



P.Pic'24

PORTO

PEDAGOGICAL INNOVATION CONFERENCE



Book of abstracts

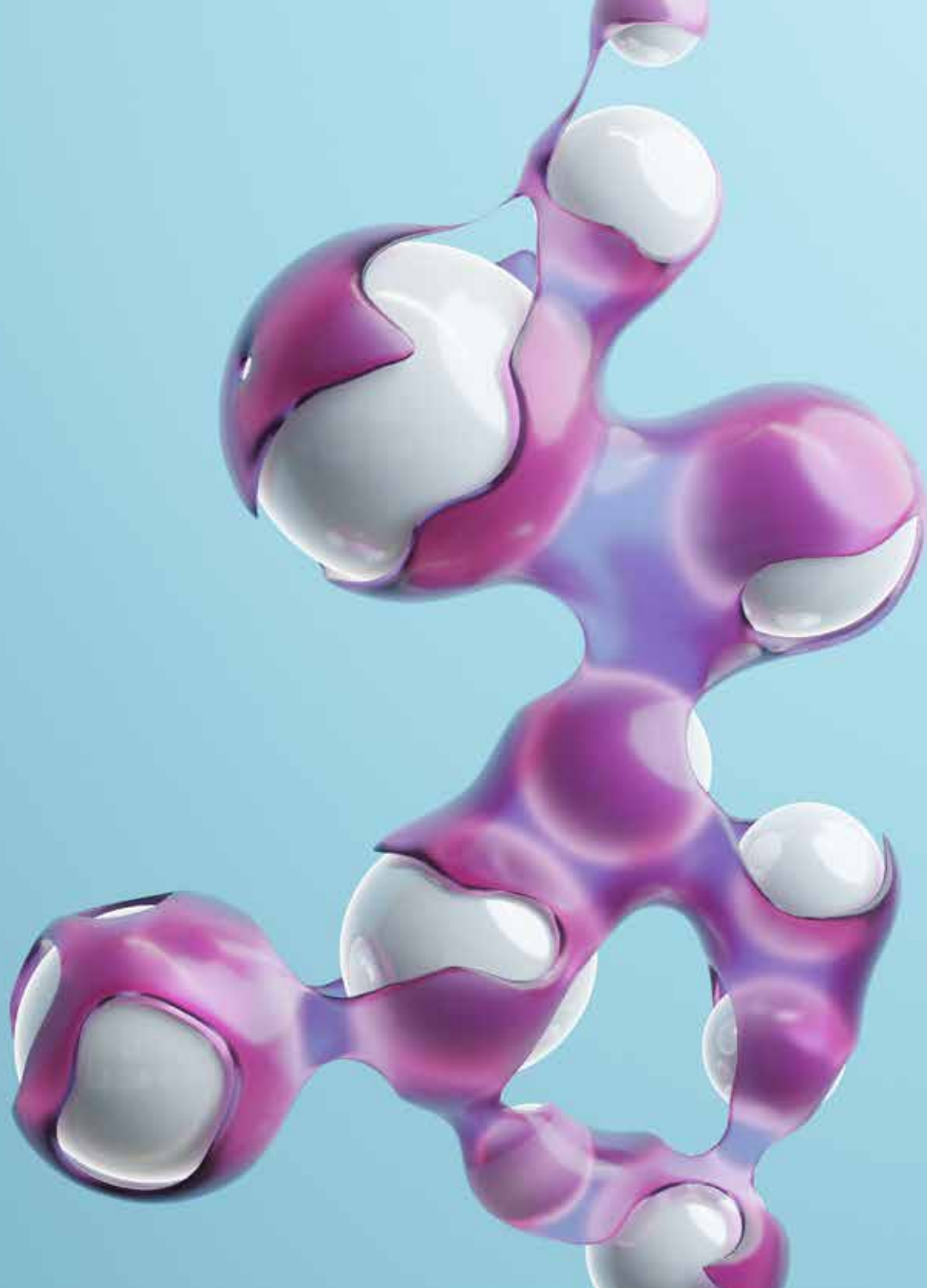
P.PORTO

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TITLE

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Abstracts

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 Prologue

P.PIC'24 is an international scientific event, organized by the Pedagogical Innovation Center of the Polytechnic of Porto. The extraordinary success of P.PIC'23, translated into more than two hundred participants, four guest speakers of recognized national and international merit and a round table, under the theme “New approaches, languages and resources for the 21st century Education”, strongly supports this new edition.

Like the previous one, its objective is to bring together students, teachers and researchers to share, discuss, reflect and develop their ideas on topics related to Innovative and Emerging Approaches in Education. It will offer excellent opportunities for intercultural exchange, as well as academic and personal development.

The two-days program conference includes keynote lectures, parallel sessions, a poster session, and networking moments, in particular a Round Table in “ChatGPT, AI and the future of Education: what is around the corner?”. Thus, offering excellent opportunities for intercultural exchange, as well as academic and personal development.

P.PIC'24 takes place from the 4th to the 5th of July 2024, at the Instituto Superior de Engenharia do Politécnico do Porto.

The General Chairs.

—o Plenary sessions o—



Susanna Calkins

(Northwestern University)

Inclusive Teaching (Creating an inclusive course and learning environment)

Abstract

What does it mean to make a course inclusive? How can we cultivate a learning environment where students are treated equitably and feel supported in their learning? In this interactive session, participants will reflect critically on how they approach and design their courses, questioning the assumptions and biases they bring to how the course “should” be taught, and what students “should” be able to do. Using a course equity map and a syllabus assumption activity, participants will reflect critically on who and what is being represented, highlighted or ignored in the curriculum, what aspects of a course could be more equitable and inclusive, and how the “hidden curriculum”—those aspects and expectations of a course only known and understood to some students—may be fostering inequity in their courses.

Bionote

Susanna Calkins, PhD directed faculty initiatives at the Searle Center for Advancing Learning and Teaching at Northwestern University for almost two decades, and is now the founding Director of the Nexus for Faculty Success at Rosalind Franklin University of Medicine and Science in North Chicago in the United States. She served as a co-PI on the NSF-sponsored Inclusive STEM Teaching Project, an open online course that has served several thousand instructors across the United States, and led the 3-week Inclusive Teaching Practicum for instructors across Northwestern. She helped write the Inclusive Teaching Principles at Northwestern, has also facilitated multiple workshops around inclusive teaching and inclusive course design, and is currently leading a full-scale inclusive teaching initiative at RFUMS. She has presented on Inclusive Teaching at several national conferences, including at American Association of Colleges and Universities, and the POD professional development conference, and the INED conference for new faculty developers. She has co-authored two academic books—Learning and Teaching in Higher Education: The Reflective Professional (Sage, 2009) and Reflective Teaching (Bloomsbury, 2020). Her third co-authored book— Reflective Doctoral Education (Bloomsbury, 2025)-is in development and will focus on inclusive pedagogy in graduate education.



José Diego-Mantecón

(University of Cantabria)

Supporting Teachers for Effective STEM Project Implementation in the Classroom

Abstract

This presentation addresses the issue of implementing STEM projects in the classroom to promote the development of mathematical competencies such as modeling and intra-mathematical connections, as well as a positive attitude towards this discipline. It describes the obstacles faced by mathematics teachers who are encountering this practice for the first time. Finally, recommendations are provided for teachers to successfully promote mathematics through STEAM projects. These recommendations include ongoing teacher training through a community that provides guidance both inside and outside the classroom.

Bionote

Jose M. Diego-Mantecón earned his M.Phil. and Ph.D. degrees in mathematics education from the University of Cambridge (UK).

With extensive experience in STEM research and international project management, he has contributed to various initiatives such as KIKS (Erasmus +), STEMforYouth (H2020), EduLarp (Erasmus+), STEAMTeach (Erasmus), and AutoMath (Erasmus +). He is the founder of the Open STEAM Group and currently serves as the Director of the Mathematics, Statistics, and Computation (MATESCO) Department at the Universidad de Cantabria.



Maria Alfredo Moreira

(University of Minho)

Teaching Competences in Higher Education

Abstract

As humorously pointed out by Barnett more than 25 years ago (1997), “Give me the easy life, give me research; let me not be troubled by teaching” (p. 21), teaching in higher education is often a neglected aspect of research and policy and too often a disinvestment on the part of teachers and institutions. Research is often prioritised, as both staff and institutions struggle to survive in an increasingly competitive international higher education space. On the other hand, teaching is complex and multidimensional, as, like in other teaching contexts, higher education teachers need to master a wide set of competences and respond to an increasingly diverse student population.

In this paper, I will address the results of three international studies, under the coordination of UMinho, drawing implications for the pedagogical profile for teaching in higher education. I will look at the competences required, based on 2021 study on teachers' motivation for teaching, carried out in Portugal; on a 2023 systematic review study that analysed 51 international empirical studies carried out between 2009 and 2019; and on an ongoing study, on teachers' perceptions of their competence, carried out in Portugal, Brazil, and Spain.

Bionote

Maria Alfredo Moreira is an Associate Professor at the Institute of Education and member of the Research Centre on Education at the University of Minho, Portugal. She has a PhD in Educational Sciences with a focus on Language Education. She has been a visiting Professor in several universities in Europe, Brazil, and in the USA. She served as Vice-Dean of the Institute of Education, as President for the Pedagogical Council, and Director of the Portuguese Journal of Education. Currently she is the Director of the Master in English Language Teaching at Primary School and Coordinator for the Teaching Practice of the Masters in Teaching at the UMinho. She has participated in several national and international projects on higher education, with a focus on multilingual and multicultural education, pedagogy, teachers' motivation, and competences. Her research interests focus on pedagogy at the university, social justice teacher education, instructional supervision, and foreign/ second language education.



Filipe Portela

(University of Minho)

Pedro Rodrigues

(P.PORTO-ESE)

Disruptive Teaching and Learning

**Approaches: from Augmented/
Virtual Reality to Artificial Intelli-
gence Experiences**

Abstract

On the one hand, this conference aims to empower teachers to explore the transformative potential of generative artificial intelligence (GAI) in the classroom by providing a comprehensive overview of GAI and offering practical tips on how to use its tools and techniques. Teachers will learn to create innovative, personalized, and engaging educational content, from presentations and videos to validating content developed by students. The ultimate goal is for educators to understand GAI's potential and integrate it into their pedagogical practices, enhancing the learning experience and promoting creativity and critical thinking.

On the other hand, during the plenary session, we will present a historical perspective on the evolution of technological resources, current state-of-the-art applications of immersive technologies in education, and a special emphasis on initial teacher training. Case studies will illustrate the transformation of educational scenarios using Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), and other three-dimensional visualization systems, such as portable domes. Platforms for obtaining and developing content for immersive technologies will also be introduced.



Bionote

Carlos Filipe Portela graduated from the University of Minho, where he earned a master's in engineering and management of information systems and a PhD in Technologies and Information Systems. He is an integrated researcher at the Algoritmi Research Centre and a Visiting Assistant Professor at the University of Minho's School of Engineering, where he teaches and supervises students in the area of information systems.

Filipe Portela has published more than 200 articles on topics such as artificial intelligence, decision support systems, gamification, pervasive systems, business intelligence, data mining, and knowledge discovery in databases. He holds a Data Science patent and leads several Research, Development, and Innovation (R&D&I) projects.

As an editor and author, Filipe Portela has written three technical books, edited three scientific books, and edited ten journal special issues. He has also chaired and co-organized workshops and conferences and served on editorial boards of scientific journals.

In 2018, he founded IOTech—Innovation on Technology, focusing on applying technical-scientific knowledge to benefit society. As the Executive Director and Director of Innovation and R&D, he spearheads the development of transformative technologies and solutions for industry and cities. He is also

the vice president of AEBA—Associação Empresarial do Baixo Ave, in charge of Digital Transformation and Artificial Intelligence.

Pedro Correia Rodrigues holds a PhD in Biology and is completing a second PhD in Didactics of Science and Technology. He is currently an Invited Adjunct Professor at the School of Education of the Polytechnic Institute of Porto (ESE-P.Porto), within the Technical-Scientific Unit of Mathematics, Sciences, and Technologies. Since 2015, he has taught and been responsible for various curricular units in the fields of Natural Sciences, Sustainable Development, and Educational Technologies, in Master's, Bachelor's, and Vocational Courses. He is also involved in continuous teachers training in STEAM Education subjects.

He is an Integrated Researcher at inED – Centre for Research & Innovation in Education. His research in Didactics of Science and Technology focuses on the use of digital fabrication, educational robotics, immersive technologies, microcontrollers, and sensors as pedagogical and epistemic tools in Natural Sciences teaching, both at the Basic Education and Higher Education levels. His research in Applied Biology focuses on Ecology, Biodiversity Management and species' spatial tracking.

—o Round Table o—



Exploring the Next Frontier: ChatGPT, AI, and Education's Future

David Carneiro

(P.PORTO-ESTG)

Eduardo Nunes

(Kendir Studios)

Inês Guimarães

(MathGurl)

Jaime Carvalho e Silva

(University of Coimbra)

Rodrigo Portela

(P.PORTO-ISEP)

—o Paper Presentations o—

Designing a first ever PhD program in a polytechnic HE business school

Clara Sarmento
(P.PORTO-ISCAP)

This paper describes a complex challenge in pedagogical innovation within higher education, specifically the curriculum design of a new Ph.D. program in Intercultural Studies for Innovation, in a business school of the Portuguese polytechnic subsystem. Research aims encompass the identification, evaluation, and implementation of cuBng-edge pedagogical strategies and mixed-methods, combining qualitative analysis of curriculum design processes, learning assessment and expected outcomes.

As globalization continues to reshape the academic landscape, the demand for professionals well-versed in intercultural competencies has intensified, especially within business companies. This study delves into the strategic integration of innovative pedagogical approaches to cultivate a learning environment that not only addresses the unique challenges of intercultural studies but also fosters critical thinking, collaboration, and adaptability with an actual impact in business and society.

Methodologically, the research involves extensive literature reviews, consultations with experts in intercultural studies, and iterative feedback loops with stakeholders, including business companies and associations, city councils, cultural foundations, partner overseas universities, and potential doctoral candidates. The integration of diverse pedagogical models – including tutorials, seminars, mentorships, case studies, practical application of knowledge in real seBngs, problem-based learning, project-based learning, as well as immersion in business, institutional and R&D environments – under an interdisciplinary framework, is systematically explored. Main findings relate to the impact of cocreative practices, personalized curricula, assessment by porLolios and the production of theses on societal themes identified by stakeholders on the doctoral candidates' development of intercultural competencies for innovation.

2

ChatGPT no Ensino Superior: O caso de um trabalho no âmbito de uma unidade curricular

Alexandra Costa (P.PORTO-ISEP);
Clara Viegas (P.PORTO-ISEPo);
Natércia Lima (P.PORTO-ISEP);
Amélia Caldeira (P.PORTO-ISEP)

Nos últimos anos temos sido confrontados com a vulgarização da utilização de ferramentas de Inteligência Artificial em vários domínios. Na educação, em especial no ensino superior, a realidade não é muito diferente. As opiniões quando à sua utilização tendem, contudo, a dividir-se. Por um lado, estão aqueles que defendem a sua utilização e consideram que o seu uso vem facilitar um conjunto de tarefas; por outro, estão aqueles que se sentem ameaçados pela sua utilização.

Nesta comunicação apresentamos o caso de um trabalho realizado no âmbito da unidade curricular de Comportamento Organizacional da licenciatura em Engenharia Informática. Trata-se de um trabalho opcional proposto aos alunos que pretendiam melhorar a sua nota. 83 alunos realizaram esta atividade.

A preocupação central deste trabalho, era demonstrar que o ChatGPT poderá ser utilizado desde que cumprindo os preceitos éticos, com espírito crítico e validação das fontes bibliográficas.

No final do trabalho, os alunos foram convidados a responder a um questionário que pretendia avaliar as percepções dos estudantes em relação a este trabalho e à utilização do ChatGPT em contexto escolar. Tratava-se de um questionário misto, que incluía questões respondidas através de uma escala de Likert e de uma questão aberta. O questionário foi difundido através do Google forms. 50 respostas válidas foram obtidas. Apresentaremos nesta comunicação os resultados obtidos através da análise quantitativa e da análise de conteúdo realizadas.

3

Estagiário-Monitor-Supervisor: pode esta tríade mudar para um círculo de comunicação ativo?

Diana L. Tavares (P.PORTO-ESS);
Ana Salgado (P.PORTO-ESS);
Catarina Castro (P.PORTO-ESS);
Cristina Baeta (P.PORTO-ESS);
Rosa Santos (P.PORTO-ESS);
Sónia Magalhães (P.PORTO-ESS)

Introdução: Os estágios são momentos significativos na formação dos estudantes, futuros profissionais de saúde. A Escola Superior de Saúde do Politécnico do Porto (ESS|P.Porto) tem desenvolvido um programa de formação pedagógica para os monitores de estágio com vários níveis e distintos formatos.

Nestas formações ficou latente a pertinência/utilidade de receber feedback por parte dos estudantes, sobre os diferentes estágios.

Objetivo: Aferir e analisar a perceção dos estudantes do 3o e 4o anos curriculares do CE em Fisiologia Clínica quanto ao estágio curricular, nas diferentes valências e serviços/ instituições.

Metodologia: A proposta de realização deste projeto foi previamente submetida à Comissão de Ética da ESS|P.Porto. O questionário elaborado na plataforma Microsom Forms,

anónimo e confidencial, procura mapear as dimensões pedagógicas associadas aos múltiplos desafios presentes nesta unidade curricular, que vão desde as relações com o monitor de estágio, equipa de profissionais, outros estagiários, utentes, até ao acolhimento, monitorização e feedback tão relevantes para a aprendizagem/evolução/progresso.

Resultados: A recolha de dados está prevista ocorrer entre abril de 2024 e o ano de 2026, sendo que este trabalho irá expor os primeiros dados obtidos para o presente ano letivo.

Conclusão: Com este estudo procuraremos introduzir melhorias nos anos seguintes em educação clínica, bem como calibrar os conteúdos para futuras iniciativas no âmbito da formação pedagógica.

4

Avaliação de Competências - Modelo para Avaliação da Evolução

Helder Rodrigo Pinto
(P.PORTO-ISEP)

As competências transversais são cada vez mais valorizadas pelas empresas recrutadoras. Estas competências são desenvolvidas ao longo da vida, mas também podem ser trabalhadas em contexto de formação profissional.

Ao longo de um percurso de formação é esperado que os estudantes adquiram novas competências técnicas, mas será que as competências transversais são desenvolvidas em paralelo? Este modelo tem como objetivo dar resposta a esta questão. Baseia-se em procedimentos de recrutamento e seleção e propõe a aplicação de instrumentos de recolha e medição de dados que possibilitem a avaliação de competências; bem como as fases de aplicação dos mesmos instrumentos; e ainda apresentada a análise e discussão dos resultados.

Para analisar os dados obtidos, este estudo usa metodologias qualitativas e quantitativas, de forma a conseguir complementaridade entre ambas e compreender melhor o cenário estudado.

No caso da avaliação das competências transversais, esta pressupõe a criação de um perfil de candidato através da definição de um conjunto de competências chave e respetivo comportamento esperado, recorrendo a dados atuais de competências procuradas pelas empresas na mesma área, sendo a avaliação efetuada de forma observável relativamente ao comportamento demonstrado, interação e atitudes, em dinâmicas de grupo.

5

TBL's impact on attendance at theoretical lectures: a case study in an engineering school

José Salgado Rodrigues
(P.PORTO-ISEP);
Marina Sousa (P.PORTO-ISEP)

The decline in student participation and involvement in classes, especially in lectures, is a concern for higher education institutions in many countries. Poor attendance can have negative consequences for academic performance and for the acquisition of fundamental skills. The aim of this study is to assess the impact on attendance in lectures after changing from the classic expository approach to the Flipped Classroom model combined with the Team-Based Learning (TBL) pedagogical

strategy. A quantitative approach was adopted, and the research method was a longitudinal case study (4 academic years) regarding a curricular unit with a large number of students at an engineering school. The data was obtained from the official platform for managing academic activities. The results show a significant increase in attendance at lectures after the introduction of the TBL pedagogical approach. These results are particularly useful for managers and teachers in higher education, as they show that the change to active methodologies can have a positive impact on attendance and the consequent usefulness of lectures, which is an important factor for the various stakeholders in higher education.

Formação de Educadores Ambientais: contribuições no Projeto Rio Doce Escolar do curso MOOC Legislação em Educação Ambiental

Marize Lyra Silva Passos (Federal Institute of Espírito Santo); Cloves Vicente Lins (Federal Institute of Espírito Santo); Isaura Alcina Martins Nobre (Federal Institute of Espírito Santo); Andressa A Oliveira (Federal Institute of Espírito Santo)

Após o rompimento da barragem de Fundão, na cidade de Mariana, em Minas Gerais, Brasil, foi criada a Fundação Renova que tem o objetivo de promover a reparação dos danos causados ao longo da Bacia Hidrográfica do Rio Doce. Entre as inúmeras ações financiadas por ela temos o Projeto Rio Doce Escolar que tem objetivo formar educadores ambientais nas cidades atingidas pela lama do desastre no estado do Espírito Santo, Brasil. Esta pesquisa pioneira e inovadora apresenta a construção e avaliação do curso MOOC Legislação em Educação Ambiental, destinado a cursistas que fazem parte de uma Formação Inicial e Continuada, da qual o referido curso é parte integrante. Trata-se de pesquisa aplicada, qualitativa, descritiva e participativa, que visa analisar as contribuições do curso na formação dos cursistas, futuros educadores ambientais. O curso foi desenhado com base no modelo ADDIE e contou com a participação de 39 cursistas. A coleta de dados para a avaliação e a opinião dos cursistas foram coletadas por meio de

um questionário e no diário de aprendizagem dos cursistas, acessíveis na sala do curso disponibilizada na plataforma Moodle. Os instrumentos de coleta de dados revelaram uma avaliação positiva dos materiais e atividades do curso, embora alguns tenham preferência por vídeos mais detalhados e textos mais curtos. A maioria dos cursistas expressou total concordância com o conteúdo e organização do curso, embora algumas sugestões de refinamento tenham sido apontadas. A maioria dos participantes afirmou que o curso atendeu ou superou suas expectativas, que este ajudou em seu processo de aprendizagem e reflexão sobre o tema e a maioria atribuiu uma nota elevada ao curso. Esses resultados indicam uma satisfação geral dos cursistas com a experiência proporcionada pelo o curso.

Uso de História em Quadrinhos na Formação de Professores: estratégia Inovadora para integração de tecnologia na educação

Marize Lyra Silva Passos (Federal Institute of Espírito Santo); Mariella Berger (Federal Institute of Espírito Santo)

Aliar o uso de tecnologias nas escolas por meio de ferramentas digitais com propósitos pedagógicos demonstra impactos significativos no desempenho dos alunos, assim como na formação e planejamento de aulas dos professores. Esse processo requer uma abordagem criteriosa no uso da tecnologia, exigindo o desenvolvimento de um conhecimento complexo, multifacetado e contextualizado. Esta pesquisa delinea as estratégias adotadas para integrar três componentes fundamentais dos ambientes de aprendizagem - conteúdo, pedagogia e tecnologia - com o objetivo de garantir o uso efetivo de recursos tecnológicos com fins pedagógicos. Trata-se de um estudo aplicado, qualitativo, descritivo e participativo, embasado no framework TPACK (Technological Pedagogical Content Knowledge). Conduzida com 29 cursistas da disciplina Metodologias de Ensino de Ciências de um curso de

mestrado profissional voltado para a formação de professores de ciências e matemática em uma instituição pública de ensino superior brasileira. A coleta de dados foi realizada por meio dos fóruns de discussão na sala da disciplina disponibilizada na plataforma Moodle. Os instrumentos de coleta de dados revelaram uma avaliação positiva por parte dos alunos referente ao uso de histórias em quadrinhos como ferramenta que possibilitou a estes demonstrarem evidências de sua aprendizagem por meio da produção de pôsteres, descrevendo o processo de construção de suas histórias em quadrinhos, aceitos para publicação em um evento científico. Esses achados destacam não apenas a satisfação dos cursistas com a experiência proporcionada pelo uso da tecnologia como recurso pedagógico, mas também sua eficácia no processo cognitivo e na construção de significados.

8

The Project Trauma-informed Practice for Workers in Public Service settings (TIPS): new strategies for the same old objective

Artemisa Dores (P.PORTO-ESS); Marina Letica-Crepulja (University of Rijeka); Regina Silva (P.PORTO-ESS)

Many professionals are confronted in their practice with clients who show post-traumatic symptoms (PTS). 'Trauma-informed practice' helps professionals to recognize, understand, and appropriately respond to the effects of trauma. This work presents the 'Trauma-Informed Practice for Workers in Public Service SeBngs' – TIPS (Erasmus+). The project sought to: (1) increase awareness among professionals about the occurrence of PTS, (2) equip them with skills to identify PTS and reduce barriers related to discrimination, (3) improve the care and support provided, and (4) reflect on innovative pedagogical strategies. This was a distance learning

experience aimed at professionals from various sectors, namely education. The project is based on training through new digital spaces and learning tools, combined with strategies of storytelling and teaching practices based on narrativization. The project includes as final outputs (1) guidelines; (2) a catalogue; (3) a resource pack; (4) an interactive e-plaLorm; and (5) a mobile application. The diversity of learning opportunities and formats aimed to promote new and improved learning strategies, respecting personal preferences and diversity of learning styles, thus ensuring new paths to the 'old' objective of successful learning.

9

Emotions unlocked: Transforming learning through the heart's lens

Diana Dias da Silva (P.PORTO-ESS); Áurea Carvalho (IUCS-CESPU); Rui Azevedo (IUCS-CESPU); Liliana Teixeira (P.PORTO-ESS)

The topic "Emotion and Learning" presents a fascinating and rich area for exploration, especially in the context of pedagogical innovation. It ties into the broader understanding of how emotions can significantly impact learning processes, engagement, and the retention of information. This paper explores the theoretical frameworks, empirical studies, and practical applications of the role of emotion in shaping education. It covers

aspects such as the neuroscience of emotion and learning, the roles of positive and negative emotions in the pedagogical process, the connection between emotion and memory, emotional intelligence in education, teacher-student emotional dynamics, cultural and societal influences on emotion and learning, innovative emotional learning practices, and technology-enhanced emotional learning. By weaving together insights from diverse fields, we herein underscore the transformative power of emotional engagement in education, advocating for a more empathetic and nuanced approach to teaching that considers emotion as crucial to enhancing learning outcomes and the educational experience as a whole.

Cooperative Learning in the Development of Critical and Creative Thinking: report of a learning activity using Cooperative Graffiti

Maria da Graça Magalhães (University of Trás-os-Montes and Alto Douro & CIIE – Center for Educational Research and Intervention at the University of Porto), Helena Santos Silva (University of Trás-os-Montes and Alto Douro & CIIE – Center for Educational Research and Intervention at the University of Porto), José Pinto Lopes (University of Trás-os-Montes and Alto Douro & CIIE – Center for Educational Research and Intervention at the University of Porto)

This communication is part of a doctoral project whose main objective is to understand the effects of cooperative learning on the development of Critical and Creative Thinking in Science, Technology, Engineering, Arts and Mathematics (STEAM) students, with the aim of providing evidence to support pedagogical approaches in line with the Profile of Students Leaving Compulsory Schooling. The aim is to report on one of the cooperative activities implemented as part of this project. The activity involved 70 students from three classes in a secondary school in the north of Portugal and was implemented using the Cooperative Graffiti method. The students worked in the classroom in small cooperative groups to develop

and explore a problem question within the STEAM curriculum. They carried out detailed research, organized their ideas using mind maps and presented their work in an innovative way, using different digital and AI tools. The results obtained, although provisional, seem to indicate that the methodology used not only stimulated involvement and cooperation, but also developed students' abilities and dispositions to think critically and creatively about real-life problems.

Development of an indoor air quality report wizard for improved training of environmental health technicians

João Cavaleiro Rufo (P.PORTO-ESS)

Environmental health technicians (EHT) play an important role in the monitoring of indoor air quality (IAQ). Hence, proper instruction of these professionals is paramount to assure the development of valid and rigorous IAQ reports. Unfortunately, IAQ is one of the topics that most EHT struggle to learn, often failing to emit valid reports. Therefore, novel pedagogic approaches are needed.

The aim of this case-control study was to develop an IAQ report wizard and assess its efficacy in terms of EHT training, when compared to the traditional teaching strategies.

An online IAQ reporting wizard, comprising a set of tools that assists the reporting process and automates data analysis, was developed in R. A total of 53 EHT participating in the IAQ course

at the Institute of Public Health were invited to participate. These students were enrolled in two different course editions: control (17 EHT), lectured under the traditional pedagogic plan; and intervention (36 EHT), instructed using the developed IAQ report wizard. At the end of the course, students were given a theory test comprising 30 multiple-response questions about IAQ (test A), and a practical test to build a valid IAQ report (test B). Test A was scored from 0 to 20 points, with all questions having the same weight. Test B was scored based on the number of inconsistencies, with a report being considered valid only when no inconsistencies were found.

Students in the intervention group scored significantly higher in the test A vs the control group (table 1). Concordantly, there were significantly less inconsistencies in test B in the intervention group. However, there were no significant differences in terms of valid reports between the two groups. The use of the IAQ report wizard significantly improved the students' performance in both the theory test and the practical report. However, the number of valid reports was still diminished, suggesting that further effort is needed to ensure the proper training of EHT.

Enhancing Integration and Interoperability in Educational Software: A Cost-Effective Approach for Integrating Diverse Web Components with Learning Platforms

Socratis Karkalas (University of Derby)

As educational technology continues to evolve, the need for seamless integration and interoperability between diverse web components and learning platforms becomes increasingly important. However, existing standards often fail to address emerging challenges, particularly when it comes to integrating non-compliant

web components with established platforms. In this paper, we propose a novel method aimed at addressing these issues in a cost-effective and highly efficient manner. We present a prototype along with preliminary evaluation results and we discuss future steps and the prospect of using it in a more standardised context.

A web-based Oscilloscope Simulator for e-learning

João Ferreira (University of Porto);
André Rocha (P.PORTO-ISEP);
Mário Alves (P.PORTO-ISEP);
Paulo Oliveira (P.PORTO-ISEP)

We report on the design and preliminary user experience of a software tool for teaching/self-learning of the basic operation and functionality of an Oscilloscope and Signal Generator, in the context of the TCIRC course on fundamentals of electrical circuit analysis (ECE degree @ ISEP. This web application (<http://osciloscopio.dee.isep.ipp.pt/>) can be used as a simulator and/or for remote experiments, namely: 1) as a self-learning tool of the basic operation and functionality of an Oscilloscope and Signal Generator, for students to

be better prepared for the lab class; 2) as a teaching tool, either in-class and off-class, to demonstrate and produce waveforms for teaching material such as slides, exercise books, lab scripts or exams; 3) to easily (locally or remotely) capture real circuit signals for further analysis, processing and visualization, for didactic or any other purposes; 4) to implement remote experiments to complement (or substitute) real lab work.

This paper focuses on the first application context and how this tool has recently been integrated and used by over 150 year students in the context of the TCIRC course, in the preparatory work (as a Moodle quiz) for Lab Script 2, on the basic functionality and operation of the Oscilloscope and Signal Generator.

Addressing Bloom's Two Sigma Problem in UK GCSE Maths (14-16 years) through AI-Generated Personalised Learning

Sam T O'Neill (University of Derby); Max Whittaker (University of Derby); Ovidiu Bagdasar (University of Derby)

GCSE Maths, the standardised examination for students aged 14-16 in the UK, often presents a significant challenge for learners. This challenge is exacerbated by the scarcity of open-source materials, due to copyright restrictions imposed by exam boards, and a lack of personalised one-to-one tutoring. Our project draws inspiration from Bloom's "Two Sigma Problem", which

demonstrates the potential of personalised tutoring to significantly enhance student performance by up to two standard deviations compared to traditional classroom teaching. To address this, we have developed an AI system capable of autonomously generating, through a Large Language Model (LLM), a validated dataset of GCSE Maths questions and solutions, aligned with the guidelines set forth by Ofqual, the UK's official qualification, curriculum, and assessment regulator. The system ensures curriculum alignment and accuracy through validation and, in addition, employs an LLM for one-to-one tailored support. The long-term objectives are to provide personalised tutoring, reduce educational disparities and improve learning outcomes. Bridging the content gap and addressing the Two Sigma Problem, it illustrates AI's potential for personalised, scalable educational solutions.

Using an (inter) active learning approach in mathematics: a case study

Cristina Caridade
(Polytechnic Institute of Coimbra)

Active learning encompasses a set of approaches related to the ability to create meaningful learning experiences, inside and/or outside the classroom. It covers several approaches, all of which focus on student autonomy, involvement, action, and reflection on their learning [1-3]. Several studies have been carried out with the application of active learning in the teaching of Mathematics, especially in mathematics for higher education [3-6]. And if interactive approaches can be included in this context, where student learning is carried out through actions between the students themselves and between the students and the teacher, learning becomes more meaningful, building (inter)active learning.

The objective of this work was to investigate how students interact in (inter)active learning of mathematics. The research questions underlying this work were: What was the greatest evidence of change perceived in students? What obstacles and challenges did teachers encounter?

During a semester of Calculus 1 classes, students were asked to learn the contents of number methods using (inter)active learning. Every week, during practical classes (1h30), students collaboratively shared a wall (Padlet [7]) and placed their

learning records there, according to the scheme shown in Fig. 1. In the first moment of each topic, students studied autonomously the contents in groups of 2 elements and solved the proposed exercise. Materials were provided for this learning. The learning of each group was posted on the wall and shared with the rest of the class. At the end of this sharing, each group had the role of correcting the exercise solved by another group, providing their feedback or their solution in case there was an error. The teacher monitored learning and guided students in achieving it. In the second stage, students were assessed individually on the content learned. Between these two moments, the teacher visualizes the students' learning and resolutions by giving feedback, the student studies individually at home by consulting all the material shared by the class.

A Critical (Hyper) pedagogy for Autonomy Applied to Education for Sustainable Development in English Teaching in the 1st Cycle of Basic Education

Teresa Marmeleira (P.PORTO-ESE); Mário Cruz (P.PORTO-ESE)

This paper aims to explore the effectiveness of innovative pedagogical-didactic approaches, grounded in critical pedagogy for autonomy, in the context of Primary English education. It particularly emphasizes the role of hypermedia and audiovisual resources in enhancing pupil motivation and participation, thereby fostering holistic, sustainable learning and the development of student autonomy.

Employing an ethnographic, qualitative, and action research approach, this study delves into various strategies for implementing critical pedagogy to cultivate autonomy and critical thinking in English learners. Data

was collected through lesson plans, visual records (videos and photographs), logbooks, pupil questionnaires, analysis of pupil work, and interviews, focusing on the contributions of interactive, multisensory, and hypermedia resources towards sustainable development and autonomy in learning English.

Preliminary results suggest that the pedagogical strategies examined can significantly enhance skills related to autonomy and collaboration. Furthermore, they promote effective and active learning of English, where pupils exhibit heightened motivation towards acquiring a foreign language. Such an approach not only contributes to their comprehensive development as proactive citizens but also prepares them to be future change agents.

The study underscores the potential of a critical pedagogy for autonomy, augmented by hypermedia resources, to revolutionize English teaching in the primary seBng. It demonstrates how these methodologies can contribute to the creation of a more engaging, autonomous, and sustainably-minded learner base, equipped with the skills necessary for the 21st century.

Revolutionizing Hispano-American Culture and Literature Education through AI Integration

Mário Cruz (P.PORTO-ESE); Vasco
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Kostenko (P.PORTO-ESE)

The integration of Artificial Intelligence (AI) across various sectors, notably education, introduces significant advancements in teaching methodologies. This study focuses on the role of AI in enhancing the educational experience within the realm of Spanish Literature and Culture. Highlighting the importance of AI literacy, it references studies such as Laupichler et al. (2022) to underline the necessity for understanding and leveraging AI applications effectively within educational settings.

By examining the incorporation of generative AI tools in Hispanic Studies, this research adopts a constructivist and multimodal learning approach to demonstrate how AI can foster a more engaging and

comprehensive learning environment. It not only caters to diverse learning preferences but also enriches cultural sensitivity and literary interpretation through the provision of varied perspectives and analytical methods.

A mixed-method research design involving a survey and a focus group with students from a higher education institution in Portugal reveals the positive impact of AI on student interaction, comprehension, and engagement with Spanish literature and culture. Moreover, some projects created by the students have also been analysed.

The outcomes suggest that AI tools can significantly contribute to the active construction of knowledge, enhancing both linguistic acquisition and communicative competence. These findings offer valuable insights for educators aiming to integrate AI tools into their teaching practices, highlighting the potential for AI to create dynamic, culturally rich educational landscapes in the field of cultural and literary studies.

Learning by teaching with videos

Amélia Caldeira (P.PORTO-ISEP);
Alexandra Costa (P.PORTO-ISEP);
Sofia Lopes (University of Minho)

In today's world, technology plays an important role, and its influence is evident in almost every domain, and education is no exception. The introduction of new technologies represents a valuable resource in improving the teaching and learning process. Of these resources, video has been used to support student learning. From traditional classrooms to online platforms, videos have become invaluable tools for teachers and students alike, enriching the academic experience. This presentation focuses on the LIGHTS project. This project aims to improve students' mathematical communication: (i) organize and link students' mathematical thinking through communication; (ii)

communicate logical and clear mathematical thinking to colleagues, teachers and others; (iii) analyze and evaluate mathematical thinking and strategies; (iv) use mathematical language to express mathematical ideas correctly.

The LIGHTS project involves the use of videos where students take an active role in the video, rather than a passive, contemplative role. Specifically, they produce videos centered around specific mathematics topics. Unlike what happens with traditional teaching, where materials and processes are imposed on students by the teacher, it is the students who create the material for learning. When creating a video, students collaboratively plan, produce, and evaluate

their own projects. Encouraging students to produce digital videos not only can develop effective learning but also emphasizes their autonomy, positioning them at the center of the teaching and learning dynamic.

This presentation will outline the LIGHTS project, which began in 2018, including its concept and implementation. By adopting this strategy, students become more motivated to learn mathematics, avoiding giving up and abandoning curricular units related to mathematics. The LIGHTS project is also a strategy to integrate new students into higher education.

Copying, Appropriation, and Collaboration in Visual Arts Education – reflecting on/with Artificial Intelligence

Joana Mendonça (P.PORTO-ESE);
Maria Manuela Lopes (P.PORTO-ESE); Ricardo Reis (P.PORTO-ESE)

As educators in the Bachelor's degree in Visual Arts and Artistic Technologies, we navigated the intersection of art and artificial intelligence (AI), delving into concepts of copying and appropriation—themes that resonate profoundly within the AI education discourse. In four curricular units, we employed strategies to challenge and expand our student's creative and critical engagement. This abstract encapsulates our collective endeavour, integrating individual reflections and AI-facilitated compositions to scaffold interdisciplinary collaboration.

In the Art Research unit, students attended a contemporary art exhibition followed by a reflection and practical exercise inspired

by the video "Still like an artist". This experiential learning aimed to provoke thoughts on originality in the age of the digital and AI, prompting students to consider the fine line between stimulus and imitation.

The Art History module required students to select three artworks from different historical periods, allowing them to analyse the continuity and evolution of thematic expressions across time.

In Drawing I, the historical images served as a foundation for an exercise in simplification, a form of appropriation while keeping the historical theme as a unifying element: students appropriated elements from each image to create a new work, potentially diverging from the original historical subject.

Painting I saw these concepts materialised through paint, with students creating compositions based on their historical and drawing explorations. Notably, one student harnessed AI apps to compose the work, addressing the complexity of the chosen historical paintings.

This abstract argues for the inclusion of AI as a possible pedagogical partner, in the teaching of visual arts as a means to promote 21st-century skills in technological proficiency but also in critical thinking, creativity, and collaborative learning.

Expanding Knowledge about Parental Involvement through Board Game

Regina Sávai-Átyin (University of Debrecen); Zsófia Kocsis (University of Debrecen); Dániel Bodnár (University of Debrecen); Zsolt Csák (University of Debrecen); Gabriella Pusztai (University of Debrecen)

In the past decade, the question of moving from a traditional approach to an educational paradigm centred on student activity has also arisen in higher education. Several research has drawn attention to the need to create an active learning environment for university students, prioritising curricula that respond to the challenges of today's society, skills and learning to learn. There are many innovative pedagogical tools at their disposal, some of which have to do with games (Camacho-Sánchez et al., 2022). Traditional learning theory focuses on the cognitive dimension and does not take into account the emotional and social dimension of learning, which makes students more active. Game-based learning helps

to deepen knowledge, develop skills and increase motivation. The effectiveness of board games shows a better and longer-term effect compared to many other traditional educational methods (Karbownik et al., 2016). Research has confirmed that the use of board games in the classroom develops many skills which are particularly important in teacher training as these are essential factors in working with colleagues, students and parents. Based on board game pedagogy and our previous research findings, we have developed a board game that aims to increase players' knowledge. Our research question is: How does the board game we developed contribute to increasing students' knowledge about parental involvement? The board game is primarily recommended for teacher candidates, teachers and school counsellors. After testing the board game, students completed a questionnaire in which they evaluated the game mechanics and identified the information that was perceived as new during the game (n=107). The players particularly appreciated the co-operative nature of the board game and the characters. The majority of respondents thought that the quiz questions and action cards provided a lot of useful knowledge and that the board game offered a good opportunity to discuss the topic.

O potencial pedagógico de escape rooms no ensino superior: um estudo de caso

Miguel Sequeiros (P.PORTO-ESS);
Ana Salgado (P.PORTO-ESS)

A importância da utilização de metodologias pedagógicas inovadoras tem sido cada vez mais discutida no contexto do ensino superior, uma vez que urge promover a participação ativa dos estudantes e potencializar os processos de aprendizagem.

Este estudo apresenta um caso de implementação de um escape room como ferramenta pedagógica numa unidade curricular da área Fisiologia Clínica.

Durante a realização desta atividade, os estudantes foram desafiados a rever e aplicar os conhecimentos adquiridos ao longo do semestre para resolver enigmas e completar tarefas dentro de um ambiente de escape room, especialmente projetado no laboratório de eletrocardiografia.

Após a conclusão da atividade, os cerca de 30 participantes foram convidados a preencher um questionário, de

forma anónima e confidencial, no qual avaliaram a sua experiência com esta prática pedagógica.

Os resultados preliminares revelaram uma receção extremamente positiva por parte dos estudantes, destacando a experiência como altamente envolvente, motivadora e eficaz para a consolidação dos conteúdos programáticos lecionados. Além disso, observou-se indiretamente um impacto positivo na qualidade da interação e colaboração entre os colegas.

Este estudo oferece insights sobre o potencial dos serious games como uma estratégia eficaz para motivar para a aprendizagem no ensino superior.

Com a partilha desta experiência, assim como dos resultados obtidos, esperamos incentivar a adoção de abordagens inovadoras de ensino e aprendizagem nas diferentes unidades orgânicas pertencentes ao Politécnico do Porto.

Digital Systems for teaching and learning Mathematics in outdoor environments

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For an extended period, math's trails have served as tools for promoting mathematics. With the successful transition from traditional pencil-and-paper mathematical trails to mobile devices and innovative technology, new opportunities for data collection and research on math's trails have emerged. In addition to the traditional math trail activity, students exhibit increased enthusiasm

for mathematics due to the integration of mobile devices and tasks that demonstrate practical applications and relevance in mathematics. Moreover, participating in a math trail enhances mathematical performance compared to conventional indoor lectures or similar activities.

In this communication we will describe a tool available for teaching and learning mathematics: the MathCityMap system (MCM), which includes MathCityMap@home. MCM has available a Web portal to create tasks, a smartphone application to play, and a Digital Classroom that allows the teacher to virtually simulate a class and thus monitor the students' work and progress in real time.

Digital Learning Graphics Enhanced by ASYMPTOTE

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The use of technology in mathematics education has demonstrated its potency in enhancing student comprehension and involvement. The diverse resources offered by technology can be effectively employed in teaching, thereby enriching the entirety of the educational system. In this communication we will describe a tool available for teaching and learning mathematics: the ASYMPTOTE system. This system consists of a web portal to create tasks, a smartphone app to play, and a Digital Classroom that allows the teacher to virtually simulate a class and thus monitor the students' work and progress in real time. On the web portal, teachers can search and select existing tasks, or create their own tasks, to design a learning graph, that is, a sequence of tasks with various levels of difficulty, for a specific mathematics topic. Students in

the application will be able to see the available tasks that the teacher has defined and go through them, receiving synchronous and systematic feedback on their entered solutions. The aim is to enable teachers to conduct synchronous and adaptive online teaching and learning processes in Mathematics. Students only need a smartphone or tablet and an internet connection. The application has a rewards-based system that facilitates student commitment and places it within the spectrum of gamification of education.

The web portal provides access to a repository of assignments on different math topics and different levels: elementary, secondary and university. Tasks in ASYMPTOTE are divided into categories according to their objective: training, reasoning, modeling. Learning graphs are adapted to the needs and level of students. If the student manages to solve a task successfully, they move on to the next task or they can solve a task on the same topic, but more complicated. Nevertheless, if a student encounters challenges or struggles, a supporting task is provided. This task is easier than the main task and help him understand that topic better.

Didactic models in digital education: reflections for an international comparative study

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This paper aims to reflect on the importance of digital didactics in digital educational processes in higher education (HE). It seeks to provide an overview of the state of the discussion on digital didactics, specifically the concept of digital didactics, the relevance of specific didactic models for digital educational environments, and the need for teacher training in this field. Literature shows that there still is a gap between the wide range of educational technologies available and the didactic knowledge necessary to effectively use ICT in teachers' professional practice. To avoid the called "digitization" in

education, that is the use of traditional methods with the help of ICT tools, there is a need for new pedagogical principles, including being skillful in digital didactics, because it's counterproductive and ineffective to keep "embedding" the traditional didactics into digital education processes. This paper also includes an overview of our doctoral project in Digital Didactics taking place at University of León (Spain), with two important objectives in mind: to ascertain and classify the most prevalent didactic models and methods used in digital education in the international literature in a taxonomy based on the criteria traditional/instructive model and active model, and to

understand whether the existing training programs in three higher education institutions, in countries such as Portugal, Spain and Finland, are adequate and encourage the adoption of active models and methods in digital education and how the skills acquired in teacher training are put into practice. Based on a mixed cross-sectional type design the project will be conducted in two main phases: a systematic literature review about digital didactics, followed by data collection through a survey and interviews, statistical analysis and content analysis on teacher training programs in HE and the use of didactic models/methods in digital education at 3 international HE institutions.

Projeto de Formação Pedagógica da ESS do P.PORTO

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Paula Lopes
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O projeto de desenvolvimento profissional da carreira docente da ESS tem sido desenvolvido ao longo dos últimos 8 anos com iniciativas em formatos muito distintos que vão desde o escape room pedagógico até a workshops sobre temáticas como a avaliação das aprendizagens.

Este projeto para além de ouvir as sugestões dos docentes numa relação de proximidade dentro de portas, realiza ciclicamente uma

avaliação de necessidades com toda a comunidade educativa.

Ao longo do ano letivo de 2017, e de novo em 2022, foram auscultados sobre este tema estudantes, docentes, órgãos de gestão e presidência da Escola Superior de Saúde através de reuniões, grupos focais e questionários.

Os dados apresentados dizem respeito à avaliação de necessidades bem como à

descrição das várias iniciativas do plano de atividades realizadas nos últimos anos letivos envolvendo centenas de docentes e profissionais de saúde.

Com este trabalho pretende-se, à medida que partilhamos as experiências, refletir criticamente acerca das potencialidades e desafios da formação pedagógica no ensino superior, com a expectativa de contribuir para a inovação nesta área tão impermanente.

Perspectives of pre-service mathematics teacher on technology integration within teacher master's degree programs

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(P.PORTO-ESE); Daniela Mascarenhas
(P.PORTO-ESE)

Recent investigations have delved into how teacher education programs incorporate technology in higher education, revealing a notable underutilization of technology during initial teacher education, despite its recognized impact on future classroom practices. This paper employs the theoretical framework of Community of Practices (CoP) to examine pre-service teachers' perspectives on technology integration within teacher education programs. Utilizing a qualitative

methodology, six pre-service mathematics teachers enrolled in the "Master's degree in Teaching the 1st Cycle of Basic Education and Mathematics and Natural Sciences in the 2nd Cycle of Basic Education" participated in a focus group session. The study analyzes their perspectives on technology integration through the three primary CoP categories: Domain, Community, and Practices. Findings underscore the formation of a CoP among pre-service teachers, wherein they share

responsibilities, reasons, and goals for attending the teacher education program, engage in collaborative activities, and collectively shape narratives, actions, and experiences. However, participants expressed concerns about the predominant emphasis on theoretical instruction at the expense of practical application within their teacher education program. They highlight a limited integration of technology and a lack of encouragement to utilize technological resources in their teaching practices.

Managing pupil's core drives towards an e-inclusive and transformative primary english classroom

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During the transition to the 21st century, Jacques Delors gave a powerful reminder on how Education “is one of the most powerful tools with which to shape the future or, to use more modest terms, to steer us into the future by taking advantage of constructive trends and trying to avoid pitfalls” (Delors, 1996).

Following this ideal, the current educational scene should be seen as one in which the main focus ought to give students “opportunities that challenge them to solve complex problems, make rational decisions,

and present compelling arguments for their solutions to the problems” (Harshbarger, 2016), instead of ensuring that students can prove proficiency on annual assessments as most contemporary public education systems do (idem).

Hence, Chou's Gamification Octalysis Framework becomes a valuable management tool for pupil motivation, engagement, and holistic development (Chou, 2016), aiming at a profile through which knowledge, skills and mindsets (Ehlers, 2020) are mobilized to answer complex demands (OECD, 2018). Moreover, its core-drives deal with intrinsic and extrinsic motivations that

foster desired-actions (Chou, 2016) in the English learning classroom, thus promoting e-inclusive and transformative approaches which are aligned with the Universal Design for Learning (Hersh, 2020).

This study is being developed as part of a PhD project which main objective is to reflect upon the Gamification Pedagogy and how it may affect the teaching and learning of the English language, following an ethnographic and qualitative methodology. Results tend to show that pupils became more productive and engaged towards learning a second language, however, some challenges occurred during our practices.

Delimitar o Futuro na relação entre a IA e a Pedagogia Fotográfica

Hugo Mesquita (P.PORTO-ESMAD); Adriana Baptista (P.PORTO-ESMAD); Olívia Marques (P.PORTO-ESMAD)

Este artigo explora a integração da “sintografia” em contexto de aula na Licenciatura em Fotografia, como uma estratégia para explorar as práticas artísticas e profissionais na era da transformação digital, problematizando as implicações pedagógicas da utilização da inteligência artificial em disciplinas criativas. O estudo gravita em torno do uso de IA para gerar conteúdo fotográfico, especificamente através da elaboração estruturada de prompts derivadas dos conhecimentos e práticas da fotografia. Analisámos os produtos fotográficos finais gerados por IA, categorizando-os como resultados

positivos ou negativos com base na sua qualidade estética e concordância com as diretrizes de prompting, para imagens de IA, ensinadas em aula. Esta avaliação é complementada por uma análise dos textos usados pelos estudantes na produção dos prompts para gerar essas imagens, visando estabelecer uma relação entre a incidência de termos relevantes para a construção da fotografia utilizados nos prompts e a qualidade da imagem resultante. Além disso, o estudo apura casos em que ocorreram desvios das estratégias ensinadas, examinando tanto a natureza desses desvios como o seu impacto no produto final. A análise levanta hipóteses capazes

de fundamentar o quanto o desvio pode levar a resultados positivos ou negativos. Partindo de uma aceção que a sintografia, como ferramenta pedagógica, pode promover uma compreensão mais profunda da interação entre tecnologia e criatividade, parece-nos urgente propor aos estudantes um envolvimento crítico com as dimensões éticas da IA, tanto na produção académica como artística. Por último, o estudo propõe explorar um conjunto de estratégias pedagógicas que visam otimizar o potencial educativo da IA nas disciplinas artísticas, contribuindo assim para o discurso mais amplo sobre a educação ética em IA.

Definição de competências - contributo do projeto internacional digital freelancing for higher education students and recent graduates (DIFREE)

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Nos últimos anos tem-se registado um aumento significativo do número de estudantes inscritos no ensino superior, demonstrando que as Instituições de Ensino Superior (IES) têm um papel importante na sociedade. Em Portugal, com a criação do Ensino Superior, hoje um sistema dual, dividindo-se em ensino universitário e o ensino politécnico (Correia, Amaral, & Magalhães, 2002; Simão, Santos, & Costa, 2002), ambos os modelos procuram oferecer uma escolha variada de áreas de conhecimento de norte a sul de Portugal. Essa

oferta de currículos tem que dar resposta a diferentes desafios impostos pelo mercado trabalho, quer porque o digital assume-se como intrínseco nas tarefas diárias, quer porque o mercado de trabalho tem pedido novas competências fruto de mudanças e desafios que estão a ocorrer, a um ritmo cada vez mais veloz. Há, por isso, necessidade de currículos que ofereçam a possibilidade de obtenção de novas competências e da requalificação de outras, indo ao encontro das necessidades do mercado de trabalho.

STACK: an experience in an engineering math course

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Computer-assisted assessment (CAA), such as the tool Moodle plugin STACK, can provide immediate feedback to students, enhancing their learning experience. Formative assessment tasks, when performed by automatic assessment tools, can play the role of a tutor by allowing the student to test and improve their knowledge, as these tools provide adequate feedback and allow repetitions of these tests. Modern digital automatic assessment platforms like STACK offer diverse features for delivering personalized feedback to learners. The use of these modern tools can contribute effectively to the enhancement of the student's learning process.

STACK includes a potential response tree resource to define a sequence of questions where each answer is evaluated separately. Previous answers can be reused, even if they were incorrect or only partially correct, to ensure that each answer is evaluated once based on the previous answers. This feature provides more accurate and consistent grading for student responses. The STACK type question module of Moodle facilitates this process by allowing the placement of questions in a more traditional format, accepting answers in a "mathematical" format, and performing their evaluation. The focus of this work is a pilot study on the application of this tool in both formative and

summative assessment, integrating an evolution of Stack question feedback based on student responses. These concepts were applied and tested in a curricular unit of mathematics in an Engineering degree. Feedback from students was generally positive, although some difficulties addressed to teachers were identified namely question design and implementation, feedback design and integration and training students in typing responses. STACK has potential as a CAA tool in mathematical engineering education, careful consideration should be given to its use during final assessment.

CHATGPT with 3D printing technology in professional development for pre-service math teachers through exploring Platonic solids

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Artificial intelligence is making incredible breakthroughs in supporting mathematics education. In this study, we leverage ChatGPT, with reference to Claude and Copilot, to assist in the design of Platonic solids, aiming to support the professional development of pre-service math teachers. These solids are then mass-produced using 3D printing technology. Our research findings indicate that ChatGPT plays a partial role in the design process. We work with ChatGPT with different

requirements so that it can generate possible lines of code that can be compiled into suitable solids via OpenSCAD software. Furthermore, ChatGPT contributes to enhancing the comprehension of pre-service teachers related to the relationship between regular polyhedra and fundamental concepts in the universe, such as the five elements.

Combining old and new: dialogue management in AI

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The authors present a comprehensive analysis of the current state and future perspectives in dialogue management within the realm of conversational artificial intelligence (AI) systems. The focus is on examining how these advanced systems manage interactions using natural language, with an emphasis on the key aspects of flexibility, adaptability, and user personalization. In the realm of traditional approaches, the article delves into methods such as rule-based, finite state, and frame-work-based systems. These methods, while offering a high degree of control and precision in specific scenarios, heavily rely on human intervention for their configuration and maintenance. The limitations of these approaches become evident in terms of scalability and flexibility, particularly when dealing with complex and unpredictable dialogues, highlighting a crucial area for development.

The article examines the burgeoning field of data-driven approaches, especially supervised and reinforcement learning models. These approaches offer a paradigm shift, providing systems with the ability to adapt and respond with greater flexibility. By learning from extensive dialogue datasets, these models exhibit an improved capability to handle the inherent ambiguities and variabilities of natural language. However, the efficacy of these models is closely tied to the quality and diversity of the training data, pointing to the need for comprehensive and varied datasets. A critical aspect of dialogue management, as discussed in the article, is the effective management of context. The integration of elements such as conversation history, user profiles, and external knowledge bases is pivotal in crafting responses that are not only relevant but also deeply personalized. This integration enhances user engagement and satisfaction by facilitating interactions that are both intuitive and resonant with the user's needs and preferences.

Do AI-Powered Translation systems reflect Cross-Linguistic Influence? Examples from Chat GPT 3.5 translations of English/Portuguese source texts used in classes.

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The development of language transfer research has evolved alongside different theoretical movements, including behaviourism, structuralism, mentalism, and cognitivism. Jarvis & Pavlenko (2008) introduced the term Cross-linguistic Influence (CLI) to describe more dynamic processes of language transfer following new notions of reverse transfer, bidirectional transfer and lateral transfer. As such, CLI primarily refers to the phenomenon where the knowledge or usage patterns of one language affect the acquisition or usage of another language. Furthermore, it can result in both positive transfer, where knowledge of one language

facilitates learning or usage in another, and negative transfer, where interference from one language hinders learning or usage in another.

The translation sector has undergone a significant transformation due to the emergence of Artificial Intelligence (AI). Currently, most Machine Translation (MT) engines rely on AI to convert content from one language to another almost instantly. With Neural Machine Translation (NMT) it has become possible to use Neural Networks to predict large blocks of any given text. The increase of more precise and effective automated translations could lead to a greater reliance on totally AI-powered translations engines. It

is in this context that future translations professionals should be made aware of CLI evidence in target texts produced by NMT. Analysing CLI in AI translation would allow for better student training and professional practice.

Our purpose is to consider automated translations generated by Chat GPT 3.5 from both English and Portuguese source texts evidencing negative CLI. Less effective and precise translations are necessarily justified by negative transfer, be it human or artificial. By guiding future translators to detect and correct negative CLI, we hope to train better professionals.

O contributo de ferramentas de GAI de monitorização do discurso oral na promoção de competências prosódicas e ortoépicas de estudantes de ensino superior

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A formação em línguas implica direcionar um olhar atento, entre outros aspetos, à proficiência oral dos estudantes. Esta, para além de competências interacionais, requer a promoção de um conjunto de competências verbais e paraverbais. No domínio das competências paraverbais assumem particular destaque as questões de dimensão prosódica e de dimensão ortoépica. Os aspetos prosódicos, cientificamente estudados pela Fonética e Fonologia, enquanto áreas disciplinares da Linguística, podem contemplar traços relacionados com a melodia da fala, com a dinâmica da fala assim como com a qualidade da voz (Cagliari, 1992). No que concerne à melodia da fala, são relevantes

aspetos como a entoação pelas pistas semântico-pragmáticas que esta veicula. Quanto à dinâmica da fala, sublinha-se a o impacto do débito e das pausas, sendo ambos responsáveis pela determinação do ritmo do discurso. Por último, no que respeita à qualidade de voz, destacam-se questões como o volume e o registo. No discurso oral, a competência ortoépica (Pérez, 2021), investigada pelos mesmos ramos científicos da Linguística devido à sua afiliação à competência prosódica (Souza & Pereira, 2019), afigura-se igualmente importante por contribuir para a transmissão de autenticidade no uso da língua. No ensino superior, no contexto de formação especializada de profissionais de

comunicação empresarial e na formação de intérpretes (Penha, 2015), estas competências devem ser desenvolvidas e mobilizadas. Não ignorando a oferta aportada pela Web 3.0., era da Web Inteligente na qual nos encontramos, no presente trabalho, propomo-nos realizar um estudo sobre o impacto da utilização de ferramentas de Inteligência Artificial especializadas no diagnóstico e na monitorização do discurso oral – Speeko e Orai (Halimah, Lustyantie & Ibrahim, 2018) – no desenvolvimento das competências prosódicas e ortoépicas dos profissionais em formação em diferentes cursos da oferta formativa do ISCAP.

Aprendizagens adaptativas nos planos de estudos de artes visuais: uma análise prática

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Tradicionalmente a educação arystica mobiliza as metodologias do próprio fazer arystico para a sua prática. A individualidade inerente à criação arystica coloca os estudantes perante a necessidade de domínio de várias dimensões do conhecimento, seja no âmbito técnico, conceptual ou de expressão plástica.

Ao introduzir as aprendizagens adaptativas nos programas dos cursos de Artes Visuais, pretende-se que os estudantes possam beneficiar de conteúdos educativos adaptados a cada indivíduo.

Neste pressuposto, a metodologia de trabalho de projeto afigura-se como central na estruturação do pensamento criativo,

bem como na resolução dos desafios pedagógicos, tecnológicos e arysticos levantados pelas diferentes Unidades Curriculares.

Deste modo, o Curso de Artes Visuais e Tecnologias Arysticas, que propomos tomar como base para reflexão, tem na sua matriz uma grande diversidade de disciplinas e tecnologias que, apesar das suas particularidades, se articulam de forma muito orgânica na estruturação de conhecimento. Neste contexto, abordaremos a sua operacionalidade, quer ao nível da apropriação de espaços oficiais, das suas características, bem como dos modos de funcionamento e organização, os quais,

sistematizam e fomentam o desenvolvimento de competências potenciadoras da autonomia criativa. O investimento na dimensão prática do saber, de modo a estimular nos estudantes o poder de observação, dota-os da capacidade de aprender e compreender a fazer.

Perante estas observações, propomos uma análise da organização do currículo do referido curso à luz das micro aprendizagens adaptativas, sobretudo quando o Currículo e a aprendizagem são questionados pela vertente pessoal, mediante a definição de uma matriz e do seu método, sobre o qual essas aprendizagens são desenvolvidas.

Development of an interdisciplinary Project in the Digital Health Degree Program

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The integration of interdisciplinary approaches is crucial for addressing contemporary challenges, particularly within the domain of digital health. This study outlines the development of an interdisciplinary project that merges four core curricular units: Multimedia Technologies, User-centered Design, Data Science, and Programming. By seamlessly blending these disciplines, the project aims to stimulate innovation and address pressing issues within the digital health sphere.

Digital health is indispensable in modern healthcare systems, providing a multitude of benefits including enhanced access to care, improved

patient engagement, efficiency gains, personalized medicine, preventive health-care, research advancements, and support for public health initiatives.

Multimedia technologies serve as the cornerstone, enabling the creation of dynamic and interactive digital health solutions. Leveraging multimedia tools such as augmented reality, virtual reality, and mobile applications, the project facilitates engaging user experiences and interventions aimed at improving health outcomes.

User-centered design principles are deeply integrated into the project, ensuring that the final products are customized to align with the needs and preferences of the

target audience.

Data science assumes a pivotal role in extracting insights from extensive repositories of health-related data.

Programming serves as the engine that drives the implementation of digital health solutions.

The project's interdisciplinary nature collaboration and the exchange of ideas among participants from varied academic backgrounds.

In conclusion, the development of an interdisciplinary project integrating multimedia, user-centered design, data science, and programming holds immense promise for advancing digital health innovation.

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On The Use Of Large Language Models For Transforming Student And Staff Experience In Higher Education

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Large Language Models (LLMs) have begun transforming how society interacts with computers to gather information and contextually obtain knowledge. This paper details the use of LLMs in first-year undergraduate education. Students were actively encouraged to use LLMs for information retrieval, problem-solving, and self-guided research; they were also given demonstrations on interacting with these models. The LLMs have also been used to co-create multiple-choice quizzes,

tutorial problems, and lecture notes/slides, which are then converted to PDFs. Additionally, students have built their own Discord bot using the ChatGPT API, which serves as an academic mentor. Acting as a peer, mentor and student liaison officer, the bot has helped build a strong cohort identity providing, encouragement, information, and guidance.

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L'alimentation et las culturas gastronómicas: uma experiência didática de FLE e de ELE

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Pretende-se apresentar uma atividade que se realizou no âmbito de duas unidades curriculares – Espanhol A2 e Francês A2 – do curso de Línguas e Culturas Estrangeiras da Escola Superior de Educação do Porto. Este trabalho foca-se no ensino de um léxico (a alimentação) e de conteúdos gramaticais (determinantes artigos definidos, indefinidos e partitivos, os pronomes, o imperativo, o infinitivo e as perífrases verbais) específicos e comuns às duas línguas. As atividades propostas foram trabalhadas individualmente e

em grupo. A unidade didática permitiu aos alunos explorar vários aspetos culturais da gastronomia francesa e hispano-americana e da história que se esconde atrás de algumas propostas culinárias exóticas e de fusão, e que, em muitos casos, eram desconhecidas para os alunos. Neste sentido, o uso de material autêntico como artigos, blogs e vídeos foram fundamentais para proporcionar um maior conhecimento das línguas e das culturas referidas. Serão discutidas as estratégias mobilizadas para o processo de ensino-aprendizagem em que foram trabalhadas as competências comunicativas em língua - de acordo com o Quadro Europeu Comum de Referência para as Línguas –, bem como os resultados desta experiência e que tinha como objetivo a prática da língua.

The Researcher - The Battle for Publications: higher education students' perception of the characteristics of a serious game that simulates the process of publishing scientific papers

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Publishing in peer-reviewed scientific journals is challenging. In addition to cramming a paper, authors must select the most suitable journal for submission, considering several factors. Furthermore, authors need to be ready to engage with reviewers' feedback and handle the possibility of rejection. This requires not only scientific proficiency but also resilience. The Researcher - The Battle for Publications (TRTBP) is a serious board game that simulates this process, aiming to provide players with a basic understanding of the challenges and decisions involved in publishing research. Drawing inspiration from modern game mechanics, it seeks to

provide players with a fun and engaging experience, fostering active learning. This study aimed to analyse the perception of higher education students regarding the characteristics of TRTBP game. A cross-sectional study was conducted with a non-probabilistic sample comprised of 31 students from ESS - Polytechnic of Porto, who played a preliminary version of the game (played by 3-5 individuals) during a 3-hour workshop. After the workshop, participants were required to rate various topics on a 1-5 scale (5 being the best rating). For this purpose, a questionnaire was developed, including topics addressed in several studies about educational games, organized in five domains: aesthetics,

gameplay, flow, and pedagogical impact. The sample comprised 25 undergraduate and 6 master's students. Most were female (87.1%), without experience in publishing (90.3%), and engaged in non-digital games either rarely (11.9%) or monthly (15.2%). The assessment of the game was positive, as the average score of each domain was: 3.6 for aesthetics; 1.1 for gameplay; 1.5 for flow; and 1.6 for pedagogical impact. Findings suggest that TRTBP has the potential to be a useful tool for training future researchers in the publishing process. Further studies, particularly with larger sample sizes and more diverse participant characteristics, are required.

Transforming student outcomes through digital assessment in mathematics: a study on the impact of Elevate My Math at the University of Derby

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James Howell (Vretta Inc.)

Numeracy, essential in various professions and daily life, faces a widening gap between required and actual skills globally. Through collaboration with Vretta Inc, the University of Derby has developed and integrated 12 modular numeracy training courses into its IT systems. Each course features diagnostics, interactive lessons, summative tests, and proficiency assessments, rewarded with digital badges. Initially piloted in 2018, Elevate Maths courses have significantly improved module

performance, with first-time pass rates rising from 82% to 89% and reaching 98% for trained students. Over 1200 digital badges have been awarded, indicating course completion. This initiative has expanded internationally, benefiting partners in Greece, China, Ethiopia, Romania, and Thailand, supporting regional and global numeracy enhancement projects.

Investigar/testar AI via Chat GPT para promulgar axiologias humanizadas

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Em 2023 desenvolveram-se pesquisas em vertentes complementares, tendo por denominadores comuns: AI & CHAT/GPT; promoção de axiologias estéticas decoloniais, feministas na cultura e artes. No congresso “Artificial Intelligence Embraced: the future of the cultural and creative sector” trabalhou-se com Colega de Universidade Norte-Americana para configuração do “call for papers” enquanto chair da track “Decolonisation of Cultural Institutions and Curricula on Cultural Management and Policy”. Apresentaram-se papers sobre temas culturais, tendo-se aplicado testagem de conteúdos autorais (previamente produzidos), mediante perguntas concatenadas ao Chat/GPT. Finalmente, os resultados obtidos foram partilhados em reuniões de investigação/networking e em comunicações. Assumindo estes diferentes papéis – enquanto investigadora – sistematizaram-se guidelines quanto a [eventuais]

contributos/implicações da AI para promoção de valores nos estudos decoloniais e feministas. Apresentam-se, aqui, reflexões que cruzam as diferentes fontes. Constatou-se heterogeneidade nas comunicações peer reviewed, o que serviu de aferidor pluritemático ao analisar os conteúdos programáticos de UC específicas em cursos de ensino superior - artes e património cultural. A presente comunicação, não se esgota na visão retrospectiva alcançada na fase anterior. Projeta-se avançar com a realização de um ciclo de debates e, por outro lado, aplicar metodologias [quase] experimentais em grupos que reúnam discentes, docentes, investigadores e agentes culturais no terreno. Os objetivos convergem para a testagem/verificação de potencialidades AI na promoção de valores identitários e societários humanistas. Finalmente, poder-se-ia desenhar, em termos curriculares, uma UC opcional, que seria transversal a diferentes UO da IES. Usufruir-se-ia, pois, do networking em plataformas internacionais, para disseminação interatuante de investigação ativada nestes domínios e em outros verificados como imprescindíveis.

BESD Students Surrounded By Teachers With Different Perspectives - Results Of a Qualitative Study In Hungary

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The main reason for our research is that teachers and researchers are confronted with the fact that the number of children and pupils with behavioural, emotional, social and learning difficulties (BESD) is increasing year by year in both national and international contexts (Bíró, 2020; Demeter, 2017; Müller-Hoffmann, 2019). The student communities in schools are becoming more diverse and teachers need to keep up with this trend, so they differentiate more and adopt new teaching methods (Reinhardt-Kökönyei, 2009). The group of pupils we analysed receives less attention from educational

institutions and possibly from families (Lányiné 2006; Balogh 2021). Teaching, as a condition for effective learning (Chrapán, 2020), is seen as a way for teachers to facilitate the difficulties of students with difficulties in behaviour, emotions, socialisation and/or learning. The closed structure of parent-teacher- children is worth to explore regarding of its ability to give an advantage through shared norms and mutual trust, while they can lead to higher student achievement (Coleman, 1988; Pusztai, 2020). In this study we analysed semi-structured interviews with teachers of development (n=5) and semi-structured in-depth interviews with

form-masters (n=9), using the the text analysis software Atlas.ti 24. Our current exploratory interview study focuses on the role that developmental teachers and teachers play in the school life of students with these difficulties. Moreover the research aimed to get an overall view of the family background of BESD students and to explore what methods teachers use in their lessons when a child with special needs is in the class. In the second half of our study, we focused on how teachers differentiate when organising learning, with a particular focus on the forms of work, methods and teaching tools.

MOODLE LMS in Learning Experience

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The Learning Management Systems (LMS) is one of the most used technological advancements that satisfy the requirements of teachers and students. The aim of this article is to show that the use of an advanced model in Moodle LMS improves the students' performance, in a curricular unit of an Engineering Degree. It is applied this advanced model, that completes the in-person expository classes, using distance learning, with innovative

pedagogical tools and different devices and somware that help students answer multiple choice questions asked at different assessment moments throughout the semester. Each assessment moment has a questionnaire where the students indicate what device or somware they used to get the answer. Furthermore, through feedback from the students' question-

naire at each assessment moment, it is possible to readapt the devices, somware or other tools available to students on the plaLorm, so that students can be able to progressively improve their performance. It is expected that this advanced model improves students' performance and presented perspectives for future work.

Resolver problemas... sem problema: a PBL na formação de professores de Português de 1.º e 2.º CEB

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A importância das Ciências da Linguagem (CL) na formação de professores de Português é um dado há muito adquirido (e.o. Fonseca, Duarte e Figueiredo, 2001. Nem sempre, contudo, a construção do conhecimento pedagógico do conteúdo (Shulman, 1987) pelos futuros professores ocorre consistentemente, como constatamos, há vários anos, na lecionação de UC de CL. Esta constatação levou-nos a propor, em UC de Linguística Aplicada dos cursos de formação de educadores e de professores de 1.º e 2.º Ciclos do Ensino Básico (CEB), uma metodologia baseada na problematização e descoberta, que culmina nas Jornadas de Conhecimento, Usos e Interfaces do Português – evento em que os estudantes apresentam os seus trabalhos de pesquisa, com o propósito de promover a partilha de conhecimento e o espírito de investigação. Os estudantes identificam um problema a explorar (p.ex.: como ensinar o género gramatical, distinguindo-o da categoria sexo biológico), definem objetivos, traçam um plano de ação e preparam a apresentação

oral, a efetuar nas referidas Jornadas abertas à comunidade. A classificação final resulta da avaliação do progresso do estudante e das soluções de incorporação das sugestões de melhoria que os docentes e os colegas formularam nas Jornadas, permitindo aferir o nível de evolução.

Esta atividade, originada em contexto de ensino remoto de emergência, insere-se no âmbito das metodologias ativas e nos pressupostos da Problem-Based Learning (PBL) (Barrows, 1986; 1996): permite ao estudante desenvolver, de modo autónomo, raciocínios adequados à resolução de problemas, adquirir informação num processo autodirigido em que o professor funciona como um mediador da aprendizagem, intervindo ao longo do percurso para validar ou reorientar a pesquisa e as hipóteses veiculadas, criando uma motivação extra para a construção de aprendizagens significativas.

Nesta comunicação, apresentaremos a metodologia adotada e os resultados obtidos na sua aplicação ao longo de 5 anos letivos.

Empowering teachers: Strategies for Integrating B-Learning in IPT

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The Laboratory of Pedagogical Innovation and Distance Learning (LIED) of the Polytechnic University of Tomar promotes initiatives aimed at encouraging the adoption of active and innovative methodologies by the institution's teaching staff. Its work focuses on specialised training and the creation of conditions to help teachers adopt new teaching strategies. In this context, it has set up a recording studio with a support team so that lecturers can create video content to support the creation of MOOCs for the NAU platform, as well as online content for their course units. With the aim of making teaching more flexible and encouraging

student-centred teaching methodologies, a long-term strategy was designed to promote b-learning methods among lecturers. In addition to the training already provided, there was a need to regulate the adoption of B-learning strategies in the teaching assessment process. One of the obstacles to its adoption was the lack of recognition of the work done during the professional assessment. A regulation has been drawn up that summarises the rules for the equivalence of face-to-face hours and online modules in degree programmes. Teachers can replace 15 per cent of face-to-face hours with online content taught asynchronously. The equivalence unit is the term module, which consists of an

introductory video of a maximum of 3 minutes, resources, learning activities and at least one assessment moment. Each module is equivalent to 15 minutes in face-to-face mode. The process involves an internal application with LIED oversight to ensure the quality of the course delivered. All content can be developed with the support of the LIED team and equipment. In this paper we intend to give a detailed account of the regulations developed, and the implementation process involving the development of specialised training. In future work, we intend to evaluate the real impact of these strategies during the next school year.

A relevância de Estudantes do Ensino Superior na transformação de comunidades. Análise de intervenções para promoção da dádiva de Sangue

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A dádiva de sangue é um tema relevante devido à necessidade de manter reservas de componentes sanguíneos para transfusão. O último relatório de Hemovigilância, refere o declínio do número de dádivas, e evidencia a necessidade de captar novos dadores e sua fidelização. Para responder a este problema, a ATC-ACSP promove intervenções na comunidade, envolvendo estudantes da área da Saúde. Esta estratégia é relevante no processo de ensino-aprendizagem, por estimular o desenvolvimento de competências transversais, capacitando os estudantes para enfrentar os desafios tecnológicos, sociais e económicos da atualidade.

Pretende-se caracterizar as intervenções na comunidade, presenciais e à distância, sobre a dádiva de sangue; analisar os resultados nos vários grupos- alvo e estudantes participantes, no período de 3 anos. Nas intervenções, utilizou-se metodologias de participação ativa ajustadas ao grupo-alvo, para potenciar a motivação e melhor compreensão sobre o tema. Estas estratégias foram planeadas de acordo com as linhas orientadoras previamente definidas pelos docentes tutores das intervenções. Em todas as intervenções verificou-se que os conteúdos abordados permitiram aumentar a literacia, clarificar as dúvidas e mitos sobre a dádiva de sangue. A reflexão dos estudantes evidenciou que ganharam

uma consciência holística sobre o seu papel como futuro profissional de saúde. Em contacto com diferentes contextos reais, este tipo de atividade estimula o desenvolvimento de competências comunicacionais adequadas às diferentes populações-alvo, e competências de gestão de recursos, estratégias e pessoas. É uma oportunidade de desenvolvimento da capacidade de agir face às adversidades encontradas. Tais competências potenciam a serem melhores comunicadores, dinamizadores mais assertivos na promoção da saúde e do cuidado coletivo – princípios essenciais para a saúde pública.

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AI as a tool to increase critical thinking in teacher training

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As digital technologies become increasingly influential in all aspects of our lives, our ability to reason, make good decisions and think critically seems to be diminishing. To develop problem solving skills is an important objective of mathematics education. One of the most effective ways to improve this ability is to give students problems that require them to think in an algorithmic way; in geometry, these are mainly

construction tasks. Through algorithmic thinking, we taught students to accurately specify, analyse and solve given problems. Finding errors in incorrect algorithms for solving construction tasks was the method we used to deepen the ability of algorithmic thinking. To train future mathematics teachers to judge the correctness of an algorithm, we used AI in the role of a pupil.

In the geometry course at the Faculty of Education at the University of Ostrava, action research was used to investigate the effects on critical thinking skills and digital literacy. The results of our observations suggest a positive impact on all the above competences. With our contribution, we want to show one of the possibilities of using AI in education.

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Teaching exponential functions using the storytelling technique with AI support

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Exponential functions are an important topic in the mathematics curriculum in Vietnam. However, students often face difficulties in understanding the concepts and applying them in real-life situations. Nowadays, with the development of technology and teaching techniques, there has been innovation in education. AI technology and Storytelling techniques have garnered attention from many researchers and have been applied in teaching abstract mathematical concepts. This study

utilizes Storytelling techniques with the assistance of AI to design teaching situations for exponential functions through a narrative. The research was conducted with 11th-grade students in Vietnam. The results show that the use of Storytelling techniques with AI assistance has helped students build knowledge more effectively. Stories integrated with real-life situations have improved the application of knowledge in practical scenarios.

Gestão da formação docente: uma proposta para aumentar a mobilização pedagógica pela co-tutoria

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Pedro Duarte
(P.PORTO-ESE)

A formação docente é uma das lacunas atuais do ensino em Portugal pois existe um número muito reduzido de novos professores a ingressar no ensino e um grande envelhecimento da classe docente. Numa situação de emergência para tentar colmatar a falta de professores nas escolas, com formação equilibrada nas componentes, científica e pedagógica, este projeto de investigação propõe uma abordagem diferente nesta gestão de formação de docentes incentivando à mudança. Os professores devem colaborar muito mais entre si, entre grupos disciplinares e entre gerações diferentes, com

o objetivo final de encontrar um equilíbrio educacional nos processos de ensino e de aprendizagem. Esta ação colaborativa reforça a componente pedagógica profissional com valores pessoais e sociais. A metodologia adotada será uma investigação-ação, com uma amostragem não-probabilística, e com análise híbrida de dados. Por fim, pode-se referir que a formação pessoal deve ser humanista, com uma colaboração potenciada se for intergeracional, para se atingir depois uma formação pedagógica integral e binívoca entre tutores e co-tutores.

Escultura em rede e o encontro inesperado com a alegria

António F Silva
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Os constrangimentos provocados pela situação pandémica desafiaram as relações de ensino-aprendizagem. Criaram-se novas circunstâncias para a aprendizagem, com experiências que transformaram o estranho em conhecido, com meios familiares, usando competências para produzir significado e conhecimento.

Foram seleccionados conteúdos, objetivos, estratégias, modos de avaliação, que possibilitaram manter o comprometimento dos estudantes com as aprendizagens no campo específico da Escultura, exequíveis e adequadas às modalidades de interação, contribuindo para uma ocupação produtiva, em ambiente de isolamento.

Como realizar as aprendizagens em casa, sem acesso à oficina, aos materiais e ferramentas? Levantada a questão primordial, definiu-se uma acção que permitiu ultrapassar esse impedimento.

Foi adaptada a Ficha de Unidade Curricular de modo que as questões levantadas, a partir de conceitos-chave, no âmbito da resolução de problemas escultóricos, possibilitassem o envolvimento dos sujeitos e promovessem aprendizagens a partir da trilogia: compreender-

fazendo (hands-on), fazer-pensando (minds on), pensar-envolvendo-se (hearts-on).

Usar poucas coisas, disponíveis e de acesso doméstico como princípio orientador foi objectivo primordial para manter a rotina, assumindo uma forma de lidar com a situação de excepção.

Evidências, representações, referências são testemunho de um percurso, realizadas em contexto adverso e sintetizando uma acção que evidencia o comprometimento com a aprendizagem.

Na relação Vida e Arte, cruza-se razão, conhecimento, experiência e emoção, numa acção produtiva de partilha do sensível.

Assim, as esculturas realizadas já não falam só para os produtores, mas através de um processo de reconhecimento do outro, passam igualmente a falar de nós.

Foi, pois, uma oportunidade de repensar prospectivamente as metodologias da Educação Arística a partir do seu laboratório primordial, a sala de aula.

Competências Críticas em Estudantes do Ensino Superior: Análise da Utilização de Ferramentas de IA na Divulgação Científica

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A inteligência artificial (IA) está a revolucionar a educação nas universidades, beneficiando quer os estudantes quer os docentes. Contudo, é imprescindível que estes sejam capazes de as utilizarem e conhecerem as suas potencialidades, mas também as suas fragilidades. Para isso é importante, junto dos estudantes fortalecermos a análise crítica dos conteúdos que são produzidos.

O objetivo deste estudo é explorar a utilização de ferramentas de inteligência artificial que permitam facilitar processos de divulgação científica e obter por parte dos estudantes uma análise crítica dos outputs obtidos com base na inteligência artificial.

Encontra-se em implementação um projeto exploratório, incorporado numa unidade curricular de projeto de investigação, que irá explorar uma ferramenta que tem por base inteligência artificial. A ferramenta selecionada servirá de suporte para a criação de conteúdo de divulgação de um projeto de investi-

gação que será apresentado a um grupo de estudantes finalistas que terá que realizar uma análise crítica. Posteriormente os dados obtidos serão sistematizados de forma a podermos identificar pontos fortes e fragilidades da ferramenta utilizada e da análise crítica dos estudantes.

Perspetiva-se uma avaliação crítica e reflexiva que evidencie a sinalização das vantagens e das limitações existentes neste tipo de ferramentas. Saber utilizá-las como apoio sem as mesmas se sobreponem à construção do conhecimento e competências de cada indivíduo.

As ferramentas com base em IA permitirão aumentar a produtividade, simplificar a conceção e permitir que os autores se concentrem na qualidade do conteúdo. No entanto, devem estar cientes das potenciais limitações e considerar as suas necessidades específicas. Assim como, a sua utilização massiva e sem análise crítica contribui para a diminuição da capacidade na resolução de problemas, ao tornar o indivíduo mais dependente da tecnologia.

Desvendando os segredos da Matemática invisível: uma abordagem à visualização geométrica no 6.º ano de escolaridade

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A Visualização Geométrica revela-se uma capacidade fulcral para a Matemática e para a vida. Assim, esta comunicação abordará o tema Geometria, sincronicamente à resolução de problemas, tema Capacidades Matemáticas, como também mostrará que o recurso à manipulação de materiais e de ferramentas tecnológicas, no 6.º ano de escolaridade, promove o desenvolvimento da visualização por parte dos alunos. Para além disso, o estudo realizado procurou compreender em que medida os processos de resolução de problemas dos alunos expressam o recurso a estratégias de visualização geométrica e de raciocínio espacial, realizando observação direta, naturalista e participante e a análise documental. Este estudo envolveu a participação de 17 crianças do 6.º

ano, com idades compreendidas entre os 11 e os 16 anos. Perante o contexto, foram realizadas sete situações formativas com base na resoluções de problemas do tema Geometria recorrendo não só à capacidade de visualização geométrica, mas também a materiais manipuláveis físicos e digitais.

Após o término do estudo, constata-se que as capacidades de visualização geométrica estimuladas e desenvolvidas ao longo das situações formativas influenciaram positivamente os processos de resolução de problemas de Geometria, verificando-se a mobilização de estratégias alicerçadas na mesma. Sumariamente, a apropriação destas capacidades foi gradual e coerente com o desvendar dos “segredos” de visualização geométrica, tendo sido observada e registada em grelhas de avaliação, produções escritas dos participantes, fotografias e vídeos.

“Mundo Mater”

Mariella Bejarano
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“Mundo Mater”, la experiencia gastronómica de Central (el mejor restaurante del mundo en el 2023) y su aprovechamiento didáctico en la clase de español A2, incluye también historias paralelas de fusión de culturas con la española, africana, china y japonesa. La unidad didáctica propuesta a este nivel como parte de la unidad curricular del curso de la Licenciatura de Lenguas y Culturas Extranjeras de la Escuela Superior de Educación de Porto, planteó una serie de ejercicios dirigidos no solo a la difusión de la cultura, en este caso, sobre Perú, Lima y la cultura Inca, sino también, se realizaron una serie de ejercicios para activar la lengua en sus cuatro destrezas. Por lo tanto, con estos dos objetivos en mente, el trabajo se inicia mediante un input con vídeos sobre “Mundo Mater” y su recorrido por todos los microclimas peruanos, desde la costa hasta

los Andes, para luego dar paso a la expresión oral terminando con la comprensión lectora y la expresión escrita con preparación previa con microtarefas efectivas diseñadas para trabajar la gramática y léxico pertinente a la alimentación, gastronomía y experiencias, lugares y regiones.

La metodología de recolección de datos consistió en un análisis de contenido de los trabajos en foros realizados por los alumnos tanto de manera grupal como individual y cuyos resultados reflejan una comprensión satisfactoria del tema y un entusiasmo en trabajar en propuestas diferentes que les permitan desarrollar sus destrezas lingüísticas al entender mejor otras culturas y situaciones de la vida real.

IN_SPIRE: Sharing Best Practices in Tourism Education

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O desenvolvimento de competências técnicas (teóricas e práticas) e transversais é uma componente fundamental da formação superior em Turismo, não só pelo facto da atividade turística assentar no serviço e na interação pessoal, mas também porque a maioria dos programas pressupõe algum tipo de componente prática, nomeadamente, aulas teórico- práticas e formação em contexto de trabalho. Tratando-se de uma área recente no Ensino Superior, persiste o debate relativamente ao que se entende ser o equilíbrio entre a vertente mais académica e a natureza técnica e profissionalizante dos cursos nas áreas do Turismo, Hotelaria e Restauração. Para além dos perfis dos estudantes e dos programas, esta discussão

estende-se às competências dos docentes destas áreas, que, cada vez mais, são desafiados a responder a solicitações da indústria, dos estudantes e da sociedade.

Decorrente da necessidade premente de desenvolver iniciativas que promovam a inovação, capacitação pedagógica e o ensino experiencial, neste artigo descreve-se o processo de ideação e desenvolvimento de um toolkit que visa disseminar boas práticas no âmbito da educação e formação superior em Turismo. Assente no diagnóstico das competências chave de cada um dos subsectores turísticos, para além das diferentes fases de implementação do projeto, os autores refletem sobre as suas práticas, procurando partilhar metodologias, estratégias, materiais e ferramentas, contribuindo, dessa forma, para o desenvolvimento desta área do saber.

Augmented reality as a supporting tool for building mathematical knowledge: the case of parallel projection, perpendicular projection, and representation of a figure in space

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In the 11th-grade Vietnamese Mathematics Curriculum, students learn about parallel projection, perpendicular projection, and the representation of a figure in space. This content poses difficulties for students. Some studies have pointed out typical challenges: limited spatial imagination, difficulty in representing the characteristics and relationships between three-dimensional geometric objects within a two-dimensional scope. Conversely, students struggle to understand and visualize from two-dimensional drawings to three-dimensional space. Additionally, there are causes from the teaching approach of teachers. This leads to students only studying math in the classroom and not relating mathematical knowledge

to real-life situations around them, while real-life objects are good tools to illustrate knowledge of spatial geometry. This study uses action research methods, using GeoGebra 3D Calculator software to design teaching situations about parallel projection, perpendicular projection, and the representation of a figure in space. The study was conducted with 40 11th-grade students in Long An province, Vietnam. The results of this study show that the use of Augmented Reality (AR) in the 3D Calculator software establishes a connection between reality and abstract knowledge about parallel projection, perpendicular projection, and the representation of a figure in space. The study also indicates that applying AR in teaching helps students understand and effectively build new knowledge about projections and representations in space.

Exploração de ambientes web imersivos em contexto educativo

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Os projetos apresentados neste artigo, foram desenvolvidos em oficinas de formação de professores sobre Ambientes Web Imersivos (AWI) em contexto educativo. As oficinas foram realizadas no âmbito de um projeto de investigação de um programa de doutoramento em Multimédia na Educação, que visa estudar e compreender a utilização de AWI em contexto educativo. O objetivo da formação foi dotar os professores de competências-chave relacionadas com a utilização de AWI, levando-os a explorar as potencialidades dos Ambientes Web Imersivos de forma a poderem integrá-los nas suas práticas

pedagógicas. Os dados recolhidos permitiram testar (e redefinir, se necessário) os instrumentos de recolha de dados inicialmente concebidos, bem como selecionar professores do ensino básico e secundário de diferentes disciplinas para colaborarem com os investigadores. O artigo apresenta alguns dos espaços imersivos criados durante oficinas de formação em Ambientes Web Imersivos realizadas com professores do ensino básico e secundário. O estudo mostra que os AWI têm potencial para transformar as práticas de ensino.

Uso da Inteligência artificial para apoiar a autorregulação de aprendizagem: Uma revisão de literatura

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A utilização exponencial da Inteligência Artificial (IA) tem suscitado o interesse na comunidade académica em compreender o impacto na sociedade e na educação. A autorregulação da aprendizagem (ARA) é essencial para a adoção de estratégias de aprendizagem pelo estudante, como o planeamento, gestão de tempo e reflexão.

Abordagens pedagógicas que fomentam a ARA apoiam o sucesso académico. A IA pode apoiar a adoção de estratégias de ARA, visível pelo surgimento de tecnologias que acompanham o processo de aprendizagem. Assim, importa compreender a intencionalidade educativa das aplicações relacionadas à IA.

Procedeu-se a uma revisão de literatura dos últimos 5 anos, nas bases Scopus, WoS e ERIC, com os objetivos de 1) identificar quais são tecnologias de IA, e 2) de que forma são integradas nas abordagens pedagógicas para apoiar a ARA.

Dos 67 artigos iniciais, após a eliminação de duplicados e sem acesso, foram selecionados os artigos com base em critérios de inclusão/exclusão. Os artigos foram escolhidos por estarem centrados no uso da

IA em ambientes educativos e no suporte à ARA, resultando num corpus final de 15 artigos.

Identificamos 9 modelos baseados ou integrados com IA, nomeadamente: Chatbot, Hybrid Human-AI Regulation, AI application storyboards, Explainable Artificial Intelligence, Mobile-Assisted Language Learning, SHapley Additive exPlanations, Learning Analytics, Reflective Thinking Promotion Mechanism-based AI-Supported English Writing e Blockchain-Enabled learning management system.

As abordagens pedagógicas com recurso à IA focaram-se no acompanhamento, na recolha de dados, no feedback, no apoio personalizado para superação de dificuldades/dúvidas.

O uso de Chatbot é das mais evidenciadas para auxiliar a ARA, face à sua praticidade, à acessibilidade e à sua transversalidade nas várias áreas curriculares. O ChatGpt foi a aplicação mais predominante nos trabalhos analisados. Abordagens pedagógicas que recorram à IA revelam ser inovadoras e promovem a ARA.

Nas linhas da escrita em linha: a colaboração e a reflexão metalinguística no desenvolvimento de competências

José António Costa
(P.PORTO-ESE)

Se, por vezes, a interação através da escrita nas redes sociais (através de comentários, mensagens de texto...) substitui a interação oral presencial ou mediada, tal não significa um nível superior de competências dos utilizadores dos media. O investimento numa pedagogia de escrita continua a fazer sentido tal como há três décadas (Fonseca, 1992; Camps, 2003; Barbeiro, 2019), podendo beneficiar dos contributos de novas metodologias [inspiradas em velhas ideias – cf. Dewey (1933); Vygotsky (1978)] e dos avanços tecnológicos. Nesta comunicação, propomos evidenciar o modo como as metodologias colaborativas e as ferramentas de colaboração online podem destacar-se na formação de professores, quer no seu estágio profissionalizante, quer em aulas de unidades curriculares (UC) de Didática do Português. Apresentaremos uma atividade de escrita colaborativa desenvolvida por uma estagiária, em fase de ensino remoto de emergência, e uma outra proposta aos futuros professores na UC de Didática de

Português no 1.º CEB, em mestrados que formam docentes de 1.º e 2.º Ciclos do Ensino Básico.

As atividades de escrita colaborativa promovem a interação de sujeitos com níveis de competência diversos, no sentido de dar resposta a problemas variados: geração de conteúdo, organização textual, formulação linguística, adequação e correção linguísticas (Lowry, Curtis & Lowry, 200ti), o que contribui para desenvolverem competências de escrita, com destaque para o papel “da explicitação discursiva, não apenas por parte do professor, mas envolvendo os alunos nessa explicitação” (Barbeiro, 2020, p. 369). A colaboração na escrita permite, ainda, construir textos estruturalmente mais complexos e gramaticalmente mais rigorosos (Storch, 2005), bem como estimular a participação ativa dos estudantes através de uma aprendizagem experiencial e multissensorial (Dewey, 1933; Arslan, 2010) e o desenvolvimento de competências transversais, como o pensamento crítico e a resolução de problemas.

Product ideation in the age of AI: Insights on design process through shape coding exercises

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This study explores the impact of text-to-image generative AI technology on the ideation phase of product design master students shape-coding concept designs for social robots. Between 2019 and 2024, five social robotics workshops were conducted with around ten participants. The first three editions utilised conventional ideation methods like semantic mood boarding, sketching, 3D modelling, and conceptual rendering. The last two editions employed a mixed-methods approach, combining traditional techniques with AI tools such as Midjourney, Vizcom, and DALL-E. The findings reveal that deploying AI tools in the ideation phase of a design process significantly enhanced the numeric diversity of design concepts compared to conventional methods. Feedback from participants reported the ability of such novel tools to inspire novel design directions and increase the variety of ideas. AI-assisted synthetic ideation work enabled

students to already explore intricate design details early in the ideation phase by transforming semantic keywords related to sociability, intelligence, and trustworthiness in social robots into visual representations. This hybrid mixed methods exploration using low fidelity organically generated concept forms and high fidelity synthetically generated detail design evidenced a notable advantage over conventional ideation methods typically achieved through classical design techniques in terms of promoting more creativity in novice designers with weak concept ideation skills by colliding more proposals with the designer and this way increasing serendipitous probability of arriving at interesting proposals. The study contributes to the field of product design education, demonstrating the potential of generative AI technology in fostering creative ideation and diverse concept generation. Designers can utilise these insights to optimise their ideation strategies and improve divergent thinking in their design process.

Aproximações entre metacognição e emoção nos processos de ensino-aprendizagem

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A utilização de estratégias metacognitivas em espaços formais de educação, por meio da mediação e fomento do professor, demonstra potencialidades de melhora na aprendizagem, desempenho em sala de aula e na habilidade de gerenciamento socioemocional dos estudantes. Sendo a área de ensino de ciências naturais e exatas tipicamente associada aos maiores graus de

dificuldade para a assimilação dos conteúdos, o emprego intencional da metacognição no ensino-aprendizagem deste campo do conhecimento pode evidenciar sua efetividade. Assim, por meio de uma análise bibliográfica na base de dados Web of Science com os termos *emotion* e *learning* nas palavras-chave e *metacognition* no título, foram obtidos 18 artigos completos entre 1997 a 2021. Destes, apenas 9 trabalhos perfazem o objetivo de compreender as relações dos efeitos na aprendizagem e as implicações com fatores emocionais ou motivacionais com a prática metacognitiva. Os resultados indicam ser possível identificar impactos positivos no planejamento, regulação e aperfeiçoamento

na realização de atividades, bem como o maior engajamento para a solução de problemas, redução dos sentimentos de valência negativa e melhor gerenciamento de erros na realização de problemas. Ainda assim, se ressalta a escassez de estudos na literatura para uma compreensão abrangente e assertiva da temática e maior singularidade na concepção do que é metacognição.

Gamificação como Prática Pedagógica em Terapia da Fala

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(P.PORTO-ESS)

A Escola Superior de Saúde forma Terapeutas da Fala (TF) há 39 anos. Ao longo dos anos tem investido no desenvolvimento de práticas educativas que permitam aos seus estudantes integrarem os conhecimentos essenciais ao longo da sua formação.

Observa-se que o estudante atual tem a necessidade de informações num curto espaço de tempo e dispersam com facilidade em contextos de aulas exclusivamente tradicionais e expositivas (Fragelli, 2017). Assim, a Gamificação procura novas formas de ensinar e aprender, e no cenário educativo, traz novas possibilidades para a prática educativa. Como estratégia pedagógica, mostra-se como uma tendência promissora (Martins et al. 2018). Estas práticas pedagógicas pretendem motivar os estudantes, promover a aprendizagem e resolução de problemas e mantê-los mais envolvidos com o processo de ensino aprendizagem.

O objetivo da presente investigação é analisar a utilização da gamificação como estratégia pedagógica no Ensino Superior.

O estudo é de caráter exploratório do tipo transversal e de natureza quantitativa. A amostra são os 43 alunos do 1º ano, do curso de TF, no âmbito da unidade curricular de Aquisição e Desenvolvimento da Linguagem II (ADL II).

Foram utilizados 2 instrumentos: Jogos sobre a matéria lecionada divididos pelos conteúdos ministrados Leitura e Escrita, Semântica, Fonologia, Morfossintaxe, Pragmática, Linguagem na Adolescência e no idoso na plataforma online Quizizz disponibilizados ao longo do semestre no final de cada conteúdo abordado; Questionário no Microsoft Forms disponibilizado aos alunos no final do semestre que tem como objetivo recolher o feedback. Atualmente está a ser efetuada a recolha dos dados através dos instrumentos referidos acima. Até ao momento os estudantes parecem mostrar-se satisfeitos com esta prática pedagógica de ensino.

Com os resultados pretende-se melhorar as práticas pedagógicas na formação dos estudantes de TF promovendo a motivação e envolvimento com o processo de ensino- aprendizagem.

Extending the Lifespan of Internet of Things (IoT) Networks: An Adaptive Routing Selection Algorithm by Incorporating Data Attributes

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The increasing prevalence of compact and affordable computer devices has led to the emergence of wireless sensor networks (WSNET), which hold considerable promise for a wide range of simultaneous tasks. By utilizing a portion of their available resources, these networks have the capability to execute many activities concurrently or engage in collaborative efforts with other networks to tackle extensive applications. In order to enhance network performance and reduce energy consumption,

it is crucial to implement a revolutionary routing system. We present a flexible routing framework that can smoothly switch between several routing algorithms according to the specific requirements of an application, network circumstances, and location information. This paper presents a novel approach for adaptive routing scheme selection by introducing a digital attribute based clustering hierarchy that overlays sensor networks. In this study, we offer novel analytical perspectives on our methodology and showcase its capacity to improve network efficiency.

Active teaching approaches in Engineering Education: a comprehensive review

Luis Resende (Federal Technological University of Paraná); Soraia Santos (Federal Technological University of Paraná); Juliana Xavier (Federal Technological University of Paraná)

This work investigates the implementation and impacts of active teaching approaches in engineering education in response to 21st-century demands. The systematic literature review analyzed 38 articles selected through a rigorous filtering method. Of these, 20 actively explore teaching methodologies in various educational settings. The studies identified three main categories of active methodologies: Problem/Project-Based Learning (PBL), Cooperative Learning (CL), and Case Study (CS).

Although only 7 articles directly answered the initial research question, there is a consensus on the importance of active approaches to promote participatory and effective learning. The benefits include increased student engagement, improved academic performance, and the development of critical and

professional skills. However, challenges are identified, such as resistance to change and the need for investment in technological resources. Despite this, the results suggest that active approaches have the potential to produce engineers who are better prepared and qualified to meet contemporary challenges.

The discipline of differential and integral calculus in engineering courses: observing the reality at Federal Technological University of Paraná, Pato Branco Campus

Micheli Cristina Starosky Roloff (Federal Technological University of Paraná), Luis Mauricio Martins de Resende (Federal Technological University of Paraná), Christian Joseph Antoine Mercar (Université Claude Bernard – Lyon 1), Juliana Castanon Xavier (Federal Technological University of Paraná)

This study delves into the Brazilian educational landscape by examining the practical application at the Federal Technological University of Paraná, campus Pato Branco. Throughout the second semester of 2023, four classes of Differential and Integral Calculus 1 were closely monitored, with four professors actively engaging in teaching and facilitating learning. The observation encompassed various teaching activities, including the duration spent by professors at the board, students tackling

exercises independently, and whole-class discussions. Moreover, the professors' perspectives were captured through a questionnaire gauging the frequency of specific teaching methods and their perceived efficacy in enhancing student learning outcomes. By shedding light on pivotal elements like time allocation for problem-solving and the potential for student-centered instruction, this research seeks to inspire and guide transformative changes within the Brazilian educational framework, particularly in the realm of Engineering courses.

Formación continua de profesores: recorrido colaborativo integrando tecnologías educativas con docentes de Español en contexto de Covid-19”

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Durante el período de la pandemia de Covid-19, la necesidad de adaptación e innovación en la enseñanza del español se volvió aún más urgente, lo que llevó a la germinación de una comunidad de aprendizaje informal. En este contexto desafiante, se hizo crucial investigar cómo una comunidad de aprendizaje informal puede contribuir a la formación continua de profesores y al desarrollo profesional en la enseñanza del español en el contexto de Covid-19. Para responder a las limitaciones impuestas por la pandemia, se desarrollaron 17 encuentros en línea que resultaron en 17 acciones de formación de corta duración (AFCD) y se aplicaron encuestas por cuestionario

antes de cada AFCD. Los resultados obtenidos permitieron verificar que, a través de la comunidad de aprendizaje informal, se promovió un recorrido colaborativo de desarrollo profesional, en el cual los profesores pudieron compartir experiencias, recursos y estrategias, construyendo un espacio vital para el intercambio de ideas y el apoyo mutuo, que favoreció el refuerzo de lazos entre los docentes, el fortalecimiento de la resiliencia

y la capacidad de adaptación de los docentes. Los resultados demuestran que la formación continua de profesores se reveló esencial para capacitar a los docentes a integrar eficazmente tecnologías digitales en sus prácticas pedagógicas, volviéndose relevante para garantizar la calidad de la enseñanza del español durante la enseñanza emergencial y que se formó un clúster de desarrollo profesional para desafíos futuros.

Boosting Math Skills via Escape Rooms in Higher Ed

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This abstract explores the efficacy of the application of digital escape rooms to enhance mathematical skills in higher education settings. We analyze the impact of immersive learning experiences on freshmen's engagement and proficiency

in mathematics, in particular in Differential Integral Calculus, offering insights into innovative pedagogical approaches for educators. This is done in the scope of the MATH-DIGGER Erasmus+ project. More info here: <https://www.ipp.pt/mathdigger/>.

Fostering Mathematical Competencies and Soft Skills Through Service Learning

Deolinda Dias Rasteiro
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This paper outlines a service-learning initiative that was offered to higher education Mechanical Engineering students with the dual goals of fostering critical thinking skills and mathematical competencies. Service-learning offers a dynamic framework for all, embracing student development by fusing academic education with real work (should not be confused with volunteer work) within the community. Applying mathematical concepts to real-world situations, service-learning in mathematics education helps students get a wider knowledge of the practical importance of mathematics and strengthens their critical thinking abilities as they take on real-world situations and create mathematical solutions/answers to meet

the community's needs. While students interact with their colleagues and the community, they transfer mathematical knowledge and collaborate on solutions, which improves their collaboration, communication, and creative skills. Service-learning also fosters empathy and self-awareness since it helps students understand how mathematics affects society and how civic engagement is important. The use of service-learning ideas in the curriculum is described in this study, with particular attention to the Statistical Methods course taken by second-year Mechanical Engineering students. The objectives were to develop students' abilities in data analysis, encourage significant community involvement, and evaluate the effect on student competencies.

