

# Towards bridging the digital divide in Brazil: advancing learning opportunities with unplugged artificial intelligence, augmented intelligence, and learning analytics





Núcleo de Excelência em Tecnologias Sociais



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- Intelligent Tutoring Systems
- Augmented Intelligence in Education
- Digital transformation in educational public policies
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    er=H4fYGsIAAAAJ&hl=pt-BR











# Towards bridging the digital divide in Brazil: advancing learning opportunities with unplugged artificial intelligence, augmented intelligence, and learning analytics







## Work across a broad range of programs and policies





## Lines of action





## Lines of action





## Work across a broad range of programs and policies



















## Learning Recovery Approach





# Develop reading, math, and writing skills of the students



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## Learning Recovery Approach

## FIGURE 1 **SCHOOLS WITH INTERNET ACCESS**

Total of schools (%)







## **TEACHERS AND REMOTE LEARNING EXPERIENCE (MAY, 2020)**

Total of teachers (%)

Remote learning experience	Total	Preschool	Basic Education I (initial years)	Basic Education II (final years)	High School
Rate of teachers without remote teaching experience	88%	94%	91%	85%	81%
Rate of teachers who did not feel prepared for remote teaching	84%	89%	86%	80%	77%

Fonte: Source Península, 2020



# How to improve the <u>writing skills</u> of K-12 students without increasing the burden on teachers and considering the social inequalities of the country?





## Status quo: Human and centralized model



## Problems with the model

- High cost with scanners or mail service
- High cost with evaluation of the essays
- Teacher training to use the system
- Teachers complaining about system usability
- Time-consuming (around 4 months to receive the essays back)
- No further support

# Proposed approach: Hybrid Human-Al model

Students write their essays





The system automatically evaluate the essays of the students. It takes around 3 to 5 minutes to evaluate one essay

Assessed essays are delivered to 3 the App Assess Assess Assess Assess Assess Assess Assess

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## AIED Unplugged: Leapfrogging the Digital Divide to Reach the Underserved

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Abstract. Artificial Intelligence in Education (AIED) is a driving force to improve education. Nevertheless, policymakers from the Global South fear that AI will increase the digital divide and reduce the opportunities for students in these regions to thrive. To address this problem, we analyzed the past 30 years of data on four aspects of the digital divide. Then, based on these findings and a series of discussions with stakeholders (e.g., policymakers), we proposed the concept of *AIED Unplugged*. An approach to creating AI-based educational technologies that do not require changes in current school settings (e.g., infrastructure), do not rely on stable internet access, and do not ask for digital skills to use them. We applied this concept to redesign an education policy in Brazil to help students improve their writing skills. Our results show a reduction in time, cost and complexity to running the policy, and a positive impact on more than 500,000 students in 7,000 schools in the country.

Keywords: Global South  $\cdot$  public policy  $\cdot$  educational technology.



To appear: AIED 2023



# How to improve the <u>math skills</u> of K-12 students without increasing the burden on teachers and considering the social inequalities of the country?





## Math resolution problems in real-world settings







Luckin, R; Holmes, W; (2016) Intelligence Unleashed: An argument for AI in Education. UCL Knowledge Lab: London, UK



## Timeline



## Continued evolution of the platform and impact analysis

Continuing development of the ITS, including multiplication and division operations

Pilot – Sep

04

System version with sum and subtraction

annotation for training the algorithms

Image collection -

June

Image collection and

Usability Pilot -

May Evaluation of program

flow



## Ongoing and open research problems

- How to reduce access barriers to vulnerable students in adaptive learning systems?
- How to augment teachers (humans in the loop) to provide adaptive learning for students?
- How can data about learners be analyzed and presented so that teachers can be empowered to assist?
- How to give individualized feedback to "unplugged" students?
- How to evaluate (quantitatively and qualitatively) unplugged approaches with teachers and students?
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MAY 2023

We hope to collaborate with you and work together to use AI, Augmented Intelligence and learning analytics to reduce education inequalities through partnerships and joint projects.

## Special Issue at the International Journal of Artificial Intelligence in Education

# Call for Papers: Special Issue on AIED in the Global South

## **Guest editors**

- Ig Ibert Bittencourt (Federal University of Alagoas; Brazil; Harvard Graduate School of Education, US)
- Maria Mercedes Rodrigo (Ateneo de Manila University, Philippines)
- Yu Lu (Beijing Normal University, China)
- Cesar Collazos (Universidad del Cauca, Colombia) ·
- Diego Dermeval (Federal University of Alagoas, Brazil)
- Paul Prinsloo (University of South Africa, South Africa)
- Seiji Isotani (Harvard Graduate School of Education, US)

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