algorithms** that can be input into computers to be **calculated**.

Students should **be able to interpret** the **results** that the **computer** returns, make them **understandable**, and then **test** them in **real-life** contexts.

Wolfram says that this **idea** is relatively **recent** and that, although it has not been widely adopted, there are already **universities**, **businesses**, and **governments** that are **interested** in the **concept** .

*"**Computing** can be applied to **many different subjects**, such as **sequencing the human genome**. A decade ago this would have been impossible to do.*

*"If I told a **scientist 100 years** ago that there would be a **computer** which could do the **life's work** of a mathematician **in 1 second**, he wouldn't have believed me,"* says Conrad.



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Will students only learn the basics?

Wolfram says that although this is beneficial, there are **others** who think that **mathematics education** should **remain** as it is.

*"Some people think you have to **learn** the **basics** of math, but what are the basics? When you **learn** how to **drive**, you don't have to learn how to **build a car** or know how it works,"* he shares.

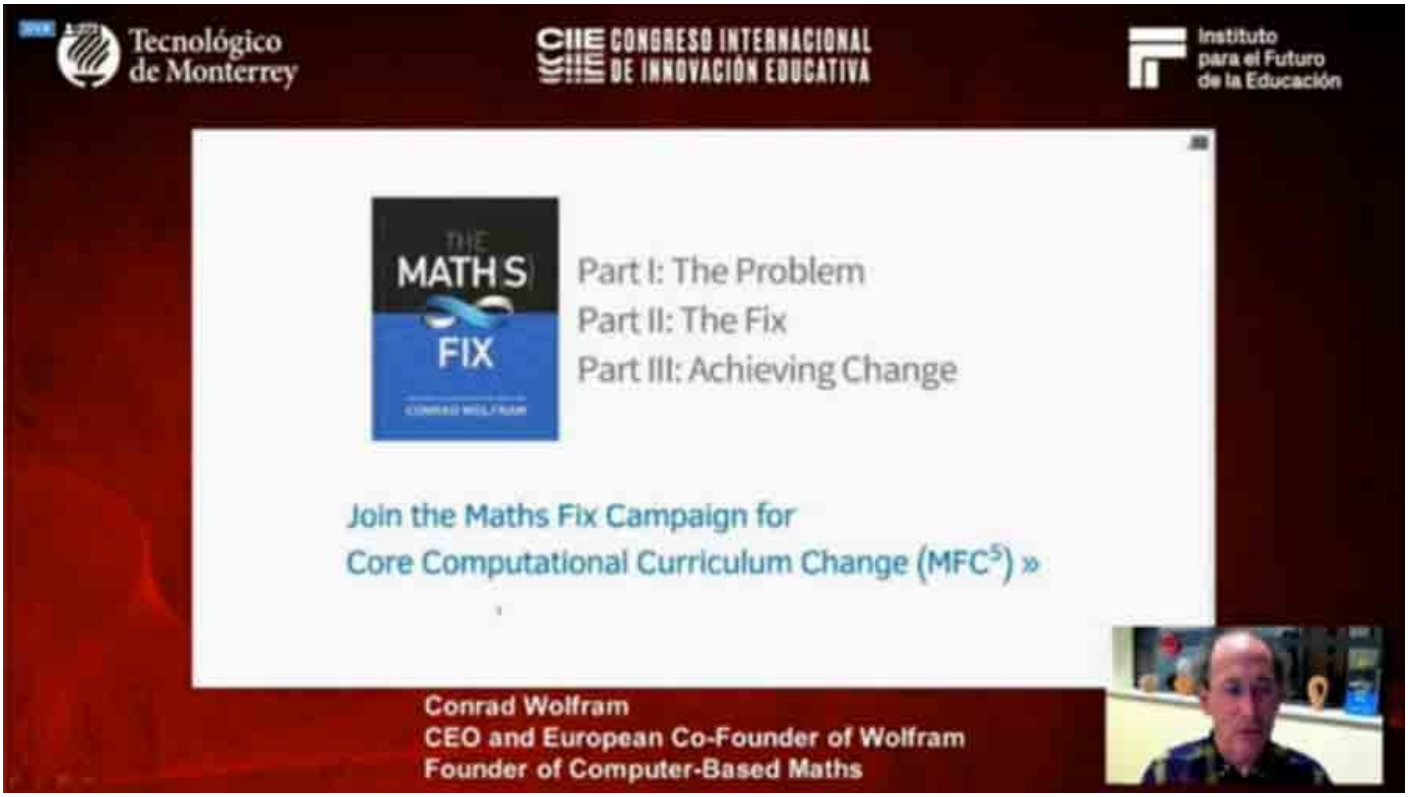
Wolfram believes that education **should not be based only on technology**, but should definitely be **aided by it**. He also says that it is necessary for students to understand the different **concepts**, but that the **calculations**, especially the most **laborious** ones, could be left to **technology**

For example, in his book, ***The Math(s) Fix***, he shares a case in which **students** analyze **cyclists** in a **competition**.

Through **data analysis**, the students learned to investigate **concepts** such as **air speed**, the **resistance** of bicycle chains, and form those ideas into **data** that can be **calculated**.

As a result, they were able to get the cyclists to **improve** their **performance**. These are **skills** which Conrad believes are **necessary** for the **industrial revolution 4.0** that we are currently experiencing.

*"**Computational thinking** is **critical.** It's like reading; it's **basic,**"* he asserts.



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“New mathematics” in the future

Wolfram has worked with **governments** and **universities** on this topic and has even developed ***Mathematica***, a project using technical computing for research, development, and education.

He has also created **WolframAlpha**, a **computational intelligence site** where you can **search** for various **topics** such as **science**, **history**, and even **hobbies**, to name but a few.

However, the expert believes that this **change** in **math education** is not something that can happen quickly.

*“It’s **easier** in **universities** like **Tec de Monterrey**, where you decide your **curricula**, but it’s **more complicated** in **secondary schools** for example,”* he explained.

Other **difficulties** include the **digital divide**, especially in countries where people don’t have access to technology.

However, the speaker says that **access** to **computing** is **not as expensive as it was before** and there are simple ways to do it through **low-cost smart phones**.

*“I strongly **recommend** that **governments** ensure these **technologies** are **available** to everyone.*

*“**Countries** or **universities** that **start doing things this way** sooner will have the tremendous **advantage** of being the first to do so,”* he said.

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The 7th annual CIIE

This is the **7th** Tec de Monterrey **International Conference on Educational Innovation**.

The event is held **annually** and for the **first time virtually** on this occasion for 5 days from **December 14 to 18**, 2020.

*"At **CIIE**, we identify current **challenges** and **opportunities** in the world of education. We seek to promote new teaching-learning **methods**, and the **tools** that new generations demand,"* said **David Garza**, *the* **Tec's** rector.

More than **4,500 attendees** from **25 countries** participated at this year's conference, and had the opportunity to listen to **25 university rectors** and more than **70 international experts**.

This year's conference focused on **6 main topics**:

- *Trends in **education***
- ***Technology** in **education***
- *Managing **educational innovation***
- *Academic **innovations in health***
- *Life-long **learning***
- ***EdTech** entrepreneurship*

In addition, **virtual exhibitions** and awards such as the **TPrize** were held in association with the **University of Los Andes** and **MIT**.

This event recognizes **startups** proposing **solutions for reducing the education gap in Latin America**.

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