

## Exploring the Role of Information and Communication Technologies in Higher Education

Pablo Fernández-Arias, Diego Vergara, Álvaro Antón-Sancho, and Antonio del Bosque

Technology, Instruction and Design in Engineering and Education Research Group (TiDEE.rg), Catholic University of Ávila, C/Canteros, s/n, 05005 Ávila, Spain

### INTRODUCTION & AIM

The integration of **Information and Communication Technologies (ICT)** in higher education has become essential, particularly in engineering education, where digital tools support complex, practical, and laboratory-based learning. In Latin America, this process is limited by unequal access to technology, gaps in professors' digital competence, and persistent **gender inequalities**, challenges that were intensified and reshaped by the **COVID-19 pandemic**. Despite the accelerated digital transition, evidence on how the pandemic has modified ICT usage habits among engineering professors remains scarce. The aim are:

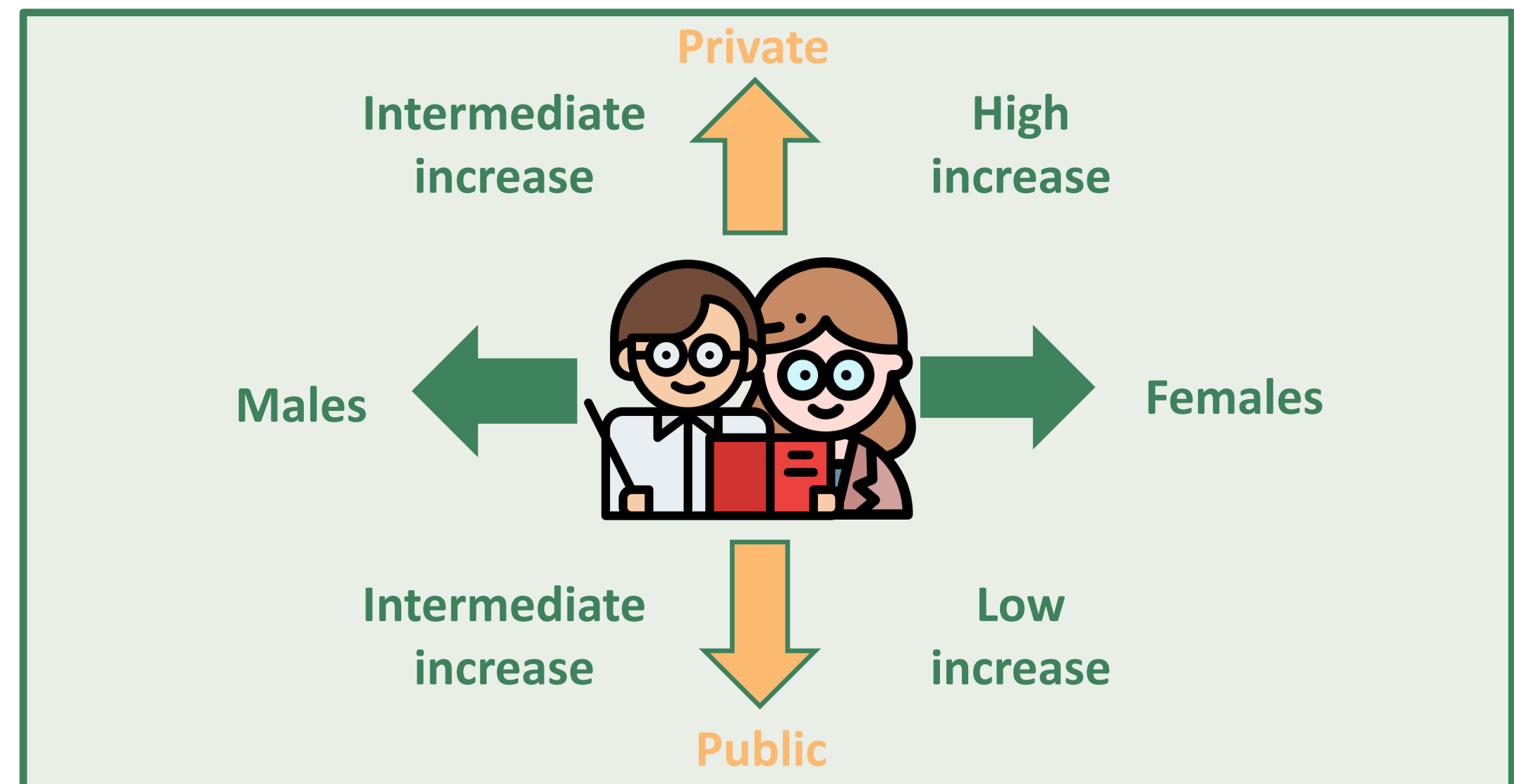
- To analyze engineering professors' perceived digital competence and **assessment of ICT**.
- To examine changes in **ICT use frequency** after COVID-19.
- To explore differences by **gender, teaching experience, and university tenure** (public vs. private).

### METHODS

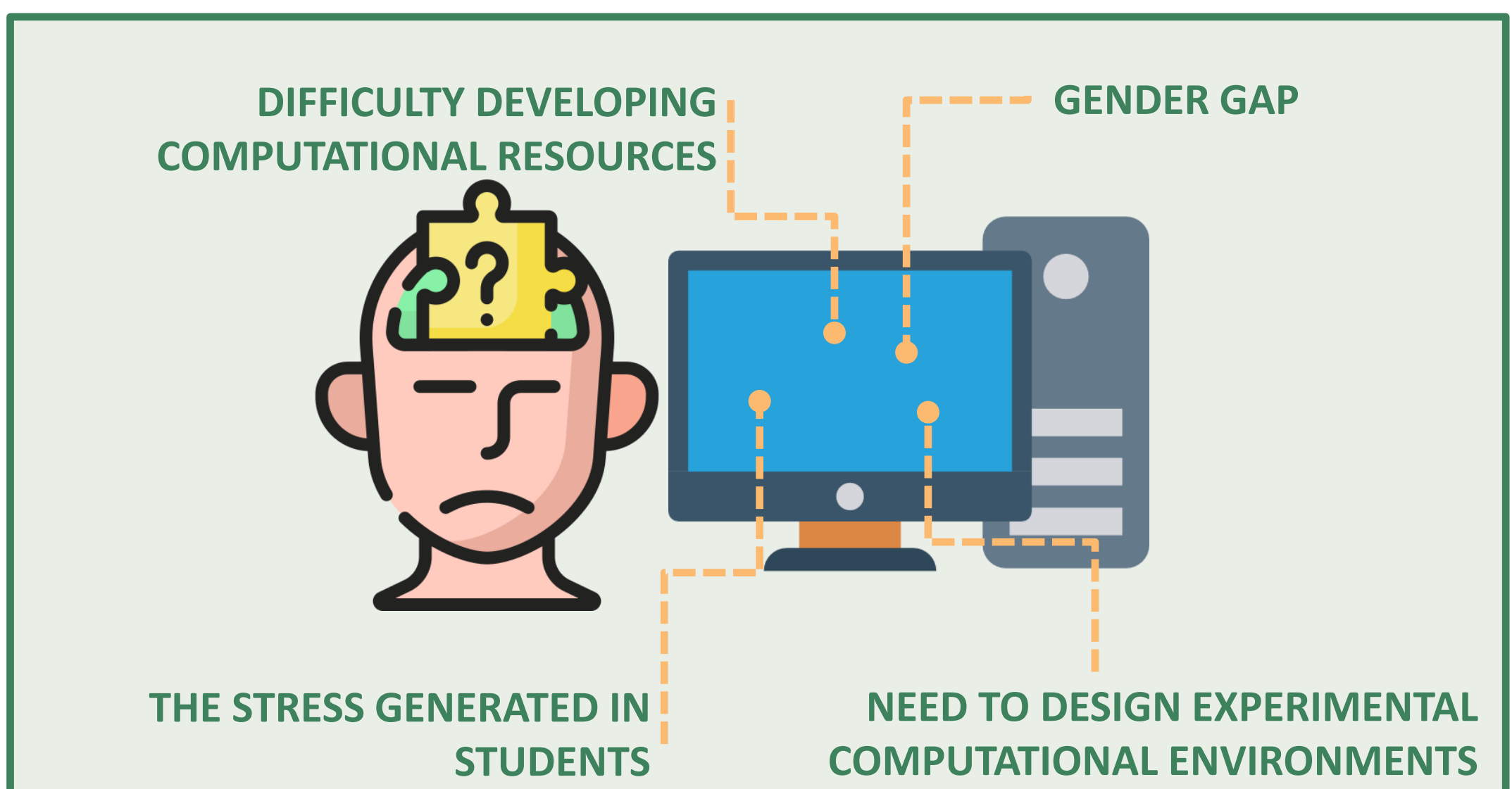
A quantitative, descriptive, and correlational study was conducted with **Latin American university engineering professors** to analyze their perceived digital competence, assessment of the didactic use of ICT, and the impact of the COVID-19 pandemic on the frequency of ICT use in teaching. The final sample consisted of **539 professors** who completed the questionnaire, selected from **716 faculty members** who had previously participated in a training session on the didactic use of ICT.

### RESULTS & DISCUSSION

The COVID-19 pandemic caused a **general increase in ICT use** among engineering professors, but with clear differences by gender and university tenure. The highest increase was observed in female professors from private universities, while the lowest increase occurred in female professors from public universities.



These differences are explained by **structural challenges in engineering education**, including the difficulty of developing computational resources, the need for experimental and simulated environments, and the stress generated by remote teaching. The results highlight the importance of institutional context and the need for targeted ICT training policies, especially to reduce gender gaps in public universities.



### CONCLUSIONS

- Engineering professors report intermediate digital competence, but a high valuation of ICT for teaching.
- The COVID-19 pandemic significantly **increased ICT** use in all teaching activities.
- This increase had a homogenizing effect on ICT use, but not equally across groups.
- **Gender and university tenure strongly condition ICT adoption**: Female professors increased ICT use more than males overall while private universities showed greater and more equitable digital integration than public ones.
- Results highlight the need for continuous, pedagogically oriented ICT training, with gender-sensitive strategies, especially in **public universities**.