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Conhecimento, Dados e Inteligência Artificial na Educação

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Artificial Intelligence and the new educational challenges

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Vitor Santos brief presentation

- Assistant Professor @ NOVAIMS

- Former Invited Professor @ UM & UTAD

- Former Microsoft Portugal Academic Computer Science Program Manager

- Main areas of interest:
  - Artificial Intelligence & Information systems & Culture
  - Creativity and innovation in Information Systems
  - Software Engineering
  - Data Science Engineering
  - Information systems architectures

- Coordinated > 270 MSc

- Scientific Indexed publication > 160

- Coordinated 6 PhDs (ongoing 11)

- 45 Technological Project

AI Podecast

Building The Future - AI Portugal Podcast | Podcast on Spotify

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 https://www.novaims.unl.pt/pt/a-nova-ims/docentes/d/22
https://www.scopus.com/authid/detail.uri?authorId=49864419600
https://scholar.google.pt/citations?user=n5PoyL0AAAAJ&hl=en

One of my good friends, Luis Pancada Fonseca, used to say:

There are two things we can hardly learn in totality:

How to Get Older and How to Educate !

- Understanding different learning styles
- Creating interesting lesson plans that fit the curriculum
- Managing behavior in the classroom
- Communicating effectively in the classroom
- Managing difficulties with student engagement (isolation and demobilization)
  - Motivating students not to stay at home
- Giving personalized support to those who need it
- Encouraging collaboration between all players
- Communicating with with pressure from school administrators
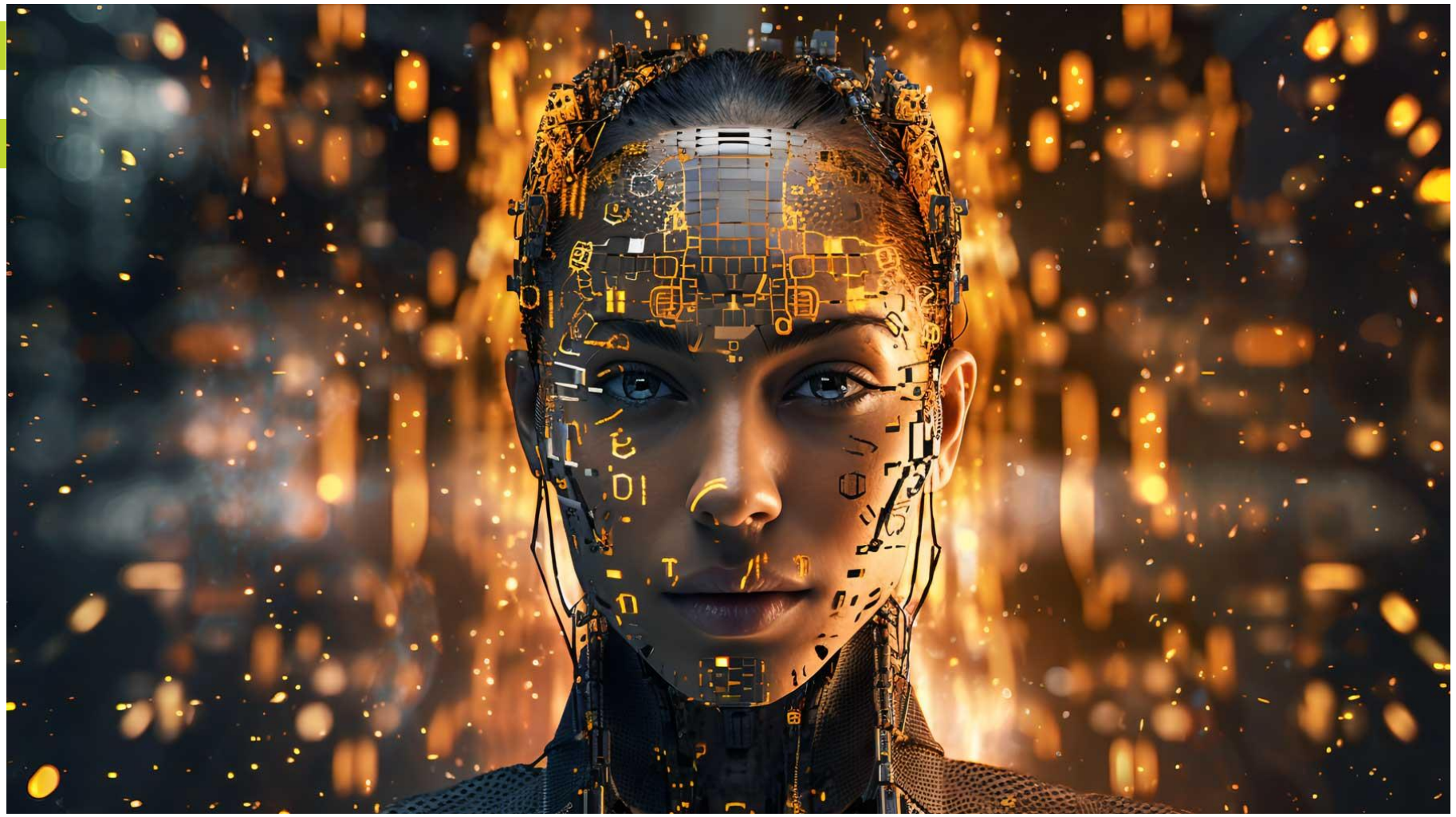- Managing time-consuming administrative work
- Burnout
- ….

- Staying up to date with learning technology
- Focusing on the content while managing the technology(s)
  - Attend to students in the classroom and online
  - Sharing files and materials online, sometimes, during class
  - Easy sharing of unauthorized recorded lessons
  - Dealing with a variety of tools and technical platforms /eg: Moodle, …)
  - Dealing with AI and, in particular, Generative AI
- More difficulties with student involvement (isolation and demobilization) - still as a result of the COVID19 pandemic
- ….

When it comes to challenges, in education one stands out for its disruptive power -->

- **How to deal with AI (namely with ChatGPT like tools)**
  - The new role of the teacher/trainer
  - New assessment approaches
  - Ensure focus on the subjects, and avoid the degradation of the approach of the subjects from the point of view of the quality and the scientific rigor
  - To guarantee the rhythm of presentation of the subjects and the fulfillment of the course plan
  - Contribute with key contents (in competition with AI produced contents)
  - …..

- and at the same time: **How to stimulate information search by promoting self-learning and discovery (using this new available technologies)**

New challenges for educators - brought by AI

Source: Before and After AI: Education - ADAAS

In the past ..

- We ask the student to develop a certain topic. He/she researches on the Internet, summarizes what was asked, writes the text, develops a presentation with illustrative photos, and delivers it in a few weeks.

- These times are gone

- Now it is different...

With the help of Generative Artificial Intelligence this project would be done differently →

- The student asks ChatGPT (for instance) to generate an essay on the topic.
- Develops the presentation in a synthetic presentation generator.
- Generates illustrative images using synthetic image generators.
- Uses a synthetic audio generator to record the presentation.
- Generates a video on the topic using a synthetic video generator.
- Generates a song for the project using a synthetic music generator.
- Generate an Avatar using a synthetic avatar generator.

In less than 60 minutes the project would be ready .

Adapted from: Source: https://www.linkedin.com/pulse/o-impacto-do-chatgpt-na-educa%C3%A7%C3%A3o-jos%C3%A9-antonio-ribeiro-neto/?originalSubdomain=pt

How do we deal with this?

- How to take advantage of these tools instead of banning their use?
  - This has been a major dilemma for schools and educators with generative AI technology

- This can lead to content bias, increased plagiarism & cheating methods, and have copyright and ethical implications

- Also, it create the fear that students by using these tools & resources, in the long term will lose the ability of <u>critical thinking and generating their own arguments</u> (will we produce a new kind of zombies ?)

A story about a psychologist and his dog

The learner also has responsibilities in the teaching-learning process

Teachers and all other stakeholders must make an extra effort to motivate students to learn

= New teaching strategies ! Focusing on curiosity, on the personal benefit of learning, on personal development, on citizenship, and on not making people dependent on an AI (with dubious intentions?) owned by a small group of companies

The need of AI literacy

Some other suggestions....

- Teach students how to use these tools in ethical and productive ways

- Adapt assessment methods to encourage student creativity, emphasize problem solving and critical thinking, and use **PBL** and **PBL** strategies

- Develop critical thinking skills - learners can use GenAI to check and validate answers and be held accountable for any inaccuracies the chatbot posts
  - Check if the output is correct, remember that Generative AI is not perfect, and you need to critically assess everything that is include in the docs
  - GenAI is a tool, never the author
  - Ask students if they used GenAI , and ask how they used, and on which part
  - Doubt of the results, verify using the data provided by the student

- Use GenAI as a tutor or co-author to support the teacher's curricular and pedagogical activities, producing engaging and interactive content, creating lesson plans, preparing lessons, translations, grading schoolwork, ….

However, AI doesn't promise only difficulties to education ....

Artificial Intelligence – The role in education

- AI promises to enhance education at all levels, especially by providing <u>personalization at scale</u>
  - AI improves how students learn
  - Educational personalization will increase
  - New jobs will emerge that are currently unimaginable
  - Blur the line between formal classroom training and self-paced learning
  - Opportunities for remote areas and adult retraining
- "Artificial Intelligence and Life in 2030" ?
  - Teaching Robots
  - Intelligent Tutoring Systems and Online Learning
  - Personalized Massive Open Online Courses (MOOCs)
  - Affective Computing
  - Adaptive Group Formation
  - Gamification and Game Based Learning Environments
  - Learning Analytics
  - …..

https://open.spotify.com/episode/2IJ13J8Nwbq88suF6VUalf
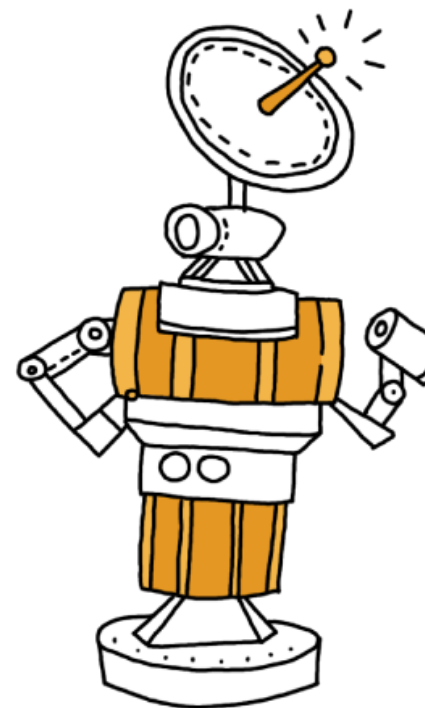
Together with other forms of AI, ChatGPT could improve the process and experience of learning for students

Role[6]	Description	Example of implementation
Possibility engine	AI generates alternative ways of expressing an idea	Students write queries in ChatGPT and use the Regenerate response function to examine alternative responses.
Socratic opponent	AI acts as an opponent to develop and argument	Students enter prompts into ChatGPT following the structure of a conversation or debate. Teachers can ask students to use ChatGPT to prepare for discussions.
Collaboration coach	AI helps groups to research and solve problems together	Working in groups, students use ChatGPT to find out information to complete tasks and assignments.
Guide on the side	AI acts as a guide to navigate physical and conceptual spaces	Teachers use ChatGPT to generate content for classes/courses (e.g., discussion questions) and advice on how to support students in learning specific concepts.
Personal tutor	AI tutors each student and gives immediate feedback on progress	ChatGPT provides personalized feedback to students based on information provided by students or teachers (e.g., test scores).
Co-designer	AI assists throughout the design process	Teachers ask ChatGPT for ideas about designing or updating a curriculum (e.g., rubrics for assessment) and/or focus on specific goals (e.g., how to make the curriculum more accessible).
Exploratorium	AI provides tools to play with, explore and interpret data	Teachers provide basic information to students who write different queries in ChatGPT to find out more. ChatGPT can be used to support language learning.
Study buddy	AI helps the student reflect on learning material	Students explain their current level of understanding to ChatGPT and ask for ways to help them study the material. ChatGPT could also be used to help students prepare for other tasks (e.g., job interviews).
Motivator	AI offers games and challenges to extend learning	Teachers or students ask ChatGPT for ideas about how to extend students' learning after providing a summary of the current level of knowledge (e.g., quizzes, exercises).
Dynamic assessor	AI provides educators with a profile of each student's current knowledge	Students interact with ChatGPT in a tutorial-type dialogue and then ask ChatGPT to produce a summary of their current state of knowledge to share with their teacher/for assessment.

ChatGPT and artificial intelligence in higher education: quick start guide - UNESCO Digital Library

Image created by UNESCO IESALC

[ChatGPT and artificial intelligence in higher education: quick start guide - UNESCO Digital Library](#)

Before & after

- **Before AI:**

- Curriculum Development: Based on traditional methodologies and manual research.

- Student Performance Tracking: Periodic testing and manual grading.

- Learning Resources: Limited to physical textbooks and teacher-created materials.

- Student Support: Handled by counselors and teachers with limited bandwidth.

- **After AI:**

- Curriculum Development: AI suggests personalized learning paths.

- Student Performance Tracking: Real-time monitoring and adaptive assessments.

- Learning Resources: AI curates and updates digital learning materials.

- Student Support: AI-powered tutoring and support systems.

Source: Before and After AI: Education - ADAAS

How can we take advantage of this (brave) new world for the benefit of education?

Finally !!

Some challenges
&
Research Opportunities ….

Some Research Topics ...

- affective techniques for engagement and motivation
- adaptive and intelligent multimedia and hypermedia systems
- agent-based learning environments
- assessment and testing of learning outcomes
- authoring systems and shells for AIED systems
- cognitive tools for learning
- computer-assisted language learning
- computer-supported collaborative learning
- culturally aware learning systems
- educational robotics
- embedded training systems
- empirical studies to inform the design of learning environments
- environments to support the learning of programming
- generative AI & education
- help and advice systems
- intelligent courseware for computer-based training
- embedded interface agents

Some Research Topics ...

- intelligent tutoring systems
- knowledge representation for instruction
- learning analytics
- modelling metacognitive skills
- modelling pedagogical interactions
- natural language interfaces for instructional systems
- networked learning and teaching systems
- OLMs, Open Learner Models
- performance support systems
- qualitative reasoning in simulations
- situated learning and cognitive apprenticeship
- student modelling and cognitive diagnosis
- support for knowledge building communities
- tools for administration and curriculum integration
- tools for the guided exploration of information resources
- visual, graphical and other innovative interfaces

2nd Workshop on AI in Education (AIEd 2025)

https://worldcist.org/index.php

I'd like to end with a question