Fun and virtual reality: the PrepaTec Physics course


Imagine that you turn into a **cat** and your goal is **to catch a canary.** To do so, you need to use **speed calculation formulas** and **Newton's laws** of motion.

This is how **high school students** at **Tec de Monterrey** learn Physics concepts**: by playing games and solving problems** in a virtual reality environment**.**

Hugo Santos, teacher at **PrepaTec Garza Lagüera**, and **Rocío Cortez**, **high school** academic coordinator for **Digital Education,** explain how this technology is used.

*"The name of the resource is **'Catch me if you can'** and there are **3 challenges** in which students assign values and do **calculations** so that the cat can catch the bird,"* explains Cortez.

This activity forms part of the online post-theory **practical course** "*Energy and Transformation*" which is taught by Professor Santos.
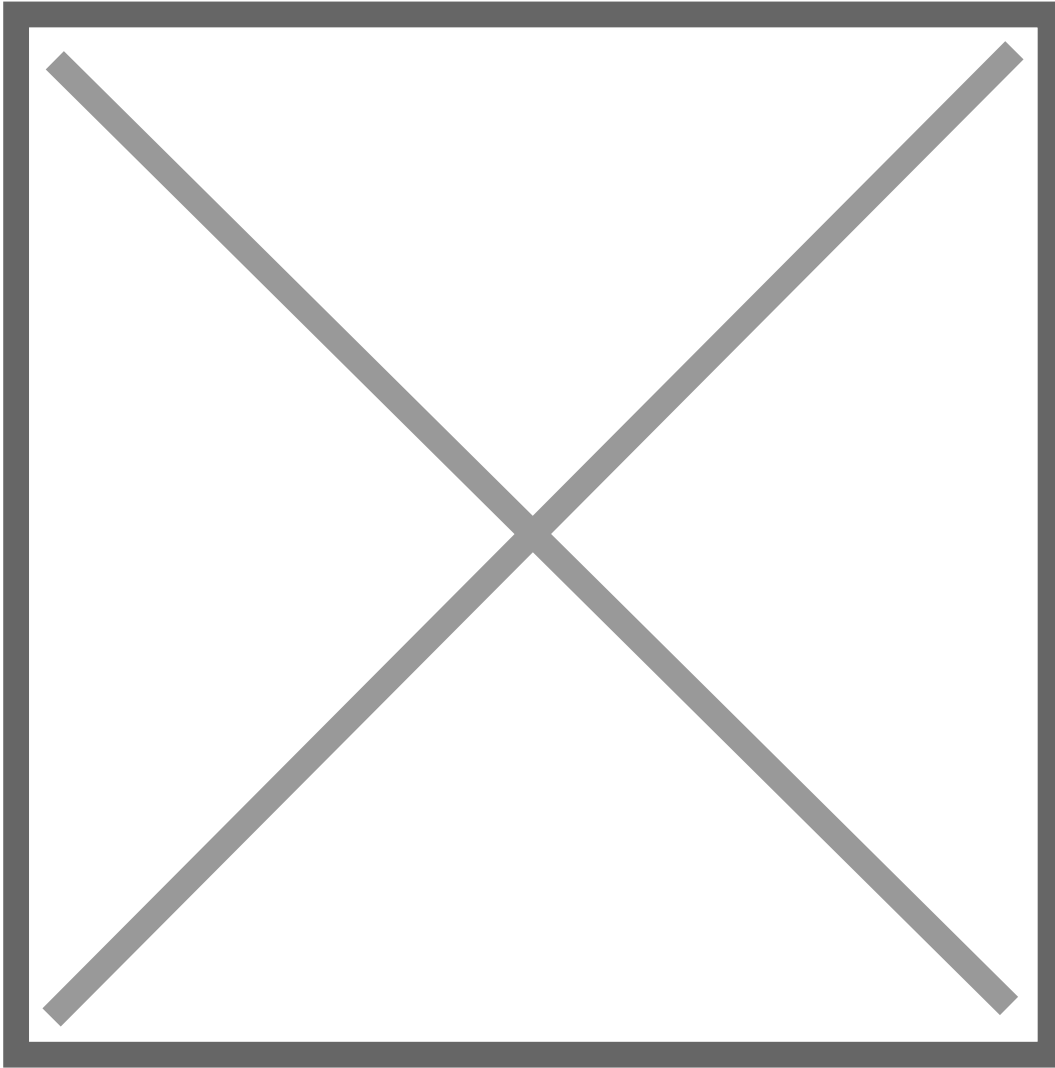
Playing "Catch me if you can" to learn Physics

In the activity, students are presented with **different equations**, each of which must be solved in order to continue to the next **challenge**. Students do this until they complete all 3, all the while being able to **see the virtual world** in **360 degrees** from any angle.

"They (the characters) are on a street and when the bird flies past, the cat must cross the street and climb a ladder," adds Santos.

*"The kids **assign values** such as **speed, distance**, and **time elapsed**. Then they confirm their result,"* says Cortez.

*"**The name of the resource is 'Catch me if you can' and there are 3 challenges in which students assign values and do calculations." - Rocío Cortez***

Virtual reality (VR) is immersion in a **digital simulation** by **using headsets**. Users can manipulate objects, have meetings, interact with the environment, and consolidate their subject

knowledge and skills.

This technology enables individual and collaborative experiences. Students can enter this virtual world using a **computer** or **cellphone** by following a link that is sent during class.

*"It's a **digital space** where students can have an **immersive experience** using their computer or 3D glasses. It focuses the interest of the students and **makes the course more fun and more impactful**,"* she adds.

https://www.youtube.com/watch?v=uw_0IeQDU2E

The benefits of virtual reality: more motivated students

The teacher notes that one of the **benefits** he has seen in class is that **students** feel **more motivated** and **can better understand concepts** as a result of **using theory in hands-on experiments.**

*"When students start to use it, they start to see it as a **video game,** and they tell us that it looks like this one or that one,"* Santos shared.

*"We force them out of their **comfort zone**. As it's an **online course**, they think that they'll just see the teacher, but they don't imagine that they'll be able to enter an **immersive world**,"* adds Cortez.

Other benefits include **improved attention spans, better memory, and personalized learning.**

Different learning processes used by virtual reality courses include problem solving, games, submitting portfolios, self-evaluations, co-evaluations, and automatic feedback, according to a Tec de Monterrey **EduTrends** report.

*"**When students start to use it, they start to see it as a video game, and they tell us that it looks like this one or that one.**" - Hugo Santos*

Challenges of this type of technology

The teacher points out that most **students** adapt to **change** and the use of **technology**, so teachers should try to apply it in their classes.

*"Sometimes, we're stuck in **2D** and **we don't want to take any risks,** but we must become **facilitators** of **knowledge** and let students **experiment, discover, practice,** and **find out their own answers**,"* he explains.

*"Our **dream** is that this can be **developed** and applied across **various subjects**. There should be more **resources**, more **facilities**, and more **teachers** to bring this experience to life,"* he adds.

The challenges that the **EduTrends** publication notes in providing this type of course include:

- It's **expensive** to create an immersive experience.
- Collecting and maintaining information about everything that is needed **takes a lot of time and effort.**
- The **technology** for creating these experiences is **new and experimental.**
- **Learning** in a VR environment **doesn't have the same effects** as learning in the **real world.**
- It requires a very high **data processing** speed.

For Tecnológico de Monterrey, **augmented reality** and **virtual reality improve the learning experience** by using digital elements that facilitate interaction with situations that are often difficult to access in the real world.

This technology is part of the **immersive innovation** that has taken place at the Tec since 2018:

- *442 teachers*
- *21,760 students*
- *223 subjects*
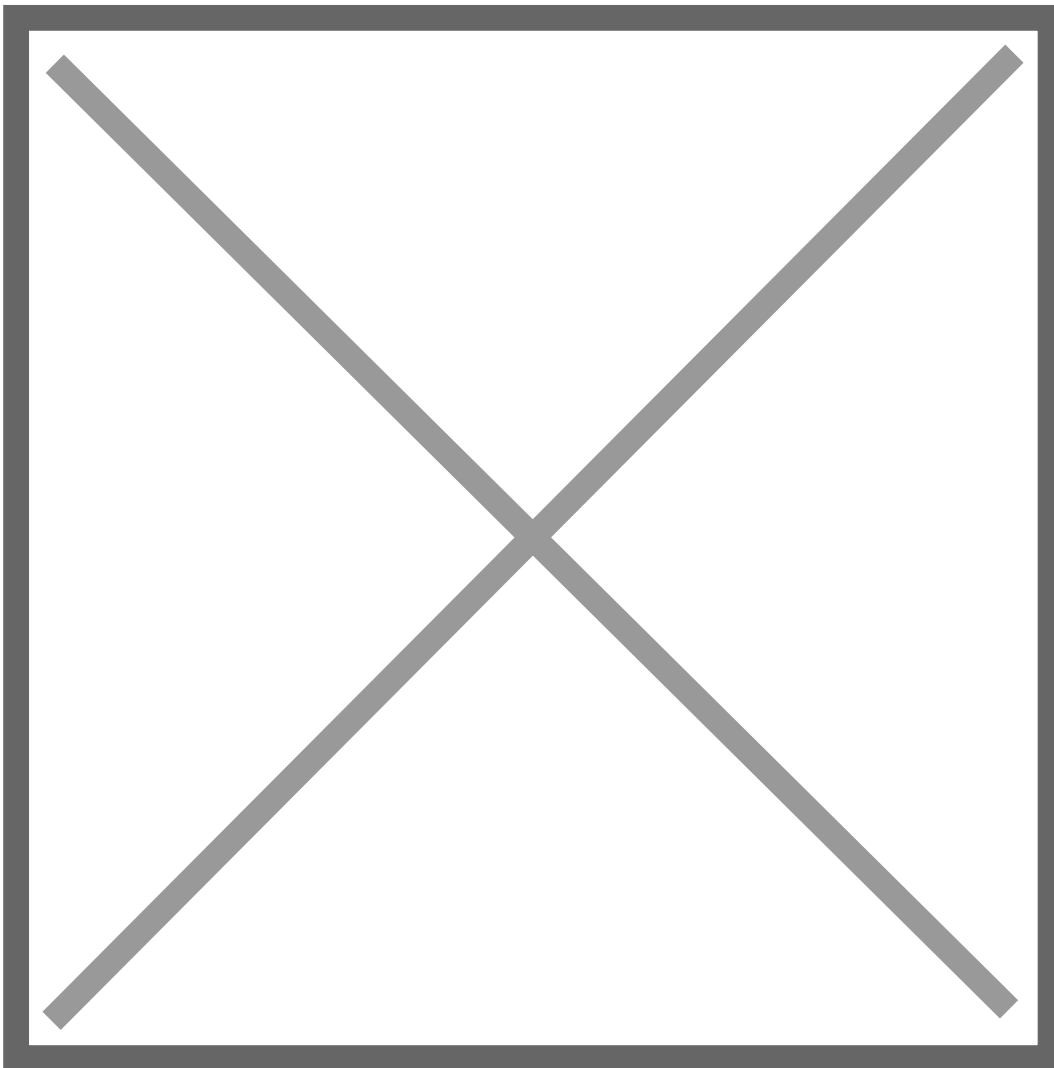
The goal: create a virtual learning "amusement park"

Professor Santos points out that a **medium-term goal** is to create a **virtual "amusement park"** to teach students about **energy** and **transformation** concepts.

*"**We're taking baby steps now** but**, in a few years,** we'll be **running,"** he says, smiling.*

Although it has already been used in classes during the **semester**, the professor explains that it's still a work **in progress** and that they will continue to develop **new ideas** and **activities** within the virtual world they have named ***"Tec City."***

*"The **project** isn't finished. It's designed to teach **Physics**, but it could be **expanded**. Joking with the designers, I told them that this is just the beginning.*

*"We're going to use **vehicles** for an **acceleration** and **displacement** topic and then there'll be a **gym** where we can look at **Newton's laws** of motion and topics like **force** and **power**," he says.*

Cortez explains that they approached the **Educational Innovation and Digital Learning** department in order to carry out the project. They designed the course alongside Professor Santos who was the person in charge of the **pedagogical aspects**.

*"It had been used in other **subjects**. When we were **designing** (the course), they showed me their work and I remember telling them that **I was really interested**," says Santos.*
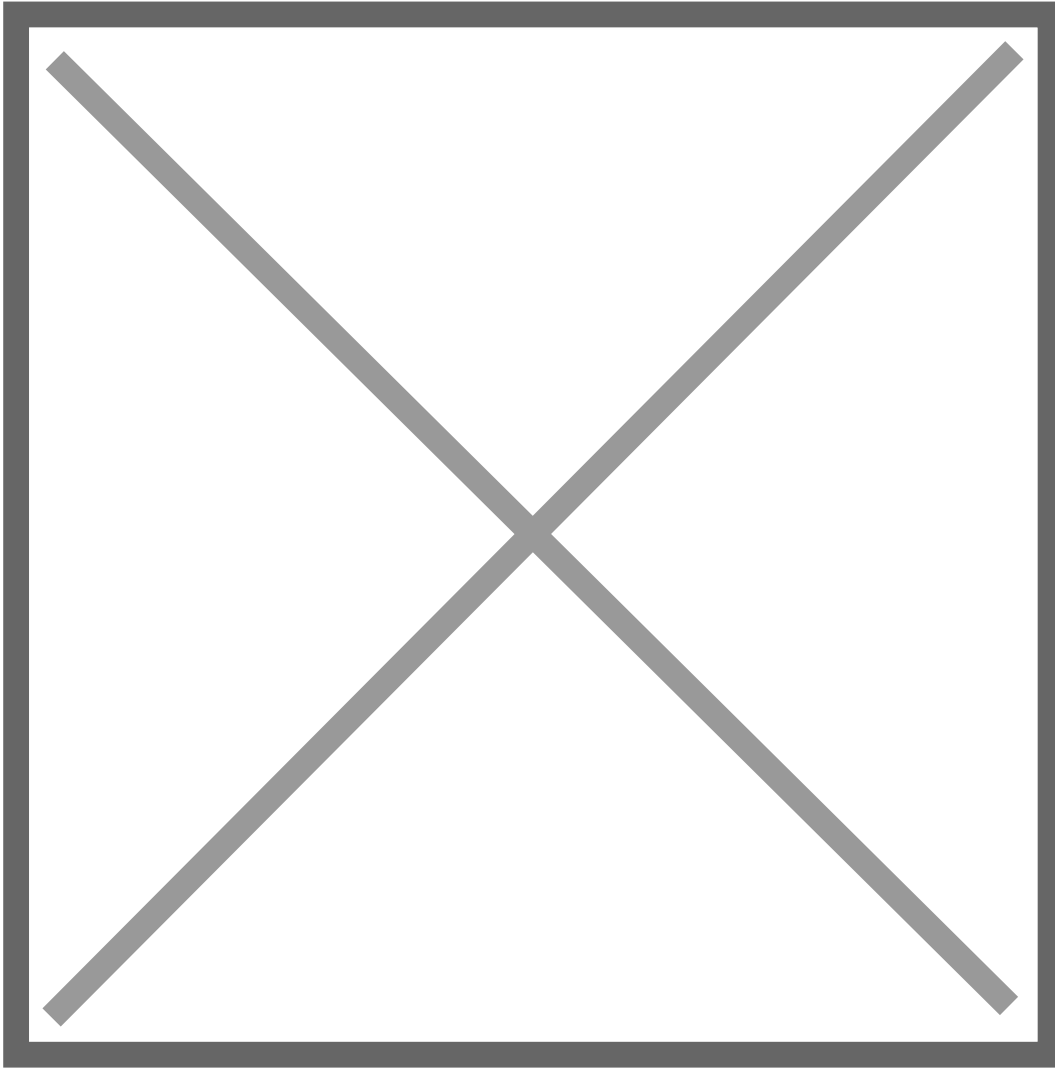
Not the first project to use virtual reality

Cortez points out that they're not the first to use this **technology**, which was developed by the **Educational Innovation and Digital Learning** department. She points out that it had already been used **in other semesters and courses** at **PrepaTec** .

There is a **virtual supermarket** where **nutrition** students learn to select **healthy products** and a **virtual museum** where students exhibited and viewed their works as part of a film class.

*"The students learned about **healthy food** through the visit to the **supermarket** where they could select products for a **balanced diet**, as well as a **virtual gallery** where were modified movie posters were displayed,"* says Cortez.

She also shares that one of her **dreams** is to create a **fully immersive course** so she can evaluate the long-term results of its **effectiveness** compared to traditional courses.

*"It could be the **future** of an **immersive education** where students learn through **virtual reality."***

*"I don't know if time will prove me right, but meanwhile **we'll continue** to develop **this type** of **project**. I think it will have been worth it if other teachers were encouraged and contacted me,"* concludes Santos.

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