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International Conference
Co Creation Processes in Higher Education

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Esta publicação reúne os resumos das comunicações apresentadas na Conferência Internacional em Processos de Cocriação no Ensino Superior (In2Cop) 2024 e inclui ainda o programa do Encontro.
As doutrinas expressas em cada um dos resumos são da inteira responsabilidade dos autores.
This publication presents the abstracts of the communications presented at the International Conference in Co-Creation Processes in Higher Education (In2Cop) 2024 and the program of the Meeting.
The opinions expressed in each of the abstracts are the sole responsibility of the authors.

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PREAMBLE

Co-creating Innovation have long been integral to the mission of **Bragança Polytechnic University** | Instituto Politécnico de Bragança, underpinning our commitment to fostering future-oriented higher education that addresses the complex challenges of the world of work. Within **STARS EU**, our Strategic Alliance for Regional Transition funded in the European Universities Initiative, we've adopted a pedagogical approach that places significant emphasis on fostering inherent collaboration with external stakeholders from all regions of our nine European partners. This commitment is driven by our understanding that the vitality of higher education institutions, professors, researchers, and students is profoundly intertwined with the benefits derived from these co-creation activities. Furthermore, our vision extends globally, as we proactively aim to facilitate the growth of a knowledge-driven regional economies through robust international cooperation.

In this spirit, the **International Conference on Co-Creation Processes in Higher Education (In2CoP)** serves as a crucial platform for reflection and the sharing of insights garnered from co-creation ecosystems. This event is designed to inspire and sustain the growth of a multidisciplinary and multicultural learning community, one that is fully equipped to navigate the evolving landscape of higher education and address the intricate challenges posed by the contemporary and the future employment landscape.

Orlando Rodrigues
President of the Bragança Polytechnic University

PREÂMBULO

A cocriação de inovação tem sido, desde há muito, parte integrante da missão do **Instituto Politécnico de Bragança**, sustentando o nosso compromisso de promover um ensino superior orientado para o futuro que responda aos complexos desafios do mundo do trabalho. No âmbito da **STARS EU**, a nossa Aliança Estratégica para a Transição Regional financiada pela Iniciativa Universidades Europeias, adotámos uma abordagem pedagógica que coloca uma ênfase significativa na promoção da colaboração inerente com partes interessadas externas de todas as regiões dos nossos nove parceiros europeus. Este compromisso é motivado pela nossa compreensão de que a vitalidade das instituições de ensino superior, professores, investigadores e estudantes está profundamente interligada com os benefícios decorrentes destas atividades de cocriação. Além disso, a nossa visão estende-se a nível global, uma vez que procuramos proactivamente facilitar o crescimento de economias regionais baseadas no conhecimento através de uma cooperação internacional robusta.

Nesse espírito, a **Conferência Internacional sobre Processos de Cocriação no Ensino Superior (In2CoP)** serve como uma plataforma crucial para a reflexão e o compartilhamento de insights obtidos a partir de ecossistemas de cocriação. Este evento foi concebido para inspirar e sustentar o crescimento de uma comunidade de aprendizagem multidisciplinar e multicultural, totalmente equipada para navegar pelo cenário em evolução do ensino superior e enfrentar os desafios complexos impostos pelo panorama contemporâneo e futuro do emprego.

Orlando Rodrigues
Presidente do Instituto Politécnico de Bragança

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PROGRAMA | PROGRAM

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Co Creation Processes in Higher Education

2024
30_31.jan 01.feb
Bragança-Portugal

PROGRAMME

30 JAN

Morning (Parallel Closed Meetings)

09h30 _ *Portuguese Polytechnics Coordinating Council Meeting with Portuguese Science and Higher Education Minister*

STARS EU MEETINGS

Steering Committee STARS EU WP STARS EU Meets Horizon Expert Europe

Afternoon

14h00 _ Opening Session

- Elvira Fortunato, Portuguese Science and Higher Education Ministry
- Orlando Rodrigues, Bragança Polytechnic University
- Cristina Perdigão, Portuguese National Erasmus+ Education and Training Agency

14h45 _ Plenary Sessions

- **European Universities' alliances and the Future of Higher Education in Europe**
  Vanessa Debiais-Sainton (European Commission, Head of the Unit in charge of European Higher Education Policies)
- **Future Skills**
  Tia Loukkola (Organisation for Economic Co-operation and Development: OECD, Head of division)

15h30 _ Roundtable University Alliances: Governance Model and Legal Status

Moderation > Luís Pais

- Maria Leopoldina Veras (National Council of Institutions of the Federal Network of Professional, Scientific and Technological Education: CONIF, President)
- Marcos Schiefler (Network of Technological and Polytechnic Universities in Latin America and the Caribbean, Rector of UTFPR)
- Raquel Barreira (E3UDRES2, European University Alliance, Pro President of Setúbal Polytechnic University)
- José Costa (EUNICE, European University Alliance, President of Viseu Polytechnic University)
- Carlos Rabadão (RUN-EU, European University Alliance, President of Leiria Polytechnic University)
- Rima Dijkstra (STARS EU, European University Alliance, Project Leader of Hanze University of Applied Sciences)

17h00 _ Closing Session

Collaborative Innovation and the future of higher education
Manuel Heitor (Chair of the expert group on the interim evaluation of Horizon Europe)

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PROGRAMME

31 JAN

Morning (Parallel Closed Meetings)

09h30 _ *STARS EU MEETINGS*

- Steering Committee
- STARS EU WP
- STARS EU TIGs
- STARS EU Steering Committee meeting with WP Leaders

Afternoon

14h00 _ Opening Session

- Orlando Rodrigues, Bragança Polytechnic University
- Joaquim Mourato, Directorate General for Higher Education

14h30 _ Microcredentials Programme: Mountain Consortium for Knowledge

- **Business School**

Nuno Ribeiro (Bragança Polytechnic University, School Dean)

- **Microcredentials Catalogue**

Vera Ferro-Lebres (Bragança Polytechnic University, Pro President)

- **Professional Master's: IPB Approach**

Luís Pais (Bragança Polytechnic University, Vice President)

15h30 _ Award and Recognition to IPB Co-Creation Companies

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PROGRAMME

01 FEB

MORNING - 09h30

Towards Higher Education Innovation, IPB European/Erasmus Projects

- **DIFUCH, Digital future challenge-based learning in higher education >** Pedro Rodrigues
- **iMath, An intelligent system to learn mathematics >** Florbela Fernandes
- **HACK-IT, Hackathon e metodologias inovadoras no ensino superior >** Vítor Gonçalves
- **IGNITION: European DIGital Literacy Coalition for Inclusion, Collaboration and InnovaTION >** Bárbara Barroso
- **EMBRACE, Education Modernisation Brazil, Colombia, Europe - the new era of digital higher education cooperation >** Inês Barbedo
- **ThinkGame, Cooperation to implement Creative Thinking and Gamification for innovative online training of STEM students >** Maria João Varanda

Coffee Break

- **Serious Games, Developing Emotional Competencies for Nursing Students** > Mª Augusta Veiga Branco
- **ECOLAH, Embracing a complexity-oriented learning approach in health** > Juliana Almeida de Souza
- **Connected4Health, A medical and humanities-based approach to navigating obesity and eating disorders in young people >** Juliana Almeida de Souza
- **ISN, Innovative Skills for Nurses >** Celeste Antão
- **Breaking Fences, Norm Awareness in Health Science Education** > Mª Augusta Veiga Branco & António Meireles
- **HumCore: Humanitarian Corridors >** Ana Isabel Pereira

Cont.

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PROGRAMME

01 FEB

AFTERNOON - 14h00
Towards Higher Education Innovation, IPB European/Erasmus Projects

- **DISmode, Digital training for NGO's youth workers to become disability support moderators for youth with disabilities >** Vítor Gonçalves
- **IM-PRO-IN-DE, Improvement of digitalisation competences of recent and future teachers by development of advanced training on instructional design of digital training >** Vítor Gonçalves
- **CARE, Enhancing Early Childhood Education and Care in Palestine** > Luís Castanheira
- **EYdigiFolio, Early Years Digital Portfolio >** Cristina Mesquita
- **GAINkids, Global citizenship for kids >** Ana Raquel Prada
- **InnLocal: Innovation in and through Local Governments >** Claúdia Costa

Coffee Break

- **Ecochesnut, Organic production of chestnuts and development of better marketing competencies in chestnut producers>** Ângelo Rodrigues
- **EFE, Ethical food entrepreneurship >** Elsa Ramalhosa
- **VitEnoClimat, Improving the educational background of viticulture and oenology to mitigate the negative impacts of climate change >** Pedro Bastos
- **InnoMeatEdu, Innovative digital tools applied to sustainable meat science and technology higher education: a link between industry and academia** > Alfredo Teixeira
- **STEP: STEM Research, Equality, Diversity and Inclusion >** Maria Fátima Pacheco
- **NEST, Co-Creating a new form of governance in societal transition for healthy living >** Fernando Pereira
- **3 D-M, Data Driven Digital Marketing, development of a joint master's programme** > Ana Sofia Coelho
- **GreenTEA, Green Tourism in Higher Education by developing Alternative educational materials and learning opportunities >** Sónia Nogueira

ARTIGOS | ARTICLES

2024
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Collaborative Curriculum Design: Exploring Faculty-Student Partnerships in Higher Education

A. Harizi, A. Tartaraj

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ABSTRACT

This article explores the evolving domain of collaborative curriculum design, stressing the central importance of faculty-student partnerships in higher education. By analysing both the advantages and difficulties of such collaboration, it provides insight into how these partnerships may reshape the conventional curriculum design process. Using qualitative evidence from interviews, case studies, and surveys across diverse higher education institutions, the article evaluates the effect of these partnerships on curriculum relevance, student engagement, and learning outcomes. The results point to a movement towards more inclusive, flexible, and innovative curricular structures that reflect current educational demands and student voices. In addition, the article examines the implications of these partnerships for academic professional development and wider institutional culture. By advancing a participatory model of curriculum design, faculty-student collaboration is shown to play a decisive role in the renewal of teaching and learning in higher education. This article thus delivers significant insights for educators, administrators, and policymakers seeking to strengthen the impact and relevance of higher education curricula.

Keywords: Collaborative Curriculum Design, Faculty-Student Partnerships, Higher Education, Curriculum Innovation, Participatory Learning.

1. Introduction

The rapidly shifting landscape of higher education has increasingly recognised the importance of collaborative curriculum design, particularly through staff-student partnerships. This article investigates the dynamics of such collaborations and their broader implications for higher education institutions (HEIs). By analysing how academic staff and students cooperate, the study explores the influence of these partnerships on curriculum development, student learning experiences, and the educational environment more broadly.

The principal aim of this research is to examine the function of staff-student partnerships in curriculum design, considering how these collaborations shape both the process and the outcomes of curriculum development. Insights from Bovill and Felten (2011) inform the analysis of how such partnerships affect curriculum content and delivery. Moreover, the study evaluates the effect of collaborative work on student engagement and learning outcomes, in line with participatory learning principles outlined by Bryson (2016). It also examines implications for academic development and institutional culture, addressing the opportunities and challenges raised by Matthews et al. (2018).

Employing a mixed-methods approach, the research integrates qualitative and quantitative data collected across various HEIs. The methodology includes surveys, interviews, and case studies, providing a multifaceted perspective and enabling a comprehensive assessment of the effects of staff-student collaboration in curriculum design.

This research positions staff-student partnerships as a departure from traditional, top-down curriculum development, moving instead towards collaborative and co-creative processes. Such an approach reflects current pedagogical trends advocating active learning and student-centred teaching, as argued by Verwoord (2016). These collaborations are anticipated to generate curricula that are more relevant and responsive to student and societal needs, while simultaneously fostering stronger ownership and engagement among students, as suggested by Mangas (2020).

In conclusion, the study seeks to advance understanding of collaborative curriculum design in higher education, offering valuable insights for educators, academic leaders, and policymakers. It underscores the potential of staff-student partnerships to act as catalysts for curricular innovation, ultimately aiming to enhance educational quality and meet the evolving demands of contemporary learners.

2. Literature Review

The notion of faculty-student partnerships in curriculum design within higher education has increasingly attracted attention as a valuable means of enhancing teaching and learning. This review examines different dimensions of such collaborations, drawing on a broad range of scholarly sources. Although the idea of involving students as active participants in curriculum development is not entirely new, it has gained prominence in recent years. Bovill and Felten (2011) provide a comprehensive overview of this concept, suggesting that when students are directly engaged in curriculum design, the resulting educational experience becomes more meaningful and responsive to their needs. This perspective is reinforced by Liang et al. (2020), who argue that these partnerships can significantly enhance student learning and engagement, promoting a more democratic approach to education.

Despite these benefits, challenges persist. Gravett and Winstone (2020) discuss logistical and cultural barriers that can restrict the implementation of such partnerships. They contend that successful collaboration requires a fundamental shift in traditional power relations and institutional culture.

Research by Werder et al. (2023) demonstrates the positive influence of these partnerships on student learning and engagement, noting that students involved in curriculum design often exhibit deeper understanding and increased motivation. Similarly, Verwoord (2016) observes that partnerships can inspire innovative teaching practices, thereby enriching the overall quality of education. The implications for academic development are equally noteworthy. According to Mangas (2020) and Bourke and Loveridge (2016), faculty who collaborate with students frequently report professional growth, acquiring fresh insights into both pedagogy and learning processes.

Overall, the literature indicates that faculty-student partnerships in curriculum design represent a promising route to improving the relevance and quality of higher education. Nevertheless, for their full potential to be realised, higher education institutions must address the cultural and structural barriers that may hinder their adoption.

3. Methodology

The methodology adopted in this study is designed to provide a detailed examination of the dynamics and impacts of staff-student partnerships in curriculum design within higher education institutions. A mixed-methods approach is employed, combining both quantitative and qualitative techniques to generate a comprehensive understanding of the subject.

Quantitative Component: A structured questionnaire is administered to a diverse sample of academic staff and students across several higher education institutions. The purpose of the survey is to assess perceptions regarding the effectiveness, challenges, and outcomes of collaborative curriculum development between staff and students.

Participant Selection: Participants are recruited through stratified sampling to ensure representation across disciplines, academic levels, and institutional types, thereby providing a balanced and reliable dataset.

Data Analysis: Quantitative data from the survey are processed using statistical software. Descriptive statistics are used to summarise overall trends, while inferential analyses, including correlation and regression techniques, explore associations between variables.

Qualitative Component: Semi-structured interviews are conducted with a selected subset of survey respondents. These interviews provide more nuanced insights into personal experiences, perspectives, and attitudes towards staff-student collaboration in curriculum design.

Case Studies: A selection of case studies examining successful faculty–student partnership initiatives was undertaken. These case studies involved the analysis of institutional documents, interviews with key stakeholders, and direct observation of partnership activities.

Data Analysis: Qualitative data derived from interviews and case studies were transcribed and examined through thematic analysis. This process entailed systematic coding, the identification of recurring patterns, and the extraction of overarching themes, thereby facilitating a deeper understanding of the research questions.

Ethical Considerations: Informed consent is obtained from all participants, outlining the study's purpose, the voluntary nature of participation, and guarantees of confidentiality. Anonymity is ensured by removing personal identifiers from the dataset, with findings reported only in aggregate form.

This mixed-methods design facilitates a holistic exploration of staff-student partnerships in curriculum development. By integrating survey data with qualitative interviews, the study captures diverse perspectives and strengthens both the validity and reliability of the findings.

4. Results and Discussion

This section presents the key findings from the mixed-methods approach employed in the study, comprising quantitative survey results, qualitative insights from interviews and case studies, and a discussion of these findings in the context of existing literature.

Survey Results:

Table 1: Faculty and Student Perceptions of Faculty-Student Partnerships

Respondent Type	Positive Perception (%)	Neutral (%)	Negative Perception (%)
Faculty	70	20	10
Students	65	25	10

Source: Authors' calculations

The survey results, summarised in Table 1, reveal a predominantly positive perception of faculty-student partnerships in curriculum design among both faculty and students. A substantial majority of faculty (70%) and students (65%) reported favourable experiences and outcomes associated with these partnerships.

Interview and Case Study Insights:
Qualitative findings from interviews and case studies emphasise key themes, notably increased engagement and motivation among students and professional development for faculty, consistent with the conclusions of Verwoord (2016). Identified challenges include logistical limitations and the need for institutional support, aligning with concerns raised by Dai and Matthews (2023).
Interpreting Survey Data:
The quantitative data indicate broad endorsement of faculty-student partnerships in curriculum design. This positive perception corresponds with Werder et al. (2023), who highlight the benefits of student involvement in curriculum development. The slight variation in favourable responses between faculty and students may stem from differing expectations and experiences within the partnership process.
Qualitative Analysis:
The themes derived from interviews and case studies highlight the value of collaboration in curriculum design. Faculty reported developing new insights into student learning requirements, while students expressed enhanced ownership and deeper engagement with their studies. These findings reflect Bryson's (2016) emphasis on the transformative capacity of student engagement within pedagogical practices.
Challenges and Opportunities:
The reported challenges, particularly logistical constraints and limited institutional support, represent key areas for higher education institutions to address. Successful implementation of these partnerships requires not only participant commitment but also structural reinforcement, as advocated by Mangas (2020).
Overall, the findings of this study affirm the positive impact of faculty-student partnerships on curriculum design in higher education. Despite the challenges, the benefits in terms of student engagement, faculty development, and pedagogical innovation are evident. These insights provide useful guidance for educators and administrators aiming to promote more collaborative and inclusive learning environments.

5. Conclusion

The study embarked on an exploration of faculty-student partnerships in curriculum design within higher education institutions, employing a mixed-methods approach that included surveys, interviews, and case studies. The findings from this comprehensive investigation have significant implications for the practice and understanding of collaborative curriculum development in higher education.
The research revealed a predominantly positive perception of faculty-student partnerships among both faculty and students, highlighting the beneficial impact of these collaborations on curriculum relevance and student engagement. This aligns with the scholarly work of Verwoord (2016), who has emphasised the value of such partnerships in enhancing the educational experience.
A key outcome of the study is the enhanced student engagement and learning resulting from active participation in curriculum design. This outcome is supported by the research of Liang et al. (2020), who note the transformative potential of student engagement in pedagogical processes. Faculty members also reported professional growth through these partnerships, gaining new insights into teaching and learning, an aspect crucial for fostering an institutional culture that values collaboration and innovation. However, the study also highlights challenges, including logistical issues and the need for institutional support for successful implementation and sustainability of these partnerships, echoing the concerns raised by Matthews et al. (2018).
The implications for higher education are clear. Institutions are encouraged to support faculty-student collaborations, not only by promoting such initiatives but also by providing necessary resources and structures. Furthermore, ongoing professional development for faculty is essential for effective engagement in these partnerships. The findings also suggest a need for further research to explore long-term impacts and identify best practices across different disciplines and institutional contexts.
In conclusion, faculty-student partnerships in curriculum design represent a significant step forward in enhancing the quality and relevance of education in higher education institutions. By embracing these collaborations, HEIs can create a more inclusive, responsive, and engaging learning environment, benefiting both students and faculty. Addressing the challenges and capitalising on the opportunities these partnerships present, HEIs can advance their educational offerings and better equip students for the contemporary world.

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2024

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Enhancing Value Co-Creation in Higher Education Through Artificial Intelligence

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ABSTRACT

This paper investigates the transformative role of Artificial Intelligence (AI) in enhancing the value co-creation process within higher education institutions (HEIs). As the educational landscape evolves, AI emerges as a pivotal tool in reshaping learning environments, supporting personalised learning experiences, and promoting collaborative educational models. The paper begins by analysing the current state of AI integration in HEIs, emphasising its influence on student engagement, pedagogical practices, and administrative efficiency. It then examines the concept of value co-creation, a paradigm that prioritises active collaboration among educators, students, and technology to improve learning outcomes. Drawing on case studies and empirical evidence, the study illustrates how AI-driven tools and systems foster more adaptive and responsive educational strategies, thereby enriching the learning process. In addition, the paper discusses the challenges and ethical concerns associated with AI in academia, presenting a balanced view of its opportunities and constraints. Ultimately, this research highlights the considerable potential of AI to facilitate more interactive, personalised, and effective educational experiences, redefining the role of HEIs in the contemporary landscape.

Keywords: Artificial Intelligence, Value Co-Creation, Personalised Learning, Collaborative Learning, AI Ethics in Education.

1. Introduction

The emergence of Artificial Intelligence (AI) has driven a transformative shift across multiple sectors, with education among the most profoundly affected. This paper seeks to examine and critically evaluate the role of AI in strengthening the value co-creation process within Higher Education Institutions (HEIs). The primary objective is to investigate how AI, as an evolving and adaptive technology, can be leveraged to enhance educational processes, enrich learning experiences, and contribute to the wider mission of educational institutions.

The central focus is on identifying and analysing how AI can support more engaged and personalised learning environments. This includes exploring AI's capacity to tailor learning pathways to individual student needs, thereby fostering inclusive and effective educational practices. We consider how AI-driven analytics and adaptive learning systems can transform traditional pedagogical methods and enhance student–teacher interactions (Zawacki-Richter et al., 2019).

A further objective is to evaluate AI's contribution to administrative efficiency in HEIs. By automating routine processes and optimising resource allocation, AI offers the potential to streamline institutional operations, enabling educators and administrators to concentrate more fully on core academic activities (Brynjolfsson & McAfee, 2014). In addition, the paper addresses the challenges and ethical issues associated with the integration of AI into educational contexts. Critical concerns such as data privacy, algorithmic bias, and the digital divide are explored as central considerations (Wachter-Boettcher, 2018).

In conclusion, this paper provides a comprehensive analysis of the role of AI in advancing value co-creation within HEIs, weighing its transformative opportunities against the challenges it entails. By doing so, it contributes to ongoing debates on AI in education, offering insights and recommendations for educators, policymakers, and key stakeholders across the sector.

2. Literature Review

The integration of Artificial Intelligence (AI) into higher education has become a major focus of research, reflecting the growing interest in understanding its influence on educational practices and outcomes. This literature review synthesises key perspectives from recent studies, offering a comprehensive account of the current state of AI application in Higher Education Institutions (HEIs).

AI in personalised learning and student engagement. A substantial body of research has explored the potential of AI to personalise the learning experience. Hwang and Lai (2017) demonstrate how adaptive AI systems can customise educational content to individual learner needs, thereby strengthening engagement and improving outcomes. Similarly, Singh et al. (2023) emphasise AI's capacity to create dynamic, responsive learning environments that adapt to student feedback, further enhancing participation.

AI and pedagogical innovation. Scholars such as Rabelo et al. (2023) examine AI's contribution to pedagogy, highlighting its role in supporting curriculum development and instructional design to make educational content more relevant and accessible. Park et al. (2023) further investigate AI in assessment, noting its ability to deliver timely, personalised feedback, enriching students' learning experiences.

Administrative efficiency through AI. Beyond pedagogy, AI has also been shown to optimise administrative functions in HEIs. Johnson et al. (2016) illustrate how AI can automate admissions, scheduling, and resource allocation, thereby enhancing operational efficiency. This view is reinforced by Houssein et al. (2023), who argue that AI-driven analytics can inform strategic planning and institutional decision-making.

Ethical and practical challenges. Despite these benefits, the adoption of AI raises significant ethical and practical concerns. Wachter-Boettcher (2018) warns of data privacy risks and algorithmic bias, while Verma (2019) stresses the ethical implications of delegating educational decision-making to AI systems, calling for transparency and accountability.

Overall, the literature suggests that while AI holds considerable promise for transforming higher education—through personalised learning, increased engagement, and improved efficiency—it also presents substantial challenges that must be carefully managed to ensure equitable and ethical implementation.

3. Methodology

This study adopts a mixed-methods approach to investigate the impact of Artificial Intelligence (AI) on the value co-creation process within Higher Education Institutions (HEIs). The methodology is designed to capture a comprehensive understanding of how AI contributes to educational practices and administrative efficiency, whilst also identifying associated challenges and ethical considerations.

Quantitative analysis. A structured questionnaire was administered to a sample of faculty members, administrators, and students across several HEIs. The survey aimed to examine perceptions of AI's effectiveness in enhancing learning experiences, engagement, and institutional processes. Its design was informed by the Technology Acceptance Model (TAM) proposed by Davis (1989), with particular emphasis on perceived usefulness and ease of use. Quantitative data from the surveys were analysed using descriptive and inferential statistical techniques. This enabled the identification of patterns and correlations between AI adoption and educational outcomes, in line with the recommendations of Creswell and Creswell (2017).

Qualitative analysis. A series of case studies were undertaken in selected HEIs that have integrated AI technologies into their teaching or administrative systems. Following Yin's (2018) methodological framework, these case studies provided in-depth insights into the practical application of AI and its influence on the educational ecosystem. Semi-structured interviews with educational technology specialists, faculty members, and administrators were conducted to gather qualitative perspectives and experiences of AI in higher education. This approach was consistent with the principles of qualitative inquiry articulated by Seidman (2019). Interview transcripts were subjected to thematic analysis, employing the procedures outlined by Braun and Clarke (2006), to identify emergent themes relating to AI's role in HEIs.

Ethical considerations. All procedures were conducted in accordance with established ethical standards, ensuring voluntary participation, informed consent, and confidentiality for all respondents. The study's design was aligned with the ethical principles for educational research set out by the American Educational Research Association (AERA).

By combining quantitative and qualitative data, this mixed-methods design enables both statistical assessment and contextual interpretation of AI's role in higher education, thereby providing a holistic account of its potential and limitations.

4. Results and Discussion

This section presents the findings from the mixed-methods approach employed in the study, comprising quantitative survey results, qualitative insights from case studies and interviews, and a discussion of these findings in the context of existing literature.

Survey Results:

Figure 1: Faculty Perceptions of AI's Effectiveness in Enhancing Learning Experiences

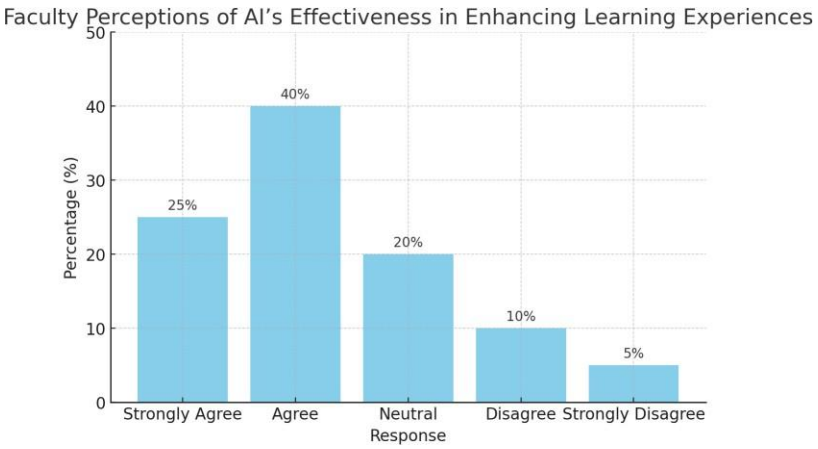

Figure 1 shows the percentage of faculty members who agree, are neutral, or disagree with statements regarding AI's effectiveness in enhancing learning experiences.

Table 1: Student Engagement with AI-Integrated Learning Tools

Metric	Before AI Integration (%)	After AI Integration (%)
Participation Rate	60	80
Completion Rate	50	75
Feedback Score	70	85

Source: Own calculations

Table 1 presents data on student engagement metrics before and after the implementation of AI tools, such as participation rates, completion rates, and feedback scores.

Figure 2: Administrators' Views on AI's Impact on Administrative Efficiency

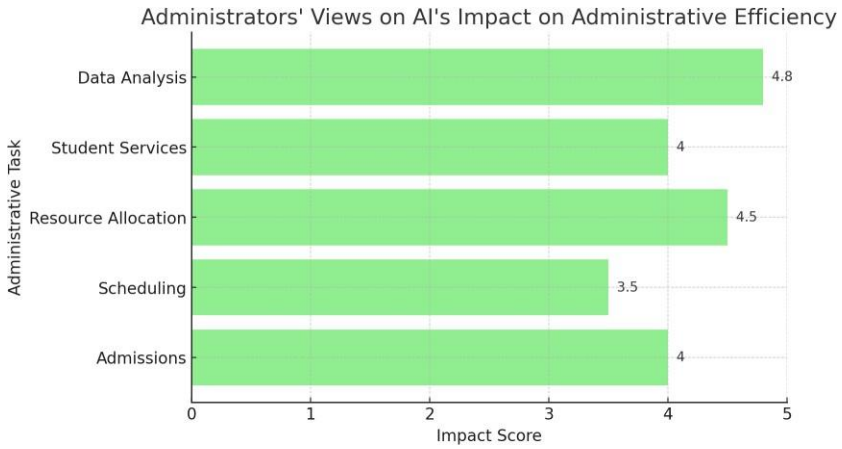

Figure 2 illustrates administrators' perceptions of the impact of AI on various administrative tasks, like admissions, scheduling, and resource allocation. The impact score is on a scale from 1 (Low Impact) to 5 (High Impact). The graph indicates a high impact of AI across most tasks, particularly in data analysis and resource allocation.

Case Study Insights: Case Study 1: Implementation of AI in a specific HEI, with its challenges and outcomes, and Case Study 2: Examination of an alternative application of AI in another HEI, focusing on student results and faculty adaptation.
Interview Themes: Key themes drawn from interviews, such as "AI's Role in Personalised Learning," "Challenges in AI Integration," and "Ethical Considerations in AI Use."
Interpreting Survey Data: The survey results, presented in Figure 1 and Table 1, show a positive trend in faculty and student perception of AI tools, consistent with Hwang and Lai (2017). Figure 2 aligns with Johnson et al. (2016), emphasising improved administrative efficiency via AI.
Case Study and Interview Analysis: The case studies deliver practical insights, showing both the potential and difficulties of AI in HEIs. These real-world examples give depth to the quantitative data and mirror the challenges of AI integration discussed by Verma, S. (2019). Thematic analysis of the interview data affords a nuanced view of AI's impact, reinforcing the concerns about AI ethics noted by Wachter-Boettcher (2018).
Comparative Analysis with Existing Literature: The study's findings concur with wider research on AI in education, particularly concerning enhanced learning experiences and operational efficiency. Yet they also underline persisting challenges, especially ethical and practical, as discussed by Houssein et al. (2023).
The results of this study offer a multifaceted perspective on AI's role in HEIs, underscoring its benefits in improving learning outcomes and administrative functions, whilst also drawing attention to the challenges and ethical aspects requiring consideration.

5. Conclusion

This study has extensively examined the role of Artificial Intelligence (AI) in advancing the value co-creation process in Higher Education Institutions (HEIs). Through a mixed-methods approach, comprising quantitative surveys, qualitative case studies, and interviews, the research provides a nuanced understanding of AI's effect on educational and administrative practices.

The findings indicate that AI substantially contributes to personalising the learning experience, consistent with Hwang and Lai's (2017) insights on AI-driven adaptive learning systems. Faculty and student perceptions, as reflected in the survey data and Graph 1, reveal a positive stance towards AI's role in improving learning experiences. The enhanced student engagement metrics in Table 1 following AI integration further substantiate this position.

Administratively, AI's ability to streamline processes and optimise efficiency is evident from the survey data and Graph 2, reinforcing Johnson et al.'s (2016) conclusions on AI in administrative contexts. Case studies and interviews add practical insights, illustrating the transformative capacity of AI in HEIs while also noting the barriers to implementation and ethical concerns, echoing the issues raised by Verma, S. (2019) and Wachter-Boettcher (2018).

The study, nonetheless, has limitations. The reliance on self-reported data and the restricted scope of case studies may not represent the full spectrum of AI's influence in HEIs. Future investigations might expand on longitudinal studies to assess the long-term implications of AI adoption in education.

In conclusion, this research underscores the transformative capacity of AI in HEIs across educational and administrative spheres. Whilst recognising the challenges and ethical concerns, the study indicates a future where AI may assume a central role in shaping the higher education landscape. The evidence and discussion set forth here contribute to the ongoing debate on AI in education and provide valuable insights for educators, administrators, and policymakers within higher education.

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Interdisciplinary Collaboration in Tackling Real- World Challenges

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ABSTRACT

This paper examines the impact and efficacy of interdisciplinary collaboration in addressing real-world challenges through cross-disciplinary projects. Recognizing the complex nature of contemporary global issues, the study explores how combining knowledge and methodologies from various academic disciplines leads to more innovative and effective solutions. Through a series of case studies involving collaborations between disciplines such as environmental science, economics, engineering, and social sciences, the paper demonstrates the practical outcomes and enhanced problem-solving capacities achieved through such partnerships. The research employs a mixed-methods approach, analysing both qualitative and quantitative data to assess the effectiveness of interdisciplinary projects in real-world problem-solving. Findings reveal that these collaborations not only foster innovative solutions but also promote a deeper understanding of complex issues, enhance student and faculty learning experiences, and encourage a culture of cooperation in academic and research settings. The study contributes to the growing body of literature advocating for integrated approaches to education and problem-solving, highlighting the need for educational institutions and research bodies to facilitate and support interdisciplinary endeavours.

Keywords: Interdisciplinary Collaboration, Cross-Disciplinary Projects, Real-World Problem Solving, Innovation in Education, Integrated Research Approaches.

1. Introduction

The burgeoning complexity of global issues in the 21st century demands a re-evaluation of traditional, discipline-specific approaches to problem-solving. This paper delves into the realm of interdisciplinary collaboration, specifically focusing on cross-disciplinary projects aimed at addressing real-world challenges. The intersection of diverse academic disciplines - encompassing environmental science, economics, engineering, and social sciences - provides a rich landscape for innovative solutions and enhanced understanding of multifaceted problems.

The primary objective of this study is to evaluate the impact and effectiveness of interdisciplinary collaboration in real-world problem-solving. By examining a series of case studies, the research aims to demonstrate how the synthesis of knowledge from various disciplines leads to more comprehensive and effective solutions to complex global issues. This approach resonates with the perspectives of (Haynes, 2011), who advocates for the integration of interdisciplinary approaches in higher education and research to tackle societal challenges more effectively.

Another key goal of the study is to explore the implications of such collaborations for educational and research environments. The hypothesis is that interdisciplinary projects not only contribute to solving real-world problems but also enrich the learning and research experience for students and faculty alike. This aligns with the findings of (Suzuki, 2017), who highlight the transformative potential of interdisciplinary education in fostering a deeper understanding of complex issues.

Furthermore, the study examines the challenges and opportunities presented by interdisciplinary collaborations. Drawing from the work of (Peek & Guikema, 2021), the research investigates the logistical, cultural, and intellectual barriers to effective interdisciplinary work, as well as strategies for overcoming these challenges.

In sum, this paper aims to contribute to the discourse on the need for and benefits of interdisciplinary collaboration in education and research, particularly in the context of addressing complex, real-world problems. Through its findings, the study seeks to provide insights and recommendations for educational institutions and research bodies in facilitating and supporting interdisciplinary endeavours.

2. Literature Review

The importance of interdisciplinary collaboration in addressing complex real-world problems has been increasingly recognized in academic and research circles. This literature review explores the current state of interdisciplinary collaboration, particularly in the context of cross-disciplinary projects aimed at real-world problem solving.

Interdisciplinary collaboration brings together diverse fields of study, creating a holistic approach to complex issues. (Haynes, 2011; Rabin et al., 2021) argues that interdisciplinary approaches are crucial for addressing the multifaceted nature of contemporary global challenges. By integrating different disciplinary perspectives, these approaches provide more comprehensive and effective solutions.

The benefits of interdisciplinary collaboration extend beyond problem-solving to include enhanced educational experiences. (Faber et al., 2014) highlight that interdisciplinary education fosters critical thinking, creativity, and a deeper understanding of complex issues. This educational approach prepares students to think beyond traditional boundaries and equips them with the skills necessary for tackling real-world challenges.

However, interdisciplinary collaboration is not without its challenges. (Halmaghi et al., 2023) discusses the barriers to effective interdisciplinary work, including institutional structures, disciplinary jargon, and varying methodologies. These barriers can hinder the collaboration process, making it difficult for different disciplines to work effectively together.

The potential of interdisciplinary collaboration in driving innovation and progress in various fields is significant. The work of (Peek & Guikema, 2021) underscores the transformative impact of interdisciplinary research on both academic and practical fronts. By bringing together diverse expertise, interdisciplinary projects can lead to groundbreaking innovations and solutions.

Despite the challenges, the value of interdisciplinary collaboration in addressing real-world problems is evident. The literature suggests that with proper support and encouragement, interdisciplinary approaches can significantly contribute to advancing our understanding and resolution of complex global issues.

This review sets the stage for further exploration of interdisciplinary collaboration in real-world problem-solving, providing a foundational understanding of its significance, benefits, and challenges.

3. Methodology

The methodology of this study is structured to critically examine the role and effectiveness of interdisciplinary collaboration in addressing real-world challenges, adopting a mixed-methods design that integrates both qualitative and quantitative approaches. This comprehensive framework enables an in-depth exploration of interdisciplinary projects across diverse academic fields, providing insights into both processes and outcomes.

Quantitative Analysis: A structured survey is developed to assess perceptions and outcomes of interdisciplinary collaborations among faculty and researchers. The survey explores project characteristics, perceived benefits, encountered challenges, and the overall contribution to problem-solving effectiveness.

Sample Selection: To ensure diversity, the survey targets a broad spectrum of academic and research institutions, drawing participants from disciplines such as environmental science, economics, engineering, and the social sciences. Stratified sampling is employed to capture a representative range of projects and contexts.

Data Analysis: Statistical analysis of survey responses is undertaken. Descriptive statistics provide an overview of trends, while inferential methods, including regression analysis, are used to examine relationships between variables.

Qualitative Analysis: Detailed case studies of selected interdisciplinary projects are conducted, involving analysis of project documentation, processes, and outcomes.

Interviews: Semi-structured interviews with key project participants—including leaders and team members—are carried out to capture lived experiences, challenges, and strategies for effective collaboration.

Data Analysis: The qualitative material is examined through thematic analysis, involving systematic coding and the identification of recurrent patterns and themes, thereby offering nuanced insights into interdisciplinary practice.

Triangulation of Data: Evidence from surveys, case studies, and interviews is triangulated to strengthen validity and reliability, allowing cross-verification of findings from multiple perspectives.

Ethical Considerations: Ethical approval is obtained from relevant institutional review boards. Participation is voluntary, informed consent is secured, and confidentiality and anonymity are strictly upheld throughout the research.

This methodology provides a rigorous framework for investigating the dynamics, challenges, and impacts of interdisciplinary collaboration, offering valuable insights into its role in tackling complex real-world problems.

4. Results and Discussion

The study's mixed-methods approach yielded significant findings on the role and effectiveness of interdisciplinary collaboration in addressing real-world challenges.

Survey Results:

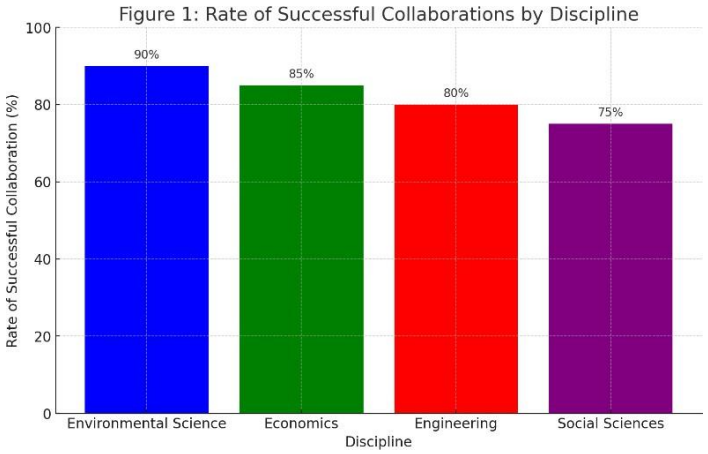
The survey results, as detailed in table 1, indicate the perceptions and experiences of professionals from various disciplines regarding interdisciplinary collaboration. The data shows a high recognition of the positive impact of such collaborations, with Environmental Science reporting the highest (85%) and Social Sciences the lowest (70%).

Table 1: Perceptions and experiences of professionals

Discipline	Positive Impact (%)	Faced Challenges (%)	Successful Collaboration (%)
Environmental Science	85	60	90
Economics	75	50	85
Engineering	80	55	80
Social Sciences	70	65	75

Source: Authors' Calculations

However, a considerable proportion of participants from each discipline faced challenges, with Social Sciences encountering the most (65%). Figure 1 illustrates the rate of successful collaboration across various disciplines. Environmental Science leads with a 90% success rate, followed by Economics (85%), Engineering (80%), and Social Sciences (75%). This visualisation underscores the generally high success rate of interdisciplinary collaborations across different fields, despite the noted challenges.



Qualitative Data Insights:
Themes emerging from interviews and case studies emphasise the enrichment of problem-solving approaches and the generation of innovative solutions through interdisciplinary collaborations. These findings are consistent with the assertions of Marchetti and Puranam (2022) regarding the innovation potential of interdisciplinary work. Participants stressed the importance of effective communication and the establishment of shared goals, in line with the observations of Haynes (2011) and Rabin et al. (2021) on the prerequisites for successful collaboration.

Challenges in Interdisciplinary Collaboration:
The study also identifies several challenges, notably logistical constraints and methodological divergences, reflecting the barriers highlighted by Suzuki (2017). These challenges underscore the necessity of developing stronger structural and communicative frameworks to facilitate more effective interdisciplinary engagement. Overall, the results reaffirm the significant potential of interdisciplinary collaboration in enhancing problem-solving capacity across diverse fields. Despite the difficulties encountered, the positive outcomes and high levels of success suggest that interdisciplinary collaboration represents a valuable strategy for addressing complex real-world issues. The study contributes to the ongoing advocacy for integrated approaches in both education and research, highlighting the essential role of institutional support in sustaining interdisciplinary initiatives.

5. Conclusion

The conclusion of this study synthesises the principal findings and implications of interdisciplinary collaboration in addressing real-world challenges. The mixed-methods approach, incorporating surveys, interviews, and case studies, has provided a comprehensive understanding of the dynamics, effectiveness, and challenges inherent in interdisciplinary projects across a range of academic disciplines.

Survey results demonstrate strong recognition of the positive impact of interdisciplinary collaboration, with significant proportions of professionals in Environmental Science, Economics, Engineering, and the Social Sciences reporting beneficial outcomes. These positive experiences, however, are tempered by persistent challenges such as logistical constraints and methodological divergences, highlighting the need for more robust frameworks to support interdisciplinary practice.

Qualitative insights derived from interviews and case studies further underscore the enrichment of problem-solving strategies and the generation of innovative solutions through interdisciplinary engagement. These findings corroborate Halmaghi et al.'s (2023) arguments on the innovation potential of interdisciplinary work and align with Haynes (2011) and Cohen et al. (2021), who stress the importance of communication and shared objectives in effective collaboration.

Despite the challenges identified, the overall positive outcomes and high levels of success reinforce the significant potential of interdisciplinary collaboration in tackling complex global issues. This study contributes to the expanding literature advocating integrated approaches in education and research, emphasising the crucial role of institutional support. In conclusion, interdisciplinary collaboration emerges as a vital strategy for addressing the multifaceted challenges of contemporary society, with educational and research institutions strongly encouraged to foster and sustain such initiatives.

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Motivating Students for Success: A Review of New Projects in Teaching Based on STEM Education

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ABSTRACT

Motivation encompasses emotional, social, and biological dimensions, acting as a key determinant of directed behaviour and the attainment of goals. It encourages individuals to strive for excellence, doing their utmost to accomplish what they desire and overcome obstacles. Within higher education, student motivation has become central to achieving satisfaction, performance, and productivity. As the driving force of academic work, motivation is linked to quality of life, a fundamental principle on both personal and institutional levels in universities. To address recurring waves of demotivation, educators and researchers have adopted new techniques and expanded perspectives on teaching. STEM education has emerged as essential in meeting the demands of a rapidly evolving world. Evidence from STEM education research shows that active-learning approaches significantly enhance student learning. This study employs a quantitative approach to examine how students perceive these active-learning methods and to what extent they feel motivated by such changes.

Keywords: STEM education; motivation; pedagogy; technology; digital revolution

1. Introduction

The educational landscape, particularly within STEM (Science, Technology, Engineering, and Mathematics), has been profoundly transformed by the wide-reaching effects of the COVID-19 pandemic. Universities worldwide were compelled to adjust rapidly, prompting shifts away from traditional teaching models and underscoring the pivotal role of motivation in sustaining the learning process.

Amid the pandemic, students faced unprecedented challenges such as remote learning, social isolation, and heightened uncertainty about the future. The three core components of motivation—drive, direction, and persistence of behaviour—become central to understanding how students adapt and remain engaged in this new educational paradigm shaped by crisis (Cunha et al., 2019; Cunha, 2022).

In this context, the integration of team-based learning within STEM education assumes particular significance. With the restrictions imposed by COVID-19, collaborative and team-oriented pedagogies emerged as indispensable for sustaining motivation and meeting educational objectives. Such approaches not only align with motivational principles but also enhance achievement and persistence, factors especially relevant in disrupted learning environments (Santos et al., 2016; Ferreira & Dias, 2017).

The recognition of active methodologies and innovative practices further illustrates the adaptability of educational institutions in overcoming pandemic-related barriers. This emphasis reflects a conscious effort to preserve motivation and engagement in hybrid or remote settings. As universities increasingly embed active methodologies into standard practice, it becomes evident that the pursuit of quality education and student motivation endures despite the challenges posed by the pandemic (Tamayo & Paschoal, 2013).

The nexus between motivation, quality of life, and university growth gains particular relevance in the context of COVID-19. Motivated students, as underscored in the text, are more likely to uphold their commitments to the university, thereby contributing to its growth and success. This assumes heightened importance during a period when the traditional dynamics of university life are disrupted, underscoring the necessity of a motivated and committed student body (Ferreira & Dias, 2017).

In conclusion, this investigation intricately weaves together the dynamics of human motivation, STEM education, and the challenges presented by the COVID-19 pandemic. The focus on motivation, active methodologies, and team-based learning underscores the resilience and adaptability of educational institutions in the face of unprecedented disruptions, ensuring the continual pursuit of quality education despite the global health crisis (Ribeiro, Passos & Pereira, 2018). The historical trajectory of STEM education, rooted in various milestones and developments, attests to the enduring importance of science, technology, engineering, and mathematics in shaping educational landscapes throughout history.

Table 1: Key moments and trends in the history of STEM (Science, Technology, Engineering, and Mathematics) education

Ancient Civilisations: The origins of mathematics and science can be traced to ancient civilisations such as the Babylonians, Egyptians, Greeks, and Romans. They made significant contributions to mathematics, astronomy, and engineering.
Renaissance and Scientific Revolution: The European Renaissance (14th–17th centuries) witnessed a revival of interest in science and mathematics. Pioneers such as Galileo Galilei, Johannes Kepler, and Isaac Newton made groundbreaking discoveries, laying the foundations for modern science and mathematics education.
Industrial Revolution: The 18th and 19th centuries brought the Industrial Revolution, increasing the demand for individuals with technical and engineering expertise. Technical schools and vocational education programmes emerged to fulfil these needs.
20th Century: Early 20th-century education formalised science and mathematics teaching, with an emphasis on traditional subjects. Over time, education evolved as new scientific and technological fields emerged.
Space Race: The Cold War period, particularly the Space Race between the United States and the Soviet Union in the 1950s and 1960s, stimulated renewed interest in science and mathematics education. Governments invested heavily to advance space exploration and technology.

Sputnik and STEM Education Reform: The launch of the Soviet satellite Sputnik in 1957 prompted substantial educational reforms in the United States. The National Defence Education Act of 1958 and related initiatives sought to strengthen STEM education to compete with the Soviet Union in science and technology.
Computing Revolution: The rise of computers and the information age in the latter half of the 20th century highlighted the importance of computer science and technology education. Computer programming became an essential skill.
STEM as an Educational Concept: The term "STEM" gained prominence in the 21st century, reflecting growing recognition of the interconnection between science, technology, engineering, and mathematics. STEM education became a formalised approach to teaching and learning.
21st Century STEM Education: In the 21st century, STEM education has become a global priority. Governments, educational institutions, and organisations have focused on enhancing STEM education to prepare students for STEM-related careers and to address global challenges such as climate change, healthcare, and technological innovation.
Diversity and Inclusion: There is a growing emphasis on fostering diversity and inclusion in STEM education to ensure that individuals from all backgrounds have equitable access to STEM opportunities and career pathways.
Online and Digital Learning: The expansion of online education and digital learning platforms has broadened access to STEM education, enabling students to engage with STEM subjects remotely and at their own pace.

Source: Sousa et al. (2022)

STEM education continues to evolve, placing increasing emphasis on hands-on, inquiry-based learning, interdisciplinary approaches, and the integration of emerging technologies. It remains crucial in preparing individuals for the challenges and opportunities of the contemporary world (Cunha et al., 2019; Cunha, 2022; Sousa et al., 2022).

STEM Learning and Development

Research conducted by Sousa et al. (2022) demonstrates that active-learning approaches within STEM education significantly improve overall student learning outcomes. STEM is understood as an integrated pedagogical approach encompassing Science, Technology, Engineering, and Mathematics. The aim is to combine these disciplines to foster critical thinking, problem-solving, creativity, and innovation (Cunha et al., 2019; Cunha, 2022; Sousa et al., 2022). STEM education occurs in multiple contexts, including formal classrooms, after-school programmes, summer schools, and online courses. It is regarded as essential for equipping students to meet 21st-century challenges and for stimulating innovation and economic growth across industries (Cunha et al., 2019; Cunha, 2022).

Team-Based Learning

Team-Based Learning (TBL) is an active learning instructional strategy employed in diverse educational contexts to enhance student engagement, critical thinking, collaboration, and problem-solving skills. Developed by Larry Michaelsen and colleagues in the 1970s, TBL has gained widespread adoption in both K–12 and higher education (Cunha, 2022; Sousa et al., 2022).

Table 2: Key principles and components of Team-Based Learning

Formation of Teams: Students are organised into permanent, diverse teams at the commencement of a course or specific module. These teams usually comprise 5–7 members, with attention given to diversity in terms of backgrounds, skills, and perspectives.
Preparation Before Class: Prior to attending a team-based learning session, students are provided with pre-class materials, including readings, videos, or assignments, to familiarise themselves with the content to be covered. This ensures readiness for active participation during the in-class session.

Readiness Assurance Process (RAP): During the session, the instructor administers a Readiness Assurance Test (RAT) individually or as a team. This assesses students' comprehension of the pre-class materials. RATs often take the form of multiple-choice questions. Students first complete the test individually and then collaboratively, fostering accountability and discussion.
Immediate Feedback: Instructors provide instant feedback on the RATs to clarify misconceptions. This enables students to learn from errors and secure a strong understanding of foundational concepts.
Application Activities: Following RATs and feedback, students engage in application exercises that require collaborative knowledge application. These activities may include problem-solving tasks, case studies, discussions, debates, or practical projects.
Team Dynamics: Team-based learning cultivates teamwork and collaborative skills. Members must cooperate to solve problems, exchange ideas, and reach consensus, promoting communication and interpersonal competence.
Instructor Facilitation: Instructors act as facilitators, guiding discussions, addressing questions, and keeping teams focused. The emphasis is on peer learning rather than exclusive reliance on the instructor.
Assessment and Evaluation: Assessment encompasses both individual and team performance. Individual results on RATs and assignments are evaluated alongside the quality of team discussions and contributions.
Reflection and Feedback: Opportunities for reflection are integral, including peer and self-assessment, to enhance team dynamics and learning experiences.
Continuous Improvement: Team-based learning promotes ongoing refinement in teaching and learning. Instructors can adapt strategies based on feedback, and students can progressively enhance teamwork and problem-solving capabilities.

Source: Sousa et al., (2022)

Team-Based Learning is effective in promoting deep learning, higher-order thinking skills, and student engagement (Sousa et al. 2022). It is particularly well-suited for courses where problem-solving, critical thinking, and collaboration are important learning objectives, such as in healthcare education, business, and the sciences (Cunha, 2022; Sousa et al., 2022).

Differences Between Team-Based Learning and Other Active Learning Methods

Team-Based Learning (TBL) is one of several active learning strategies employed in education. While TBL shares common principles with other active learning approaches, it also exhibits distinctive characteristics that differentiate it (Cunha et al., 2019; Cunha, 2022). In TBL, students are organised into permanent teams that collaborate throughout a course or module. This contrasts with other active learning methods, where students may work in varying groups or individually for each activity. The permanence of teams in TBL fosters accountability, trust, and collaborative cohesion among members.

TBL places considerable emphasis on pre-class preparation. Students are expected to review assigned materials—such as readings, videos, or tasks—prior to attending class. This ensures that participants arrive with foundational knowledge, enabling deeper engagement during in-class activities. By comparison, other active learning strategies may not require extensive pre-class preparation. TBL also incorporates a Readiness Assurance Process (RAP), involving individual and team assessments, including the Readiness Assurance Test (RAT). This process ensures a baseline comprehension before proceeding to application activities, a feature often absent in alternative active learning methods.

Structured team activities follow the RAP, including problem-solving exercises, case studies, debates, or complex tasks that necessitate consensus. Other active learning strategies may feature less structured or variable group activities. TBL emphasises immediate feedback, with instructors providing prompt clarification on RATs and other assessments. This rapid feedback loop is a hallmark of TBL.

Instructors in TBL generally adopt a facilitative role, guiding discussions and offering clarification when required. Other active learning methods may involve more direct content delivery or instructional guidance. TBL combines individual and team assessments, with individual assessments evaluating personal comprehension and team assessments assessing collaboration and application of knowledge. Alternative active learning strategies may focus primarily on one assessment type.

Due to the permanence of teams, TBL strongly emphasises team dynamics and interpersonal skill development. Methods with frequently changing groups may not prioritise these elements to the same extent. TBL also integrates reflective practices, including peer evaluations and self-assessments, supporting continuous improvement.
While TBL provides a structured, team-focused approach, the selection of active learning methods should align with specific learning objectives and context. Other strategies, such as problem-based learning, flipped classrooms, or group discussions, may be more suitable depending on course goals and content (Cunha et al., 2019; Cunha, 2022).

2. Methodology

Given the intention of approaching the phenomenon with the ultimate objective of understanding its various characteristics, it was considered that a quantitative methodological approach would be the most suitable for this research (Cunha & Santos, 2018). The quantitative approach employed the survey method. The sampling technique used was convenience sampling, due to the absence of a formal sampling frame. Questionnaires were distributed via email, resulting in a non-probabilistic, snowball sample comprising 1,266 students. Collected data were recorded in a Microsoft Excel spreadsheet after screening returned questionnaires and subsequently analysed using the Statistical Package for the Social Sciences (SPSS version 27.0).
This study relied on a questionnaire survey. To ensure that only students formed the sample, the questionnaire included an initial query confirming the respondent's student status; non-students were instructed not to proceed. The research adhered to ethical standards for academic studies: participation was entirely voluntary and conducted anonymously. No personally identifiable data were collected. Participants were briefed on the study and provided informed consent prior to completing the questionnaire. No incentives were offered, and participants were free to withdraw from the study at any stage.

3. Results And Discussion

Sociodemographic Profile

A sociodemographic profile comprises a set of data and characteristics that describe a population or group of individuals based on various social and demographic factors. These elements provide insights into the composition and traits of a specific group. Sociodemographic profiles are employed in numerous contexts, including public policy development, marketing and advertising targeting, healthcare planning, and social research. By understanding the sociodemographic characteristics of a population, organisations and policymakers can adapt their strategies and services to meet the particular needs and preferences of distinct groups.
The sample's demography was analysed regarding its different characteristics. Findings revealed that, of the 1,266 participants in this study, 65% are female and 35% are male. Academic qualifications were also examined. As previously stated, the study aimed to include only students; therefore, the questionnaire initially asked respondents to confirm their student status, with non-students instructed not to proceed. Consequently, the sample consists exclusively of university students aged 18 to 47 years: 69% are undergraduate students, while 31% are postgraduate, master's, or doctoral students. Additionally, the students' regions of residence during their studies were verified: 39% reside in Portugal, 37% in other European countries, 18% in Africa, and 6% in the USA.

Descriptive Statistics

Descriptive statistics were employed to summarise and characterise the features of the sample. These statistics assisted in detecting outliers, assessing data quality, and informing subsequent analyses or modelling. They also enabled effective communication of findings to a wider audience. Regarding the descriptive statistics for the questionnaire items on the team-based learning methodology, all items received high scores, with most exceeding the intermediate value of the scale. This outcome suggests that the majority of students held a favourable perception of the method employed. Students particularly appreciated the team-based learning format as it allowed greater interaction with peers compared to traditional lecture-based classes (Cicha, Rizun, Rutecka, & Strzelecki, 2021).

Means and Standard Deviations

The mean represents the average value of a dataset, while the standard deviation indicates the typical amount of variability within the data. It reflects, on average, how far individual values deviate from the mean. A high standard deviation implies that values are generally dispersed from the mean, whereas a low standard deviation indicates clustering near the mean. Both the mean and standard deviation are fundamental for describing the shape and dispersion of a distribution (Marroco, 2020).

Table 3: Means and standard deviations

Item	Mode	Mean	SD
Team-based learning sessions provided me with greater opportunities to interact with peers than traditional (lecture-based) classes.	4	3.87	1.09
Group discussions during the questionnaire allowed me to correct mistakes and enhance my understanding of the curricular unit topics.	4	3.98	1.07
Completing the questionnaire individually assisted me in learning the subjects of the curricular unit.	4	3.65	0.99
I felt more at ease in a team-based learning session than in a traditional (lecture-based) class.	3	3.46	1.26
Team-based learning sessions aided my preparation for assessments within the curricular unit.	4	3.75	1.25
I would like to participate in team-based learning sessions in additional curricular units.	3	3.14	1.29
Team-based learning sessions helped me to better comprehend the subjects of the curricular unit.	4	3.78	1.25
Team-based learning classes motivated me more than traditional (exhibition classes)	3	3.05	1.18
The study materials available on Moodle are suitable for My study method	4	3.52	1.24
I like studying by videos more than reading texts	4	3.50	1.14
When I didn't study the materials available on Moodle, I Felt uncomfortable in team-based learning classes	4	3.46	1.22
I regularly studied the materials available on Moodle Before the team-based learning class was held	4	3.15	1.013
Often, after the team-based learning class, I reviewed the Study materials are available on Moodle.	3	2.98	1.15
I felt integrated into my working group	4	4.21	0.867
I had a collaborative attitude in the discussions of the the questionnaire with my group	4	3.89	0.91
I learn better working in groups than working alone.	4	3.49	0.97
My group has shown to be motivated to discuss the questionnaire the	4	3.21	1.12

When analysing the descriptive statistics for the questionnaire items regarding reactions to the TBL methodology, it is evident that all items scored above the midpoint of the scale. This suggests that the majority of students held a favourable perception of the TBL approach.

Students highlighted that TBL was particularly valuable as it provided opportunities for communication and learning through discussion with peers, a dynamic largely absent in traditional lecture-based classes (Cunha et al., 2019; Cicha, Rizun, Rutecka, & Strzelecki, 2021; Cunha, 2022). They also noted that the use of Individual Questionnaires, or Readiness Assurance Tests (RATs), offered a novel and interactive perspective on learning, aiding preparation for assessments.

The item "neither agree nor disagree" received numerous responses, reflecting students' varied perceptions of this new instructional method. It was also evident that learners were more motivated to engage in TBL sessions, demonstrating a positive perception of the methodology and expressing interest in its application across other subjects.

The positive outcomes from this TBL survey can be attributed to its innovative and dynamic nature compared with previous pedagogical practices. It is important to emphasise that TBL represents a disruptive methodology relative to students' established learning habits.

The descriptive statistics further illuminate aspects of student engagement, including interaction with the methodology, participation in the course, and utilisation of learning resources. These resources predominantly comprised instructor-prepared materials, including short videos to clarify complex concepts, alongside weekly text-based study tasks. Findings indicate that while materials aligned with students' study preferences, video resources were generally preferred over text.

A critical factor for TBL's effectiveness is the pre-class review of study materials (Cunha et al., 2019; Cunha, 2022; Sannathimmappa, Nambiar, Aravindakshan, & Kumar, 2022). Only approximately 43% of students consistently engaged with pre-class materials, as reflected by combined "totally agree" and "agree" responses. Similar trends were reported by Tomas, Evans, Doyle, and Skamp (2019), Cunha et al. (2019), and Cunha (2022), with time constraints, lack of motivation, and difficulties in self-study cited as primary obstacles. Students reported feeling less confident in sessions when materials were not reviewed beforehand and rarely revisited content post-class.

Questions regarding perceptions of group work, another key component of TBL, revealed high integration within teams and a collaborative attitude among peers, consistent with the literature (Kibble et al., 2016). Teams adhered to recommended sizes of 5–7 members and included diverse cognitive styles to promote dynamic discussion and motivation. However, motivation decreased during RAT discussions, likely due to insufficient prior engagement with preparatory materials.

4. Conclusion

In conclusion, team-based learning (TBL) represents a pedagogical approach that has garnered recognition and growing adoption across diverse educational contexts. It fosters collaboration, critical thinking, and active engagement among students. Through structured activities, team discussions, and assessments, TBL encourages a deeper comprehension of course content and the development of essential competencies, including communication, problem-solving, and teamwork.

Evidence indicates that TBL enhances student performance while cultivating a more interactive and dynamic learning environment. By promoting peer teaching and accountability within teams, it enables students not only to master subject matter but also to prepare for real-world challenges, where collaborative skills are often indispensable for success.

As educational practices continue to evolve, TBL is likely to remain an effective and valuable strategy for instructors. It aligns with the growing emphasis on active learning and the necessity for graduates to possess strong interpersonal and problem-solving capabilities. Future developments may include the integration of digital technologies to facilitate flexible and remote learning, as well as adaptations to meet the diverse needs of students.

In summary, team-based learning has demonstrated its value in education by fostering a collaborative, active, and effective learning environment. It equips students with both disciplinary knowledge and essential life skills, positioning it as a promising and sustainable strategy for the future of higher education.

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RESUMOS | ABSTRACTS

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Club Tracker

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ABSTRACT

In the contemporary context, wherein sport extends beyond the realm of physical activity to constitute a significant cultural and lifestyle phenomenon for millions of individuals worldwide, the *ClubTracker* project is conceived as an innovative and timely intervention. The initiative aims to strengthen the relationship between supporters and their respective clubs by developing a mobile application, underpinned by an application programming interface (API), that provides objective, reliable, and systematically organised information on fixtures, athletes, and performance metrics. The *ClubTracker* platform is designed as a comprehensive, user-centred solution that addresses the requirements of a diverse audience of sports consumers. This encompasses both highly committed supporters, who demonstrate enduring allegiance to their club, and more casual observers, who seek an accessible and engaging means of remaining informed. The project explicitly acknowledges international supporters who are geographically unable to attend matches, as well as emergent digital-native audiences who prefer to consume sports content via online and mobile technologies. In this regard, *ClubTracker* aspires to function as an integrative and unifying platform, cultivating a globalised community of supporters. The distinctive contribution of *ClubTracker* lies in its commitment to consolidating multi-sport data within the context of a single club. In contrast to existing applications that tend to focus narrowly on individual sports or leagues, *ClubTracker* adopts a holistic approach by aggregating information from all disciplines affiliated with a club. This comprehensive model ensures that supporters, irrespective of their sporting preferences, may access accurate and detailed information through a singular, coherent interface. Furthermore, the application incorporates innovative mechanisms for virtual supporter engagement, enabling users to interact, exchange perspectives, and express collective enthusiasm. Such features include real-time chat functionality during live fixtures, thereby fostering social cohesion and a sense of shared identity among supporters dispersed across different geographical locations.

Figure 1: Mockups

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Country Quest

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ABSTRACT

Country Quest is a web-based game with the mission of enhancing global awareness and cross-cultural understanding by offering immersive and intellectually engaging explorations of countries worldwide. For its development, React was used for the frontend, C# and ASP.NET for the backend, and Firebase for the database and storage. This innovative platform not only delivers knowledge about different nations but also ensures an enjoyable learning process by combining entertainment with education. The user interface is central to this vision, acting as a key element in providing an engaging experience. The game's activities are structured to give players comprehensive insights into geography and culture through continental crossings, quizzes, and rankings. Early feedback has been positive, with users highlighting the dynamic and enjoyable character of the game. The seamless integration of education, entertainment, and game mechanics fosters a sense of community among players. Development focused on refining core mechanics and expanding the content library. The overarching goal is to make *Country Quest* accessible and stimulating for all users, regardless of prior knowledge. Ongoing user testing is expected to optimise the interface for maximum educational impact further. Figure 1 presents a brief overview of the Country Page, illustrating the design and features that contribute to the success of *Country Quest*.

Figure 1: Portugal Country Map Page.

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Virtual Academy: Integrating Tutor Interaction and Learning Materials for Comprehensive Language Education

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ABSTRACT

Online language learning has traditionally been segmented into platforms providing either tutor connections or learning materials, but seldom both. This separation creates a gap in the market, where tutors require external resources and students lack personalised feedback unless they engage private tutors. The Virtual Academy Platform addresses this issue by integrating teaching and learning within a unified environment.

This platform functions as a comprehensive language education solution, combining an extensive library of instructional materials with a network of qualified tutors. It facilitates seamless interaction between learners and instructors, delivering real-time feedback, customised learning pathways, and interactive sessions. This approach not only enhances the learning experience but also improves teaching efficiency by granting tutors immediate access to a broad range of resources. Research, including studies by Jabeen, Shazi, and Thomas, as well as Ajay, underscores the advantages of such integrated methods in improving language acquisition and learner engagement.[1]

The Virtual Academy Platform is expected to strengthen language proficiency, foster higher engagement through its interactive and individualised approach, and streamline lesson preparation and delivery for tutors, while providing an overall improved experience for learners and increasing user confidence.

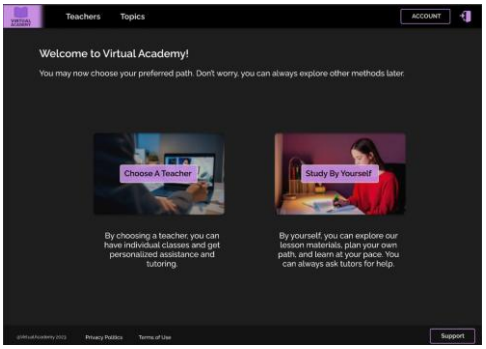

Figure 1: Path selection page.

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Digital Chef

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ABSTRACT

In an increasingly interconnected and visually driven world, cuisine is no longer defined solely by flavour but also by presentation and the act of sharing. The *Digital Chef* website represents an innovative virtual environment that combines a passion for gastronomy with the convenience of the digital era[1]. This online platform provides culinary enthusiasts with an engaging opportunity to share, discover, and draw inspiration from a wide range of recipes. As users explore *Digital Chef*, they are immersed in a rich and visually appealing culinary universe in which recipes occupy centre stage. Interactive features, such as comments and likes, foster engagement and cultivate a sense of community among cooking enthusiasts.

The site's frontend was developed using React, the backend with Express.js, and its database is powered by MariaDB. Custom APIs were implemented to connect the frontend and backend, while the FatSecret API was employed to calculate caloric values and macronutrient profiles for both recipes and individual ingredients, thereby enhancing the user experience.

However, the capabilities of *Digital Chef* extend far beyond visual appeal. Users can explore, store, and even create step-by-step tutorials for their preferred recipes, accompanied by detailed images. The platform provides comprehensive nutritional data for each recipe, including caloric content and key macronutrients, enabling users to make informed decisions about their dietary practices. Additional features allow users to save favourites, generate shopping lists, and access an updated homepage feed showcasing the latest recipes.

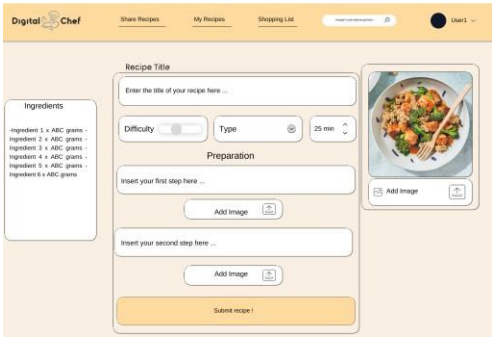

Figure 1. Prototype image

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Quiz Quest

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ABSTRACT

Quiz Quest is an interactive quiz application conceived as an engaging educational platform with the potential to reach a wide user base. The design integrates gamification strategies, including points and star-based rewards, in order to enhance motivation and render the learning process both enjoyable and effective. Its innovative contribution resides in the integration of pedagogical content within a game-oriented framework, thereby differentiating it from conventional quiz applications. The selection of quiz categories was deliberately broad, aiming to cover diverse areas of general knowledge and appeal to a heterogeneous audience. Considerable emphasis was placed on the development of an intuitive user interface to optimise accessibility and user satisfaction. The iterative design process incorporated systematic testing and user feedback, which informed the refinement of both functionality and content. Future development plans include the expansion of quiz categories, the introduction of additional interactive components such as competitive challenges, and the incorporation of social features to foster sustained engagement. Furthermore, prospective collaborations with educational institutions are envisaged to position Quiz Quest as a valuable pedagogical tool within formal learning contexts
.

Figure 1: Quiz Quest.

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EnigmaONG

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ABSTRACT

EnigmaONG, a transformative application, is committed to aggregating and presenting critical information from around the world, highlighting urgent issues such as hunger, access to clean water, poverty, education, health, and fundamental human rights. Through varied content, including images, videos, and articles (figure 1), the app illuminates global inequalities, raising awareness and fostering understanding.

Beyond sharing information, *EnigmaONG* actively promotes volunteer campaigns, encouraging people to take part in collective efforts to reduce disparities.

In a world characterised by conflict and deprivation, the app operates as a catalyst for positive change, seeking to inspire joint action and build a future where compassion prevails over adversity.

Furthermore, *EnigmaONG* integrates a donation feature, substantially supporting efforts to reduce inequality. This capability reinforces the app's commitment to delivering practical, compassionate responses and helping to create a fairer world.

The application will be developed in a cross-platform environment. Its main focus will be the mobile application, while the web version will serve for management.

Figure 1 - News Page

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Let'sMove: An event-based solution for the practice of teams sports

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ABSTRACT

The practice of sports is highly popular among diverse groups of individuals. It plays a key role in improving both the physical and psychological well-being of those who engage in it, thereby enhancing overall quality of life [1]. Nevertheless, certain obstacles arise when people attempt to start playing a sport, particularly in team contexts. Individuals who lack skills or sufficient contacts often struggle to assemble a team. To address this, the present article introduces a solution in the form of an event-based mobile application [2], designed to help people connect and organise matches more easily. By enabling users to create events for specific sports, the app displays these to nearby players, allowing them to join, view available positions, and access essential match details.

In addition, we evaluated our event-based mobile application, ensuring that it includes all necessary features to facilitate sports participation according to individual preferences. User feedback has been collected to refine and expand functionality. Results indicate that after deployment, many facilities (e.g., stadiums) for both individual and team sports remained almost fully occupied. We therefore conclude that the application has had a positive impact on users' lifestyles. Figure 1 presents the home screen of the Let'sMove event-based mobile application.

Figure 1: Let'sMove homepage

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Search for Pairs

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ABSTRACT

"Search for Pairs" distinguishes itself as an innovative game, seamlessly combining the classic match-three puzzle format with an immersive three-dimensional setting. As players explore this visually impressive environment, they encounter numerous intricately designed 3D objects, challenging them to think spatially and strategically.

Unlike traditional match-three titles, *"Search for Pairs"* moves beyond static puzzle grids. Its dynamic and evolving worlds introduce genuine depth, both literally and conceptually, to the gameplay. Reveal hidden secrets and journey through captivating dimensions by skilfully swapping and aligning identical objects.With its unique combination of engaging mechanics, striking visuals, and progressively challenging stages, *"Search for Pairs"* provides an unmistakably distinctive gaming experience. Step into a realm where matching surpasses the ordinary, redefining the potential of puzzle-based entertainment.

"Match 3D" leverages the versatility of Unity's toolset, integrating dynamic object motion with Unity DOTween. This robust tweening framework refines gameplay by ensuring fluid and visually appealing object transitions. Moreover, Unity's built-in solutions for text and image handling enable seamless integration of compelling visuals and clear information, supporting a rich and immersive narrative. The synergy of DOTween's animation capabilities with Unity's comprehensive text and image tools ensures *"Match 3D"* delivers a refined, visually captivating experience.

Figure 1: Prototype

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E-Voting using the Blockchain and AI

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ABSTRACT

This study investigates the novel integration of electronic voting (e-voting) systems with blockchain technology, reinforced by artificial intelligence (AI) for liveness detection, to guarantee secure and transparent electoral processes. The research analyses the role of blockchain as a decentralised and tamper-resistant data infrastructure, delivering a robust level of protection within e-voting environments. The integrity of the system is further strengthened by embedding AI-based liveness detection algorithms, which reduce risks of fraud and identity spoofing.

This paper introduces a unified framework that combines these technologies, tackling critical challenges of contemporary e-voting solutions, including vulnerabilities and the safeguarding of voter privacy. By implementing advanced web technologies, a cohesive integration of Python with OpenCV, ASP.NET Core, and MongoDB supports the rapid development of scalable, data-intensive platforms with advanced image analysis capabilities.

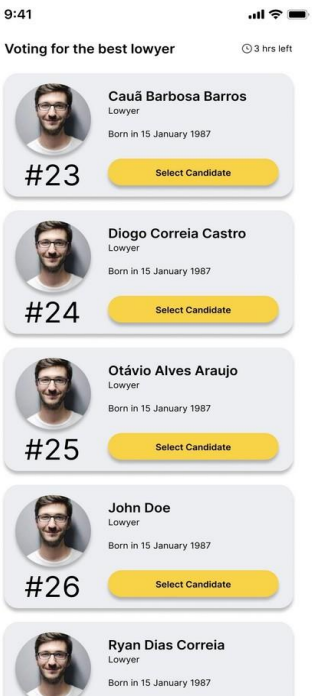

Figure 1: Mobile app, home page

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Active Material Cost Optimization of High-Voltage Induction Motors

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ABSTRACT

Sustainability has become a crucial driver shaping industrial equipment design. Electric machines are engineered not only to improve operational performance but also to minimise resource use and waste generation, as consistently pursued by WEGeuro, a manufacturer of high-performance motors for decades. This study presents an optimisation procedure for high-voltage induction motors aimed at reducing active material costs. The optimisation task was addressed by systematically adjusting design parameters of these motors [1]. The method was implemented with analytical optimisation tools using a direct search technique, the Nelder–Mead Simplex algorithm [2].

Key design factors, including slot geometry, core length, and stator windings, were carefully varied during optimisation because of their major impact on the volume of active materials, namely aluminium, copper, and steel. Regarding constraints, particular attention was given to limiting inrush current, maintaining efficiency, and controlling peak magnetic induction to avoid compromising machine performance. Additionally, mechanical and production constraints were considered.

The optimisation results were validated through finite element (FE) analysis using Ansys Maxwell. The FE electromagnetic assessment examined saturation, harmonic content in current waveforms, and also torque and efficiency. Fig. 1 shows a refined mesh and the computed magnetic flux density of one of the motors assessed.

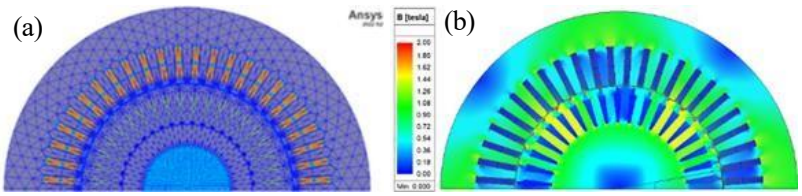

Figure 1: Finite element analysis of an induction motor. (a) Generated mesh. (b) Magnetic flux density

The overall results of this procedure demonstrated significant reductions in active material costs, ranging between roughly 8% and 24% for the studied machines, while adhering to operational and production constraints. An additional advantage was improved efficiency with reduced harmonic content in most cases. Future studies should expand beyond material volume and cost to include other relevant industrial expenses.

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Exploring the History of Ukraine Using AI-Powered Interactive Geospatial Technologies

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ABSTRACT

This project seeks to develop a comprehensive interactive map that documents Ukraine's rich history, highlighting significant events, figures, sites, and related themes shown in Fig. 1. It has the potential to become the most extensive, detailed, and first AI-powered resource for visualising Ukrainian history online, ensuring accurate and efficient data presentation while making historical knowledge more engaging and accessible. The platform, designed with usability in mind, will function as a dynamic educational resource, enabling global reach and promoting Ukraine's cultural legacy. The interface will feature both Ukrainian and English options, benefiting not only learners of all ages in Ukraine but also audiences worldwide who have shown an interest in Ukraine since the events of 2022.

The backend processing will utilise Python with its robust libraries for AI implementation and data handling. The frontend will employ JavaScript frameworks such as Leaflet.js or Mapbox, ensuring an interactive and adaptive user experience. The methodology combines AI-assisted web scraping for data acquisition, Natural Language Processing (NLP), and Named Entity Recognition (NER) for data refinement. A structured database will store processed information, and an interactive map will be created to display these insights clearly, as illustrated in Fig. 1. The content aligns with the Ukrainian history curriculum approved by the Ministry of Education of Ukraine.

By delivering Ukraine's history in this innovative format, the project acts both as an academic tool and as a cultural link, deepening understanding and appreciation of Ukraine's significance in world history.

Figure 1: Mock-up of the main page

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An innovation project at the IPB: higher education for all

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ABSTRACT

Epistemologically, higher education (HE) is frequently perceived as a space for "receiving" knowledge and skills rather than "giving", a venue for observing creation rather than participating in it. Yet in the new millennium, HE institutions have progressively revisited constructivism and expanded its scope towards a more participatory paradigm. Accordingly, cocreation ecosystems, to borrow the IPB president's expression, have flourished and fostered diverse projects, initiatives, and methodological frameworks, of which Demola at the IPB is particularly noteworthy.

Participatory methodologies were initiated by a team of professor-researchers, junior scholars, and collaborators with impairments within the project "Culture for All Bragança", undertaken by the IPB for the Municipality of Bragança. Over two years, we collaborated to develop several resources, enabling us to gain substantial expertise in cocreation, particularly within local cultural settings. This experience motivated us to focus on the IPB itself—initially only at the campus level—to implement similar resources addressing the varied needs of both students and staff. Our overarching aim is to contribute towards making the IPB a more inclusive institution for all.

This paper reports on the project's progress, from the joint diagnosis of accessibility conditions in the three campus schools and central services to the production of 2.5D/high-relief maps and mediation texts incorporating audio description, Portuguese Sign Language, and easy-to-read formats. By working directly with people with impairments, we sought to confront the challenges posed by contemporary social expectations and the evolving labour market, which demands professionals capable of engaging with diversity, whether functional, ethnic, or otherwise.

Keywords: cocreation; participatory methodologies; people with impairments; diversity; access for all.

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Tuning in: Exploring Co-Creation in Non-Formal Music Education Through Professional Internship and Community Engagement

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ABSTRACT

This work addresses a process of co-creation in the field of music education within a non-formal context, resulting from a professional internship completed as part of a higher music course. The intervention took place at a community music school, where musical training activities for drum instrumentalists were conducted, focusing on the development of motor coordination skills, interaction, and the technical-expressive enhancement of Pop and Rock repertoire.

The methodology for the professional internship comprised three phases: an observation period, followed by a cooperation phase, and finally an intervention period. During this professional practice, the intern collected field notes, which were subsequently used to develop critical reflections on the processes. The results suggest that experiences of this nature act as a catalyst for new possibilities in community music approaches, leading to the conclusion that there is a wide field of action to be explored and developed through the interconnection between academic practices and the enhancement of community resources in service.

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Chatbot as an Assistant in Out-Of-School Learning

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ABSTRACT

Artificial intelligence is swiftly emerging as a transformative technology of the 21st century. This paper examines chatbots, modern applications that have achieved wide use across many aspects of contemporary life.

A chatbot is a software program developed through neural networks and machine learning, capable of conducting dialogue via auditory or textual interfaces [1-2]. Designed to automate exchanges by emulating human interaction, chatbots can be integrated into platforms such as virtual assistants, online portals, or messaging systems.

The Small Academy of Sciences is a specialised extracurricular educational institution of a scientific profile, uniting hundreds of schoolchildren throughout Ukraine. Its instruction is organised in scientific departments covering disciplines from physics and astronomy to philosophy and literary criticism. The chatbot we designed addresses difficulties in orienting within the SAS environment.

The JAS chatbot's main functions are: 1. Informational – providing details about the SAS structure and activities. 2. Administrative – responding to "who", "what", "when", and "where" queries around the clock, handling organisational tasks. 3. Motivational – fostering engagement by sharing relevant articles and advertising scientific events. 4. Feedback – helping users adjust their educational trajectories.

In sum, our results concur with existing literature, confirming that chatbots are affordable, practical learning tools well aligned with modern educational approaches and the needs of pupils, parents, and institutional staff.

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Innovative Skills for Nurses

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ABSTRACT

Nursing education and training within Europe remain inconsistent despite established curricular guidelines. These divergences stem from cultural and political conditions and from uneven knowledge foundations, obstructing a coherent definition of nursing roles and restricting professional mobility across borders. Systemic weaknesses within national healthcare frameworks were particularly exposed during the COVID-19 pandemic. This study examines the issues linked to Specialist Nurse (SN) and Advanced Practice Nurse (APN) roles. Although these roles have developed in response to rising healthcare requirements, consistency in higher education provision remains insufficient. Differences in curricular structures, programme durations, and learning outcomes among European nations, together with disparities in clinical training, impede alignment within the field. The Innovative Skills for Nurses project aims to produce advanced, learner-centred nursing curricula that meet training needs and close competency gaps in Specialist Nurse (SN) and Advanced Practice Nurse (APN) preparation across various disciplines. It intends to enhance the digital teaching skills of trainers and nurse educators and to create an online repository containing teaching manuals, digital and virtual reality content, and diagnostic tasks, acting as vital resources for nurse qualification. Research carried out in two phases analysed nursing education in Southern Europe and compared it with legislative requirements. The findings revealed three key priorities: non-uniform nursing education, ambiguous clinical practice guidance, and inadequate quality criteria. Such inconsistency leads to unequal skill development among students and professionals; for instance, extended programmes provide more practical training. Establishing standardised nursing education would improve international mobility, encourage knowledge sharing, and define nursing competences more clearly. This would strengthen the profession globally and promote its advancement. Two strategies are recommended: (i) design a clear framework for core nursing education explicitly defining competences; and (ii) introduce a globally standardised curriculum with balanced credit distribution. These measures seek to enhance competence, encourage specialisation, and support academic excellence. Tighter regulation is needed to guarantee equal nursing competences and consistent curricula worldwide. Wherever they practise, nurses should demonstrate comparable abilities to protect patients and uphold healthcare quality.

Keywords: nursing curriculum; degree; quality.

FUNDING

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Artistic Co-Creation as a Promotion of Equality: A Musical Intervention in a Community Context

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ABSTRACT

This paper reports on professional practice conducted in a community setting as part of advanced curricular training in the field of music. Practical experience evidences the transformative capacity of music within marginalised groups, particularly its potential to reinforce self-esteem, develop personal and collective abilities, and encourage social cohesion. Accordingly, musical initiatives were implemented within an organisation assisting women from disadvantaged social contexts. Findings reveal that these initiatives enhanced participants' individual expression, while the collaborative creative process significantly strengthened these young women's sense of empowerment. The study concludes that music can perform social functions that exceed its conventionally ascribed aesthetic value, thereby acting as an effective instrument for fostering social inclusion and recognising the worth of society's most disadvantaged sectors.

Keywords: community music; cultural democracy; collective musical practices.

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Communication Channel Strategies Based on an Ontology Approach

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ABSTRACT

Pin2Give is a platform developed by Aresta Binária that actively facilitates the profiling of users and their social networks. It leverages this data to notify users of upcoming commemorative events and suggest appropriate responses. These may include sending a text message, a postcard, a video, or recommending products tailored to the recipient, the event, and prevailing market trends. Within this project, the authors investigated the use of graph databases to support an API built with GraphQL [1], enabling strategies to identify the most suitable communication channel for a specific user, contact, or event, primarily based on user actions. Our ontology and dataset (Figure 1) enabled the application of these strategies: actions performed by a User through a Communication Channel reinforce the link between that User and the relevant Communication Resource (e.g., Phone Number, Email Address, Application) according to their frequency; another approach considers the time of day when actions occur, strengthening the preference for that resource during certain periods and guiding optimal timing for its use. In future work, we aim to examine additional strategies incorporating user attributes such as occupation, age, and country of birth, which we expect to correlate with preferred Communication Channels.

Figure 1: Graph Database

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From creation to cocreation: Culture for All in Bragança

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ABSTRACT

"Culture for All Bragança" was a large-scale, ambitious project devised by the Municipality of Bragança (funded by the European Social Fund) and implemented by the IPB. A multidisciplinary team of professors-researchers, junior researchers, and collaborators with impairments developed an extensive set of accessible resources designed as mediation tools for visitors to five cultural venues in the city: Graça Morais Contemporary Art Centre, Georges Dussaud Photography Centre, the National Railway Museum of Bragança, the Iberian Museum of the Mask and Costume, and the City Theatre. These resources included exhibition tours and information texts for the five venues, provided with audio description, Portuguese Sign Language, and easy-to-read language, accessible through the project's YouTube channel @culturaparatodosbraganca2121.

In earlier work, particularly at Graça Morais Contemporary Art Centre (cf. Martins & Freitas, 2019) [1], our provision of access was conventional—ad hoc and a posteriori—defined as exclusive, neutral, non-authorial, and third-party (Fryer & Cavalo, 2021) [2] or, as Greco (2018) [3] calls it, "particularist," centred on creators without impairments and merely eliciting user reactions. However, the "accessibility revolution" proposed by Greco [3] advocates universal, user-focused, and proactive accessibility. Guided by this paradigm, we adopted a participatory method engaging people with impairments from the very start of design and creation rather than as an afterthought, giving them voice and agency throughout all stages.

This paper, therefore, presents two resources conceived by and for people with intellectual/cognitive and visual impairments, providing content in easy-to-read language and audio description. We describe the process from our joint exhibition visits with collaborators and consultants to the recording sessions and subsequent release on the YouTube channel.

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Study of the Effect of pH on Natural Fermentation of Table Olives

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ABSTRACT

Objective: To determine, over three months of storage, how pH affects the natural fermentation of table olives at physicochemical and microbiological levels. **Methodology:** Three batches of Negrinha de Freixo olives were placed in 7% (m/v) brine, each in triplicate. Batch 1 had no pH correction, Batch 2 was adjusted to pH 4.5, and Batch 3 to pH 4.0, using lactic acid. Samples were assessed at baseline and will be analysed again after 1 and 2 months at ambient temperature. **Development:** Fermentations are ongoing, with measurements for the baseline point (0 months) completed. Natural fermentation is dominated by yeasts and lactic acid bacteria. The pH initially falls due to organic acid production, then varies little, indicating microbial stabilisation and a salt–acid buffer equilibrium that maintains brine pH [1]. **Results:** Initial colourimetric data (L*, a*, b*, C*, h) showed a green hue (negative a*) shifting to yellow (positive b*). Salt content in the brine was stable, while in the olives it reached 4%. **Conclusion:** Data are still insufficient to assess pH impact on fermentation. Further analyses at months 1 and 2 will clarify the pH–pH-pH-fermentation relationship in table olives.

Figure 1: Table olives at the beginning of the fermentation (time 0 days)

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D.R.E.A.M. (Design-Thinking to Reach-Out, Embrace and Acknowledge Mental Health)

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ABSTRACT

The Challenge: To develop a digital guide that helps students promote their literacy in positive mental health and consequently improve their skills and attitudes in terms of quality of life and general well-being, as these are essential so that they can develop and achieve success in their academic career and the respective process of training and global personal development. **Approach and process:** Co-creation was completed with a multidisciplinary team of faculty, students and administrative staff of the IPB, as well as three external partners: MindSerena (mindfulness), Altamentis (nutrition and sports), and bten (App development), and Design Thinking was used to develop the prototype and contents of the digital guide and respective App. The D.R.E.A.M. App is grounded in the psychological care services we provide to students who utilise the IPB psychology service, and it is centred around three axes: recognising, embracing, and acknowledging mental health. The app is designed to be accessible to students across all three campuses: Bragança, Mirandela, and Chaves. **Its general objectives are:** Helping students to deal with psychosocial issues: isolation, difficulties adapting to Higher Education, anxiety, panic attacks, burnout and depression; Learning adaptive strategies through which students feel able to manage their symptoms associated with mental health problems; and Promoting awareness of the need to resort to health services and qualified professionals whenever situations of greater severity of reported symptoms occur. **Achieved results:** The first version of the App (fig.1) is available on both the App Store as well as on the Google Play Store, and in the last two months, over 400 students downloaded the App, 14 students found help through the App and are being monitored in consultation. Moreover, we conducted two mindfulness workshops in Bragança and Mirandela and hosted an international congress on well-being and mental health in higher education in Chaves. **Next steps planned:** Include more functionalities, discussion forums and direct contact with health professionals.

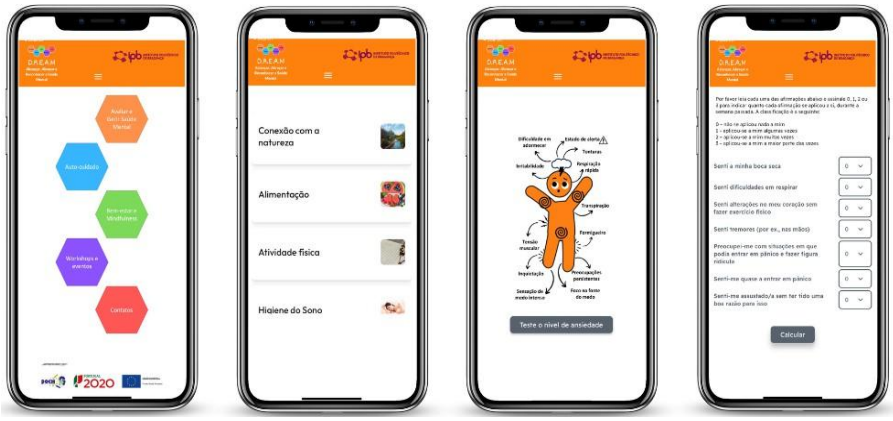

Figure 1: D.R.E.A.M. App Screenshots

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Casa do Joa – Message in the Bottle

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ABSTRACT

Project tagline: Our aim is for everyone to learn more. To simplify and deliver information more quickly and effectively, we will use our social media platforms, where we will share short pieces of knowledge and curiosities, ranging from technical insights to more accessible content. We do not want people to simply drink wine; we want them to understand what, how, and why behind it**.**
Problem/Need description: There is a general lack of knowledge among ordinary consumers regarding wine culture.
Solution approach: Since our main objective is to promote wine while preserving its essential cultural values, establishing partnerships with IPB and other institutes offering oenology courses appears to be a promising strategy. Representing our brand at regional and interregional wine festivals can increase public interest in the product. Additionally, organising wine tastings and exclusive trips to the countryside forms part of our plan. Sharing accessible and informative content about wine and its culture on social media will also be a key component of the solution.
Users/Target group: Final consumers, the local community, and local producers

Figure 1: Example of an informative post

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RIONOR - Hi, We Are Here…

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ABSTRACT

Project tagline: RIONOR (Western Iberian Network for a New Borderland Order), founded on 1 October 2016 in a small house on the Rio de Onor border, is a transnational Iberian association led by Raiano citizens from both sides of the frontier. It seeks to become a school of citizenship, promoting civic participation, building critical awareness of the surrounding social reality, and deepening cross-border cooperation between Trás-os-Montes, Castile and León, and Galicia as the most effective means to counter depopulation and revitalise these regions. RIONOR underscores the urgency of defending solidarity through active, democratic associations, encouraging citizens to devote part of their time to advancing the common good as the best path towards a fairer and more humane world.

The Challenge: How can we amplify the voice of RIONOR's population? How can we make its communication more impactful? How can every resident become an ambassador for the values of their land?

Solution approach: To design a communication plan that strengthens RIONOR's engagement with the Raiano population, its partners and political actors. To create a mobile application to enhance awareness and visibility of RIONOR.

Figure 1: RIONOR, culture and citizenship

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Charming Local Housing an Immersive Storytelling

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ABSTRACT

Project tagline: Touristic Local Housing (Alojamento Local – AL) refers to private establishments, located in both urban and rural areas, providing temporary accommodation to national and international visitors at affordable prices. This type of lodging differs markedly from conventional hotels and inns. A key feature of AL is its ability to foster a closer relationship between travellers and local traditions and culture, creating a more immersive and meaningful stay. This accommodation model has grown rapidly worldwide, with Portugal being no exception. The sharp rise in demand and supply, together with recent legislative changes and the evolving expectations of a diverse tourist market, has placed considerable pressure on the sector and created multiple challenges. It is therefore timely to rethink Touristic Local Housing in view of future scenarios.

Problem/Need description: How can the travel and accommodation experience be made more immersive and enjoyable in a world increasingly connected to artificial intelligence?

Solution approach: Forge partnerships with firms specialising in virtual reality; Develop smart environments integrated with AI technology; Design a bespoke virtual assistant, similar to "Alexa", adapted to the local context.

Benefits: Strengthen the link between visitors and the local traditions and cultural heritage of Bragança; Embed cutting-edge technological innovations into the tourism offering; Provide a unique, engaging, and customised experience that boosts guest satisfaction and promotes local identity.

Figure 1: King Garfield House logo

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Health Literacy across the Mirandese Plateau

"Seja o Presente de Vimioso, seja presente"

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ABSTRACT

Project tagline: Vimioso is a rural area where agriculture is the main occupation. Emigration and the rural exodus towards coastal cities (Bragança, Porto, Lisbon) have caused severe depopulation. The municipality's population is now largely elderly, with very low birth rates. Due to geographical isolation and weak communication networks, there is an evident need for stronger engagement and better understanding of health issues. Improving health literacy is therefore vital, empowering people to identify and adopt behaviours that promote well-being.

Problem/Need description: What measures can be introduced to raise health literacy in ageing, sparsely populated regions? How can awareness of health and social interaction be strengthened among the residents of Vimioso?

Solution approach: Deliver health education programmes that create collaboration between the human resources of partner institutions.

Users/Target group: Residents of Vimioso; pupils attending schools in Vimioso.

Benefits: Enhanced social interaction and quality of life; wider access to non-digital health information.

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Startup Blended Intensive Programme: A Learning By-Doing Experience

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ABSTRACT

A start-up is generally based on ventures that are costlier and riskier [1], often initiated by entrepreneurs lacking managerial expertise and a clear perception of business risks and uncertainties, particularly when linked to innovation and R&D activities. Acquiring experience in a start-up setting can be highly beneficial for aspiring entrepreneurs, and giving students the chance to confront many of these entrepreneurial challenges within education is thus of great value [2].To address the learning challenges entrepreneurs face, a StarsUP Blended Intensive Programme (BIP) was created under the StarsEU consortium—an educational alliance of nine European universities, involving both academic staff and students with entrepreneurial potential. The programme integrated cooperation and mobility between higher education institutions and aimed to foster innovative teaching and learning practices. It ran from November to December 2023, combining an online component with an intensive week at Hanze University of Applied Sciences in Groningen, the Netherlands. Based on success factors in start-up entrepreneurship [4], the programme sought to provide students with targeted business expertise. To this end, a business simulation approach was adopted, applying a "learning by doing" methodology. This enabled students to experience the challenges of managing a start-up in a practical yet risk-free setting. The programme comprised three stages: a preliminary phase of four online sessions covering core topics on business and start-ups; an intensive in-person week addressing more advanced themes such as business models, planning, and finance. This face-to-face period also allowed students to implement their knowledge by developing strategic plans for a simulated enterprise. They were required to take decisions with economic and financial implications for their virtual firms, creating an immersive and applied learning environment [5]. To evaluate the model's impact, Portuguese students from the International Business Management degree were surveyed about their motivations, the programme's relevance to their learning, and their views on the methods employed. Respondents highlighted several reasons for participation: deepening understanding of management and entrepreneurship, experiencing a foreign country, building international networks, and connecting with peers from diverse academic and cultural contexts. They reported that in-person activities promoted a more active student role and generated a stimulating and enjoyable learning atmosphere. Conversely, online sessions—closer to traditional methods and marked by greater passivity—were seen as less engaging. Team collaboration and lecturer interaction (as mentors or facilitators) reinforced the learning experience and offered valuable insight into working in a global context. Overall, the BIP programme appears to have strengthened students' entrepreneurial competences by combining theoretical foundations with practical experience in tackling business challenges. The "learning by doing" approach was considered effective in creating an engaging and meaningful learning experience. In addition, the use of gamification in management and entrepreneurship education was well received, being regarded as an interactive, enjoyable, educational, and innovative tool fostering critical thinking.

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IPB - Development of a Project with Mofreita and the Cercimac Institution

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ABSTRACT

The project outlined in this summary is part of a collaboration between the carpentry factory Mofreita and the institution CERCIMAC. It was developed within the Design Project course, which requires students to design a product using surplus materials from the factory, subsequently assembled by the institution's patients. With this in mind, I began by reflecting on the Portuguese region where I was living—specifically Bragança, a city recognised for its cold winters. My research led me to traditional wooden stools from the area, usually placed by the fireplace. I noted that these stools were typically of low height, a feature that also made them easier to produce. From there, I reflected on my target audience and the possible configurations of my stool. Initially, I imagined a set of stools shaped like puzzle pieces, intended for families with fireplaces in their homes. However, the complexity of this design risked difficulties in production, which in turn shifted my focus and target group. Consequently, I redirected my attention towards children aged 2 to 6 years. I designed the stools with a triangular base; when stacked, they create a star shape. When placed side by side, the modules can be rearranged in multiple ways, inspiring children to use their creativity and decide independently how the set should function. To further streamline production, the stool legs were conceived to fit directly into the seat surface. The resulting 3D models are displayed below in Figure 1.

Figure 1: 3D Models - Handling the Set

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Let´S Get Inclusive

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ABSTRACT

The Challenge: To emphasise the need for sustainable psychosocial support for students from PALOP countries (Portuguese-speaking African Countries). **The Approach and Process:** This initiative applied the Design Thinking (DT) methodology over one semester. DT is a human-centred approach to creativity and innovation. The process placed students (stakeholders) at the centre, beginning with empathy and identifying needs concerning mental health and well-being, along with difficulties encountered on the IPB platform, depending on students' motivations and requirements. All activities were developed through co-creation practices. In addition to students, IPB faculty and staff, the Portuguese Psychological Association contributed by defining key topics and providing expert insights. Figures released to Lusa by the Ministry of Science, Technology and Higher Education show that the number of PALOP students grew by 170% over five years, from 7,355 to almost 19,993. While enrolments nearly tripled, many face challenges, with high dropout rates linked to communication barriers. **The Result Achieved:** To foster awareness among IPB staff, the project was presented to the board and academic services. Content was also prepared for the forthcoming IT platform to be made available to students. Moreover, based on the report, two part-time medical doctors were recruited. **Next Steps Planned:** To advance platform development with the support of external partners.

Figure 1: Platform Template

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Viarco MultiArt -Pensil Survival in the Future

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ABSTRACT

The project *"Pencil Survival in the Future"* represents a co-creation initiative developed to support Viarco – Indústria de Lápis Lda in its strategic decision-making for the development of a new generation of pencils. In a rapidly evolving digital context, where analogue tools such as the wooden pencil face the risk of obsolescence, Viarco sought to balance its century-old tradition with contemporary innovation. The co-creation methodology engaged professors, students, and stakeholders in a collaborative and sustained process. The challenge addressed the impact of digital transformation on traditional tools, particularly the wooden pencil, long recognised as fundamental for creativity, fine motor skills, and cognitive development. Viarco's objective was to adapt its legacy production methods to respond to new market demands.The process began with an in-depth visit to the factory, gaining insight into production and research practices. Techniques such as Mind Maps and PESTEL analysis were employed for brainstorming, planning, and macro-environmental evaluation. Stakeholder mapping was conducted through qualitative methods including surveys, interviews, and observation, engaging Viarco staff, university professors, workers, and students. During the ideation phase, brainstorming sessions, idea filtering, and questionnaires were used to investigate how target audiences interact with pencils. Input from Viarco's management, grounded in decades of expertise, informed decision-making. Proposed solutions included creative workshops, limited-edition collections, ergonomic designs, and a new multi-tipped pencil. Each idea was evaluated for its innovation potential and feasibility. The process culminated in the design of the *Viarco MultiArt Pencil*, made from sustainable wood, recycled aluminium, and ocean-recovered rubberised plastic. Its ergonomic handle, inspired by Viarco's visual identity, addresses usability and sustainability concerns. Replaceable magnetic tips expand versatility, offering a multifunctional tool for artists and designers. Next steps involve prototyping and market testing to refine the *MultiArt Pencil*. Viarco has expressed interest in integrating the product into its catalogue, with prototypes undergoing user testing and sustainability assessments. Beyond its innovative outcomes, this co-creation process provided Viarco with a framework for ongoing collaboration, adaptability, and resilience in the face of technological change.

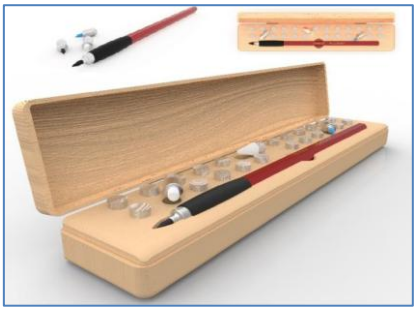

Figure 1: Viarco MultiArt- Pensil Survival in the future

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Solid State Love
"Made with love and high vibrations"

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ABSTRACT

PROBLEM TO BE SOLVED
Premature fermentation of chestnut jam. How can product preservation and sanitary quality be improved without increasing the minimum required sugar content or compromising flavour?
HOW IT CAN BE DONE
Adoption of good practices in the handling of raw materials and equipment; consistent use of personal protective equipment (PPE); strict adherence to hygiene and food safety standards.
BENEFITS
Enhanced microbiological safety of the product; extended shelf life; reduction of losses for the producer.
SOLUTION
Development of a Hygiene and Food Safety Manual, incorporating revised practices in: raw material preparation and handling; personal hygiene; environmental, equipment and utensil hygiene; processing and bottling.

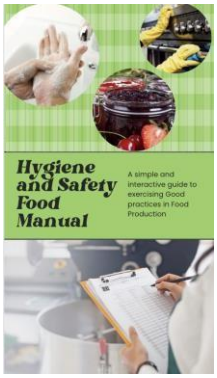

Figure 1: Hygiene and safety food Manual

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Experiencing Co-creation in Albanian Higher Education

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ABSTRACT

The higher education sector has undergone a marked paradigm shift in recent years, characterised by an increasing emphasis on collaborative practices and co-creation processes [1], [2], [3]. This paper seeks to examine the co-creation trajectory within Albanian higher education. Specifically, it addresses the challenges involved in adopting co-creation strategies in the Albanian academic setting, underlining the necessity of collaborative frameworks within changing educational paradigms "fig.1". The study considers central themes and insights from the existing body of research, focusing on the particular context of Albanian higher education. In conclusion, the findings of this study contribute to the ongoing discourse on co-creation, offering practical guidance for stakeholders aiming to strengthen collaboration and foster innovation in the Albanian higher education sector.

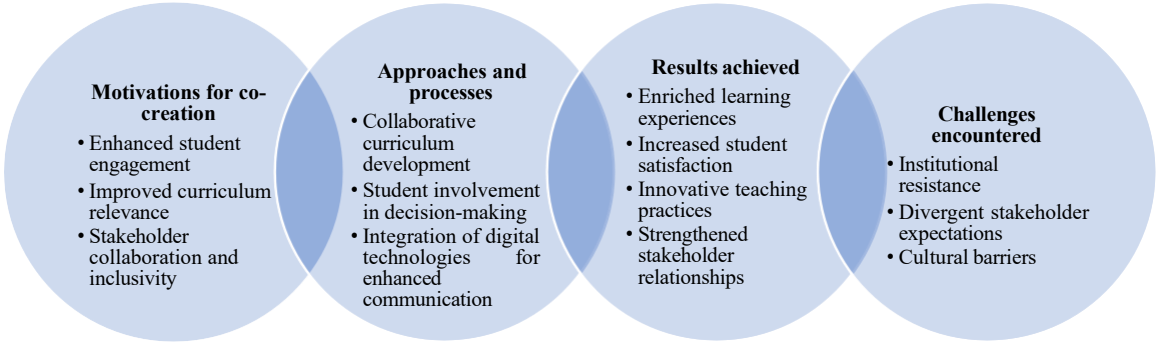

Figure 1: Key findings of the study.

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Relative Relevance of the Available Events for a Determined User/Contact

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ABSTRACT

Pin2Give, developed by Aresta Binária, is an innovative platform employing graph database technology to map and analyse complex networks of relationships between users, their contacts, and events. Conceived in response to the demand for a more effective and intuitive system for managing social interactions and events, the project transcends the limitations of conventional platforms. Users and contacts are fully characterised by attributes such as age, profession, and interests, enabling a deeper understanding of their profiles. Events, diverse and marked by unique features, are integrated into this detailed modelling, which forms a core component of the platform. By means of advanced and sophisticated Cypher queries, Pin2Give evaluates users' characteristics and preferences to recommend events that most closely match their interests and needs, as illustrated in "Fig. 1", thereby enhancing the relevance of the suggestions for each user [1].

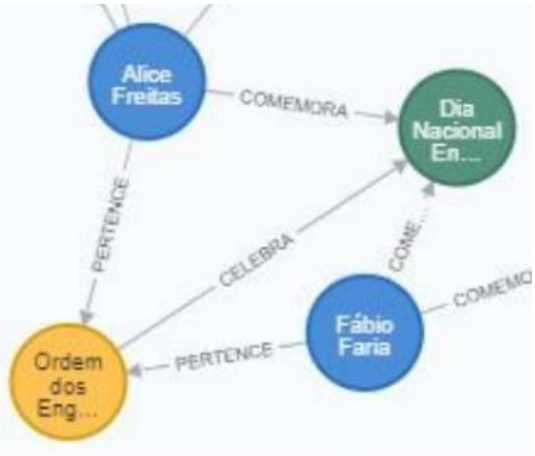

Figure 1: Graph in Neo4j

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Student-Staff Co-Creation in Higher Education: Evidence from the Western Balkans

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ABSTRACT

This study investigates the dynamic and evolving landscape of student–staff co-creation in higher education, drawing on evidence from the Western Balkans region. As educational paradigms move towards increasingly collaborative and inclusive models, grasping the complexities of student–staff partnerships becomes ever more critical [1], [2], [3]. The analysis centres on the conceptual underpinnings of student–staff co-creation, outlining the diverse frameworks and models that shape this collaborative practice. By reviewing the existing literature, the study identifies recurring themes, challenges, and benefits linked to the development of partnerships between students and academic staff "fig.1".

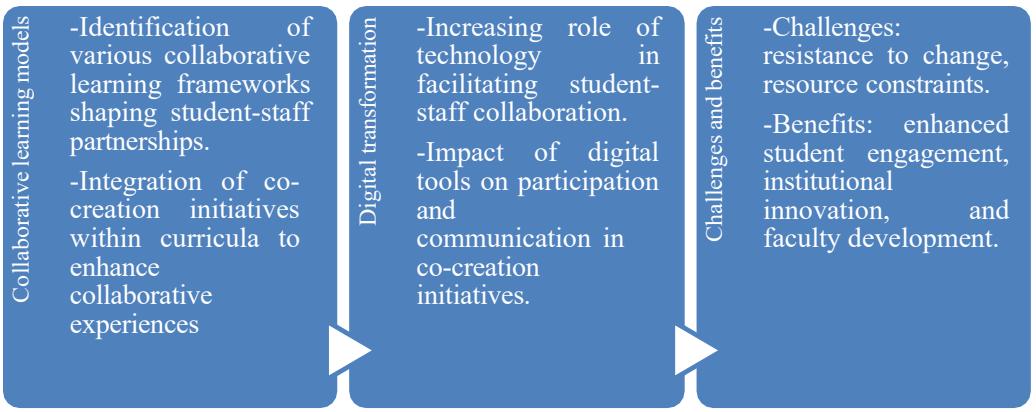

Figure 1: Main results of the study.

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Capazmente

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ABSTRACT

Problem To Be Solved
Who here has been, is, or will be a finalist student? What positive and negative emotions are associated with this concluding stage? What is the mental health status of finalist students?
How It Can Be Done
Psychological coaching promoted by the Matiz Association in partnership with Polytechnic Institutes, aimed at creating an extracurricular unit to foster psycho-entrepreneurial attributes that support the emotional well-being of final-year students.
Benefits
Professionals better equipped and more confident for the labour market; Training initiatives to increase awareness of the importance of mental health; Students more prepared and motivated to enter professional life; Development of students' soft skills.
Solution
Module 1: Diagnosis
Administration of BIG 5 personality assessments and questionnaires;
Formation of groups based on dominant personality traits and identification of the difficulties encountered at this stage.
Product: Curricular Unit Platform integrated within *"Link Me Up"*.
Module 2: Understanding
Production of information materials and guidance on mental health;
Facilitated dialogues with student groups on the significance of mental well-being;
Identification of problems encountered and their emotional impacts.
Product: Guides and informational resources, group activities with finalist students.
Module 3: Intervention
Workshops on mental health and the development of soft skills for employability;
Eight sessions of psychological coaching throughout the semester, either individual or group-based;
Integration of the *Learning Compass 2030* concept.
Product: Events, workshops, and psychological support services.

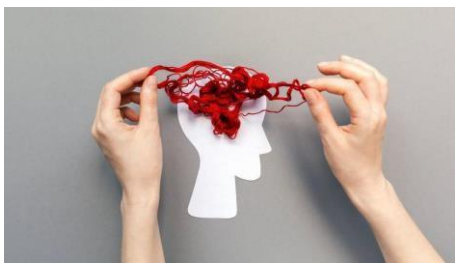

Figure 1: CapazMente logo

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Little Daisy – Hummm, so nice.

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ABSTRACT

Project Tagline:
Little Daisy is a brand specialising in childcare products and toys, founded within a family environment with the aim of supporting other households. The company operates both a physical store in the city of Penafiel and an online platform (https://alojadalittledaisy.com). The brand seeks to offer families a variety of ecological and sustainable options, prioritising conscious and healthy parenting. Little Daisy strives to provide children with experiences appropriate for each stage of development, while also giving parents confidence that they have made the optimal choices for their little ones.

The Challenge:
In a digital market dominated by multinational corporations, how can a small family-run business carve out its space? How can its family-oriented identity, together with its educational, aesthetic, and sustainability values, contribute to children's development and learning? How can the business achieve growth despite limited resources for online investment?

The Solution Approach:
The strategy focuses on enhancing social media presence: developing a structured posting calendar, collaborating with local influencers, investing in paid traffic, sharing parenting tips and product usage guides, adapting to emerging platforms and trends (TikTok, among others), and employing AI to optimise the creative process. The animated Little Daisy (derived from the logo) acts as a unifying element in the online communication strategy, connecting the brand with its audience.

Benefits:
The principal benefit lies in the convenience offered to customers, who can make purchases without leaving their homes. Additionally, customers gain assurance that their children are using products of the highest quality, reflecting the core values of the brand. Finally, parents remain informed about the latest developments in childcare and receive guidance to facilitate and enrich their parenting journey.

Figure 1: Post feed created for Black-Friday

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Thermalconf, Application of an Intelligent Environment Comfort Solution at a University Residence

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ABSTRACT

Based on the findings of the research conducted by the student within the co-creation process developed at the company, which enabled the specification of an architecture for the management of comfort equipment aligned with current sustainability, circular economy, and energy efficiency requirements—without compromising comfort—the present aim is to monetise this know-how through a pilot application implemented within the institution itself. This approach not only provides visibility to the ongoing research but also validates the relevance of the widespread adoption of such solutions across the institution, demonstrating the clear added value they offer.

The pilot project involved the installation of an autonomous and non-invasive system in a university student residence, capable of detecting users present in a given space and automatically adjusting environmental conditions according to their comfort preferences.

Consequently, alongside a high level of comfort, the system achieved notable efficiency gains and reductions in energy consumption. It can detect periods of absence—when no users are present—and accordingly adjust conditions to a reference value optimised for savings, thereby significantly reducing energy usage.

The pilot project employed low-cost, off-the-shelf hardware, including Raspberry Pi devices, wireless sensors, gateways, and radiator actuators. Figure 1 illustrates the installation of the actuators.

Figure 1: Actuator installation.

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Co-Creation of an Entrepreneurial Identity in Entrepreneurial Education in Higher Education Institutions in Albania

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ABSTRACT

Entrepreneurial education is an emerging discipline in Albania, as entrepreneurship itself only began to develop following the fall of communism. Entrepreneurship remains largely exclusive, particularly for women and girls, persons with disabilities, youth, older adults, and other vulnerable groups, such as returning migrants, refugees, and minority communities. Entrepreneurship courses are typically incorporated into business-related degree programmes, whereas in non-business degree curricula, entrepreneurship is largely absent. The course content predominantly emphasises theoretical aspects, without explicit integration of action learning or stakeholder participation, although guest lectures from industry professionals and start-up competitions are occasionally employed to teach and practice entrepreneurship. Few studies address entrepreneurial education in terms of entrepreneurial self-efficacy from the perspective of entrepreneurial orientation [1], which found entrepreneurial education to be a crucial factor, or the use of online networks in entrepreneurial education for young students [2], which elaborated online learning strategies. Entrepreneurial identity is closely linked to entrepreneurial education, as universities play a central role in consolidating students' entrepreneurial identity. Entrepreneurial identities are shaped through role engagement and socialisation within entrepreneurial communities [3]. Furthermore, entrepreneurial identities in entrepreneurial education can be co-created with other stakeholders. Entrepreneurial education in Albania should therefore integrate the co-creation of entrepreneurial identities within the learning process. This paper aims to develop a framework for the co-creation of entrepreneurial identity in higher education institutions in Albania, combining the perspectives of students, academics, and practitioners.

Keywords: entrepreneurial identity, co-creation, entrepreneurial education.

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Understanding Sustainability Challenges in Social Enterprise Development a Practical Tool

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ABSTRACT

In recent decades, there has been growing interest in the phenomenon of social entrepreneurship among both academic researchers and practitioners (Lumpkin et al., 2013; Zahra & Wright, 2015). The emergence of social entrepreneurship is often regarded as a response to the increasing social and economic challenges that governmental and non-governmental entities have struggled to address (Zahra et al., 2009; Teasdale, 2010; Gomez et al., 2020). Social enterprises are encouraged to adopt innovative and entrepreneurial strategies, fostering a more viable and financially sustainable environment. However, operating in an increasingly competitive context, social enterprises face significant challenges in managing dual mission activities. It is argued that key factors contributing to the failure of social enterprise sustainability include the inability to manage resource dependency, fund diversion, trustworthiness, lack of entrepreneurial acumen, and insufficient strategic human resource management, all of which heighten the risk of sustainability failure. In response, we propose a comprehensive framework, drawing on existing literature (Seelos & Mair, 2005; Huybrechts & Nicholls, 2012; Kamaludin et al., 2021), to strengthen the resilience and sustainability of social enterprises.

This framework emphasises training and promotes a continuous learning environment to enhance strategic planning and governance for both short-term and long-term social missions, strengthening leadership and governance, stakeholder engagement, financial viability, innovation and partnerships, effective human resource management, training programmes, and impact assessment.

The NEST Project aims to organise social business workshops, bringing together stakeholders from diverse fields. In Portugal, we have established a partnership with iLocal – Local Intelligence (Association for the Regeneration, Development, and Governance of Local Economies) to develop a Social Innovation Ecosystem for Healthy Living (SIEHL). The primary aim of these workshops is to facilitate the generation of social business ideas, promoting creativity, collaboration, and practical problem-solving.

Participants will contribute to developing social business ideas specifically designed to address local social issues. Subsequently, the next steps involve producing scientific papers proposing theoretical frameworks and developing tools to support local partners, ensuring a comprehensive approach to fostering and sustaining impactful social initiatives.

Figure 1: Make it happen

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BIT IPB project: A Contribution to Social and Environmental Entrepreneurship in the Circular Economy

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ABSTRACT

The textile sector is the second-largest contributor to environmental impacts globally, with key concerns including water and soil depletion, microplastic contamination of oceans, and carbon emissions across the product lifecycle [1]. Alarmingly, only 1% of garments produced are recycled [1], [2], highlighting the ecological consequences of fast fashion. To address these issues, the European Union has developed a sustainability and circularity strategy for textiles, offering guidance to industry stakeholders. In Portugal, the textile sector accounts for almost 4% of municipal solid waste [3].

Since 2019, Bragança Polytechnic University (IPB) has actively engaged in this field through the IPB Volunteering – Solidarity Clothing Bank programme. In partnership with Resíduos do Nordeste, this initiative has successfully prevented hundreds of garments from entering the waste stream [4]. Building on this work, the IPB Volunteer Programme – Solidarity Clothing Bank launched the BIT IPB project to mitigate the negative effects of fast fashion. The project seeks to train participants to establish enterprises focused on reusing textiles otherwise considered unusable, while also raising awareness of the social and environmental challenges linked to fast fashion.

Aligned with IPB's 2023–2026 Strategic Plan and the United Nations Sustainable Development Goals (SDGs) [5], the BIT IPB project promotes environmental and social entrepreneurship and aims to reduce unusable textiles in the Solidarity Clothing Bank. As part of the initiative, a workshop entitled "Creative Sewing with Textile Waste" provides 70 hours of basic sewing instruction and 15 technical worksheets utilising the abundant discarded textiles in the IPB Solidarity Clothing Bank (see "fig. 1"). The project places considerable emphasis on soft skills, including teamwork and intercultural competence. Early results indicate a strong interest in the programme and suggest that it is already having a meaningful impact in line with its objectives.

Figure 1: Creative Sewing with Textile Waste results

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Determining Actions for User/Contact based on Events, considering various types of Actions and Communication Channels

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ABSTRACT

This applied research project investigates the dynamic domain of personalised user and contact actions in response to events, utilising NEO4J, GraphQL, and Cypher scripting. The methodology is founded upon NEO4J's graph database, which provides a flexible and intuitive framework for modelling complex relationships between users, events, and potential actions. By employing GraphQL queries, interaction with the NEO4J database is streamlined, enhancing both accuracy and speed in data retrieval. This integration not only optimises access to information but also contributes to the system's adaptability and responsiveness.

Consistent with the principles described in *Graph Databases* by Robinson, Webber, and Eifrem (2015), the approach exploits the strengths of graph structures in representing intricate relationships within event-driven systems, thereby improving the efficiency of personalised action determination [1]. Through experimentation and real-world simulations, the project demonstrates the effectiveness of the methodology in dynamically determining user actions. This work provides a comprehensive framework for the integration of graph database modelling with GraphQL querying and establishes a foundation for further research in the field of event-driven personalised actions.

Figure 1: NEO4J's graph database

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Messaging Recommendation System

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ABSTRACT

The Messaging Recommendation System seeks to establish an approach that provides contextually appropriate message suggestions to users, based on their relationships with contacts and the nature of the event to which the message pertains. Effective digital communication extends beyond mere wording; it requires messages tailored to the individual, the occasion, and the dynamics of the relationship. In today's environment of virtual interaction, where messages may be sent for celebrations, condolences, greetings, and other purposes, the significance of conveying the appropriate message is paramount.

The project was initially developed using FastAPI for the web API, integrating Neo4j for database management, and implementing the message recommendation system. The development process encompassed essential stages, including API design, database configuration, CRUD operations, message recommendation logic, API endpoint creation, deployment and testing, documentation, user guidance, maintenance, and scalability. Ultimately, the system was implemented utilising REST API development alongside a dynamically structured Neo4j graph database schema.

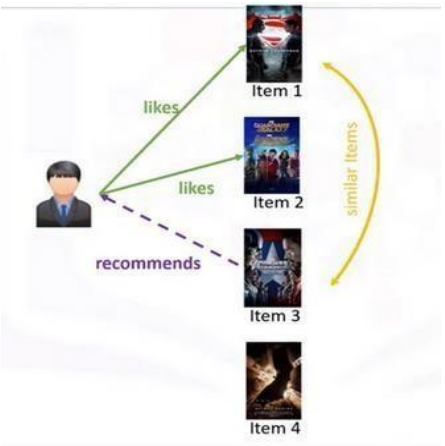

Figure 1: Messaging Recommendation System

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NÒ - Creative Surplus Design Project - Light Objects

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ABSTRACT

Institutional collaboration between companies and higher education through the implementation of real-world challenges in the educational context fosters crucial skills for understanding content, enhancing the ability to identify, evaluate, adapt, and apply knowledge to solve diverse problems. It has also been shown to improve students' decision-making abilities, critical and creative thinking, comprehension of global aspects and their interdependencies, and consideration of multiple perspectives. In this context, we present three lighting objects developed as part of the Creative Surpluses project, conducted within the Design Project Curricular Unit of the third year of the Degree in Art and Design – Minor Design at ESE – IPB, in partnership with Mofreita Carpentry and the Cooperative for the Education and Rehabilitation of Disabled Citizens (CERCIMAC) in Macedo de Cavaleiros.

The primary objective of the project was to create design objects using surplus raw materials from the company's furniture and carpentry unit, producing wooden pieces partially manufactured by CERCIMAC users, thus promoting inclusion and providing opportunities for personal and professional development. Within a co-creation framework, multiple study visits to partner institutions were undertaken during the initial phase, complemented by a literature review to define the project's contextual parameters and activities. By selecting surplus production from the carpentry industry, analysing company production technologies, and collaborating with technical teams from both institutions, three lighting objects were designed for integration into different environments. The projects involved modelling and prototype testing, physical resistance evaluation, usability and ergonomic assessment, constructive optimisation, and production feasibility analysis.

The interaction between knowledge domains and learning throughout the project enabled a multidisciplinary approach, establishing effective connections across areas and fostering a more empirical and rational design language. This methodology facilitated outcomes and perspectives on the design process with distinguishing characteristics that highlighted the value of the work produced.

Figure 1: Images from the three light objects

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TendArmada'22: a contribution to promoting culture as (trans)formation

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ABSTRACT

Culture can be defined as a set of behaviours, attitudes, beliefs, values, food, religion, among others, transmitted from one generation of society to the next, with a direct influence on interactions between people. Understanding cultural diversity is fundamental to preventing conflicts and fostering healthy environments within communities [1]. In this context, culture and art have been recognised as vital tools for promoting individual well-being and mental health, preventing exclusion through multicultural events, and even supporting the management of anxiety while facilitating the search for solutions to health-related challenges [2]. Bragança Polytechnic University (IPB) is a multicultural institution, with over 30% of its students coming from various international locations [3], making it essential to implement strategies that encourage harmonious coexistence within its community. Since 2011, IPB has been organising the tendArmada event, designed to engage with the multiculturalism present within the institution. Initially developed within the Animation and Artistic Production course at the School of Education, since 2020 it has been incorporated into IPB's Training Innovation [4], both within Demola and through extra-curricular units. This communication highlights the twelfth edition (2022), conducted under the Demola Portugal project, entitled "tendArmada'22 Reloaded Again – Culture as (trans)Formation". The primary objective of this challenge was to identify ways to integrate different schools, institutional sectors, and the academic community, thereby promoting interaction and inclusion of diverse cultures and supporting the well-being and mental health of the IPB community. Through the Demola co-creation model, the planning and execution of this edition were accomplished. Key activities included the creation of a living book [5] with collaboration from IPB schools, a discussion panel with principal institutional decision-makers, and additional artistic and cultural activities. The event demonstrated the capacity of culture to serve as a vehicle for integration, transformation, and learning within the IPB community.

Figure 1: tendArmada 2022

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Ranked List of Predicates that May Be Lacking in the User/Contact Characterisation

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ABSTRACT

Pin2Give is a platform developed by Aresta Binária that actively facilitates the characterisation of users and their network of contacts. Within this project, the authors investigated the application of graph databases to support the generation of a ranked list of predicates potentially absent in user and contact profiles. The principal aim being the creation of such a list, the approach involves establishing a set of nodes in the graph to serve as a default "graph" for comparison, encompassing all predicates expected in a complete characterisation. These predicates include User and name, age, occupation, address, religion, gender, marital status, education, number of children, course, and contact. Each predicate possesses an attribute reflecting its significance to the user, which is subsequently employed to rank the missing items. Certain predicates are inherently constrained, such as marital status (Married, Single, Widowed), education (Middle School, High School, Graduation, Master's Degree), and gender (Male, Female). The course predicate depends on education and is included only when the education level is Graduation or Master's Degree. Relationships connecting these predicates include isLinked, withCourse, hasSpouse, hasChild, isChild, taughtIn, and hasContact. The model underpinning the default graph database is illustrated in Figure 1. To identify missing predicates, the default graph is compared with the personalised graph using Cypher queries to traverse the relationships; the results yield an overall ranked list of absent predicates in user and contact characterisations. Future work involves expanding the default model to enhance the breadth of characterisation details, thereby improving graph performance and the comprehensiveness of missing predicate detection.

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Riskit: Insolvency Predictor Web Platform

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ABSTRACT

The current society is volatile, influenced by macro social, economic, geopolitical, and natural phenomena that have a global and deeply interconnected impact. As a result, as unpredictability increases, access to information and decision-support tools becomes increasingly vital in all aspects of social life. The capital market (and companies) is at the forefront of these phenomena, given its volatility and extreme exposure to these macro events. In this scenario, our objective was to develop a platform that predicts insolvencies. The Riskit: Insolvency Predictor is a web-based platform aimed at assisting the scientific community and investors in predicting the possibility of companies becoming insolvent based on specific financial indicators. Methodologically, a dataset of 15,000 Portuguese companies was randomly extracted from the SABI (Iberian Balance Sheet Analysis System) database. An analysis was conducted, resulting in the selection of 11 financial indicators used for predictions. To make predictions, the authors conducted a comprehensive study of models commonly used for this type of forecasting and also experimented with some machine-learning models that are not frequently mentioned in the literature. The evaluation of the application's performance in predicting insolvencies is measured by a series of performance benchmarks calculated with the help of a confusion matrix. It was found that models frequently mentioned in the literature do not always have better performance. The main objectives of this project were achieved, providing both the scientific community and investors with a tool that predicts insolvency using a set of financial indicators and demonstrating the value of machine-learning models for making these predictions. The application can be visited at https://riskit.ipb.pt/.

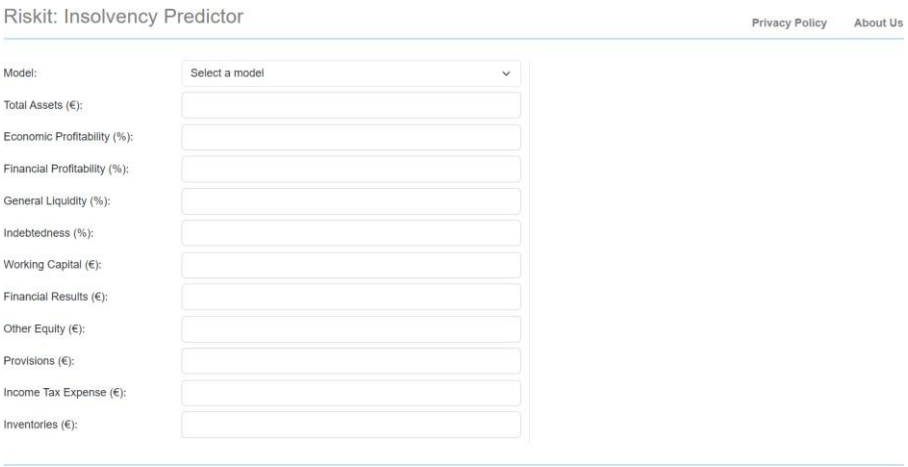

Figure 1: Riskit: Insolvency Predictor application

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Multichannel Engagement Strategy: Orchestrating Actions for Event Outreach and Product Promotion.

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ABSTRACT

Pin2Give is a platform developed by Aresta Binária that proactively fosters the characterisation of users and their network of contacts. It employs this information to notify the user of imminent commemorative events and propose actions. This may take the form of a text message, a postcard, or even a video, or recommend products according to the recipient's characteristics, the event, and market trends. As part of this project, the authors investigated the use of graph databases to support user expectations in real-time application usage.

Our specific challenge is to attract more participants for forthcoming events and maximise product sales. Initially, we implemented a graph database with real data pertinent to upcoming events in Portugal, and subsequently conducted extensive research on the products that could be marketed for each event. Following this, we created several users with their contacts (phone number, email, social network).

The utilisation of these contacts as communication channels to perform specific actions depends on the type of user contact (e.g., send SMS via phone number, dispatch postcard or short video via email or social network), and push notifications employing the reminder concept. The actions to be executed are directly dependent on the user's engagement and interactions with our software when the user first tags an event of interest. Our recommender subsystem (RS) automatically dispatches the initial product, namely the event ticket, with the schedule details. Users are then notified of the event day and receive publicity regarding the products intended for sale during the event. This orchestration of actions was resolved at the second application layer (backend) through triggers combining source code and a Cypher graph database. This approach allows portions of the source code to be executed alternatively according to schedules.

In the final development phase, we implemented the (RDF/OWL) ontology aligned with our principal objectives using Protégé. We then integrated this ontology at the user interface level, enhancing user personalisation, which in turn improved the RS to deliver precise research results and contribute to a more intelligent and context-aware system, as illustrated in Figure 1.

Finally, following the deployment of our web semantic-based application, we observed a decrease in both event participation and product sales.

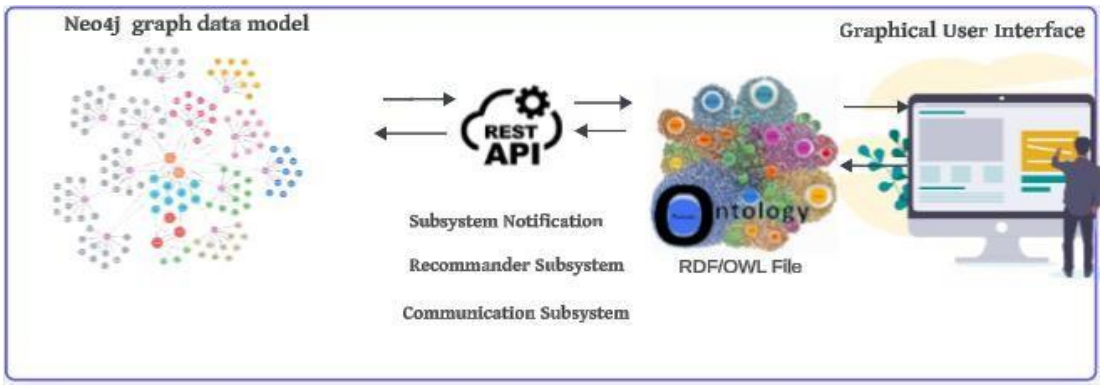

Figure 1: Web Semantic Based Application (Architecture)

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Green Building Innovations: Leveraging Local Resources for Enhanced Living

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ABSTRACT

Sheep farming continues to constitute an important sector of the economy in low-density rural regions, such as Trás-os-Montes in northeastern Portugal. Shifts in market demand have rendered the disposal of sheep wool a pressing concern for farmers. Wool constitutes a particular type of waste due to its potential bacterial load, entailing substantial disposal costs, as proper handling requires landfilling. Consequently, wool is often mismanaged (e.g., buried or incinerated), with notable impacts on soil and air quality. While Merino-type wool is highly valued, there is currently minimal demand for churro-type wool from native breeds. This study presents a co-creation process designed to develop sustainable building materials utilising local sheep wool. The initiative aimed to valorise regional resources, promote sustainable living, and reinforce local economies through the repurposing of sheep wool in construction materials and furniture.The co-creation process led to the incorporation of wool from local sheep breeds as a raw material in the production of an insulating product (“fig. 1”) and, in solid form, in furniture such as tables (“fig. 2”) and chairs (“fig. 3”). This approach not only converts low-value wool into a high-value construction resource but also provides supplementary income for local sheep farmers, while offering an environmentally sustainable solution for wool disposal. Moving forward, the project will continue to engage diverse stakeholders and advance research and technological development.

Figure 2: Prototype of a sheep wool insulation panel

Figure 1: Prototype of a table with solid sheep wool top

Figure 3: Design of a stool with a flexible wool seat

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Circular Economy: a solution for the valorisation of substrate (waste) from the cultivation of *Agaricus bisporus*

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ABSTRACT

The circular economy is increasingly recognised as a crucial response to society's environmental and social challenges. It rests on three key pillars: i) eliminating waste and pollution from the outset; ii) maintaining continuous use of products and materials; iii) regenerating natural systems [1]. This paper presents a co-creation process with Mogaricus Cogumelos, a local Paris mushroom (Agaricus bisporus) producer, aimed at valorising the thirty tonnes of cultivation substrate waste generated monthly. Two proposals were developed in collaboration with a company specialising in organic bio-waste solutions. Firstly, regarding the cultivation substrate, it was proposed to launch a new product line: a home-growing kit for Paris mushrooms (Agaricus bisporus). This kit ("fig. 1") targets home gardening enthusiasts and educational institutions for environmental learning, seeking to engage users in sustainable practices. Additionally, the inclusion of a cultivation guide printed on seed paper is proposed to enrich the consumer experience by providing comprehensive, eco-friendly instructions.

The second by-product, mushroom stems from harvesting and market preparation, offers further opportunities for innovation. The proposal encompasses the development of biodegradable packaging as a sustainable alternative to the Styrofoam cups currently employed by the company. This initiative seeks to reduce environmental impact by introducing eco-friendly packaging into the market, in line with circular economy principles, and illustrates the practical application of sustainable development in industry.

Figure 1: Demonstrative images of the solution

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One Health: Co-Creating Sustainable and Healthy Food Systems

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ABSTRACT

Current dietary patterns, characterised by high consumption of animal-derived products and excessive caloric intake, are detrimental not only to human health but also to planetary health, owing to elevated carbon dioxide emissions. The vegetarian restaurant BUMA acknowledges this global challenge and is committed to recreating traditional Portuguese dishes without animal-based ingredients. Nevertheless, most of the population in the Bragança region appears to have limited awareness of this issue.

This project outlines a co-creation process addressing this concern by integrating the One Health concept to reassess and transform food systems, thereby enhancing both human health and environmental sustainability. The methodology comprised two principal phases: (1) an analysis of the current problem and stakeholder perceptions, and (2) an assessment of future trends and weak signals.

In the first phase, interviews were conducted with diverse stakeholders, including BUMA representatives, restaurant customers, and professionals in nutrition, health, and environmental fields, as well as the general youth population. These discussions yielded valuable insights into dietary habits and their environmental consequences. The findings suggest that shifting the current paradigm towards reducing production and consumption of animal-based foods would be advantageous. However, the principal barrier to this transition is the population's limited awareness of the impact of their dietary choices.

The second phase, focused on future trends and weak signals, revealed a growing concern among individuals and communities regarding health and lifestyle choices. Consumers are increasingly attentive to food labelling, while researchers are developing more intuitive and accessible nutritional labels to facilitate informed decision-making.

A key outcome of the co-creation process was the development of an online platform (Fig. 1), strategically designed to address these gaps and promote healthy and sustainable diets. The platform disseminates information through tips, reflections, and recipes, and incorporates a carbon footprint and nutritional value calculator (Fig. 2). This tool classifies meals as A, B, or C (Fig. 3), according to their low, moderate, or high carbon and nutritional impact, thereby raising awareness of the importance of making sustainable and health-conscious dietary decisions. The platform is adaptable for use by individuals, restaurants, and the broader food industry.

For BUMA, the platform enables direct comparison between vegetarian and conventional meal options, emphasising the environmental cost of animal-based products. Future plans include integrating this information into the restaurant's menu to attract environmentally conscious consumers seeking lower-impact meals.

The project further aims to extend the platform's reach and foster collaboration with other stakeholders, such as municipalities, professional nutrition associations and boards, public health services, among others. Additionally, an excellence seal will be introduced to recognise restaurants, businesses, and local producers that prioritise sustainable and health-focused dietary practices.

Ultimately, this project seeks to raise public awareness of the One Health approach and aligns with the prioritised Sustainable Development Goals: SDG 3 – Good Health and Well-being, SDG 12 – Responsible Consumption and Production, SDG 13 – Climate Action.

Keywords: One Health, Co-creation, Sustainability, Dietary choices, Environmental, Carbon footprint

Figure 1: Platform QR Code

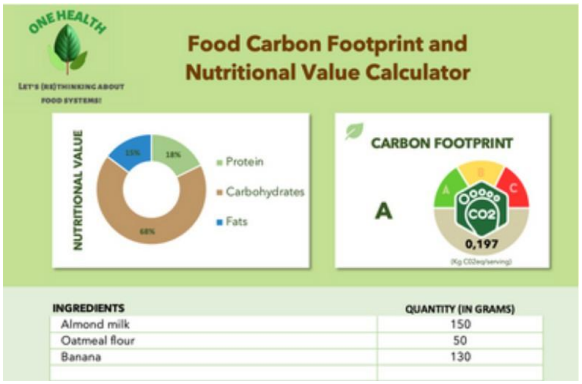

Figure 2: Carbon footprint and nutritional value calculator

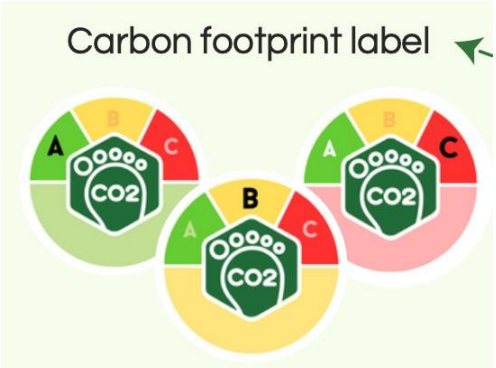

Figure 3: Carbon footprint and nutritional label

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Optimising Suggestion Lists Based on the Market Trends

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ABSTRACT

Pin2Give is a platform developed by Aresta Binária that proactively facilitates the characterisation of users and their network of contacts. It leverages this information to notify users of imminent commemorative events and recommend appropriate actions. These may take the form of a text message, a postcard, or even a video, or involve suggesting products based on the recipient's characteristics, the event, and prevailing market trends. As part of this project, the authors investigated the use of graph databases to support the optimisation of a product list according to market trends.

For this purpose, given a list of products for a user, contact, or event, the Neo4j API [1] was employed to retrieve information regarding the categories of each product and their attributes. Subsequently, Pytrends [2], an unofficial Google Trends API, was utilised to identify trending products within each category. For each set of results, a Generative Pre-trained Transformer model, namely ChatGPT [3], whose API was employed, was used to select only valid products. Using the valid product list and the attributes retrieved from the database, ChatGPT was further employed to ascertain market values for each property. The updated market trend list was then forwarded to the graph database, where graph algorithms were applied. The database list was subsequently refined to retain only products exhibiting alignment between the optimised list and the initial list.

For the overall architecture, FastAPI [4] was utilised to integrate all components and manage the endpoints required to address the problem (Fig. 1).

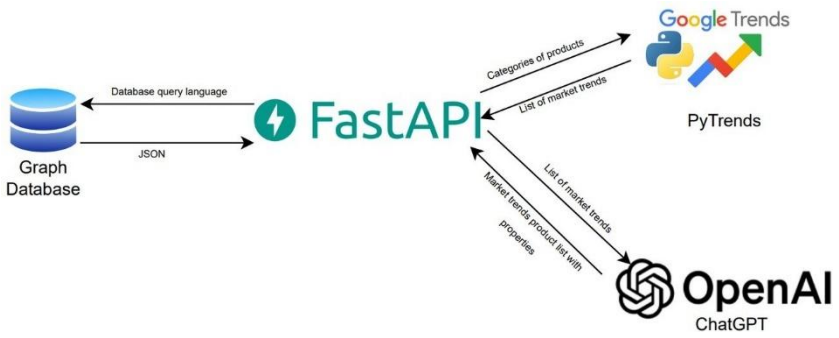

Figure 1 – Overall Architecture

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Defining a Tool for Fostering Innovation Culture in Portuguese Local Government

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ABSTRACT

In today's highly competitive and demanding global context, innovation has become a fundamental pillar for organisations, particularly within the public sector and local administration [1]. This study seeks to examine the significance of innovation in fostering and promoting a robust culture of influence in Portuguese municipalities. The "Innovation Culture Self-Assessment Instrument (FACI)" was employed as a key tool, integrated into the SIMPLEX' 20-21 Programme and promoted by the National Institute of Administration. This instrument is designed to support public organisations in implementing innovative strategies as part of their broader management systems. Our research focuses on analysing the culture of innovation in Portuguese municipalities and proposes an innovation culture assessment tool tailored to the local context.

To this end, a co-creation process was introduced, exemplified by the adaptation of the original instrument into the "Local Innovation Culture Self-Assessment Tool (FACIL)". This process involves collaboration with various stakeholders, including local governments, staff, and potentially citizens, to develop specific innovative strategies for municipalities in Portugal. FACIL is a novel tool incorporating innovative approaches to support local authorities. It was designed specifically to evaluate, quantify, and enhance levels of innovation within Portuguese municipalities. The tool seeks to facilitate the promotion of practices that improve efficiency, transparency, and the quality of public services, while also encouraging more active and collaborative citizen participation.

The methodology employed in this study adopts a qualitative approach, emphasising interviews as the primary data collection method. Interviews were conducted with four municipalities: Penela, Oeiras, Cascais, and Bragança. These discussions enabled the adaptation of the tool to the local context and drew upon the experiences and innovative insights of these municipalities. As part of the co-creation process, the "FACIL Game" (fig.1) was developed as an interactive instrument to evaluate the innovation culture of local authorities. This game created an environment in which employees could actively engage and reflect on their work, facilitating the identification of strategies for improvement and opportunities for innovation. The playful nature of this tool proved essential in promoting the advancement of innovative practices and strategies among Portuguese local authorities.

Figure 1: The "FACIL Game"

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Building Inclusive Futures

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ABSTRACT

Based on the 2021 Census data in Portugal, 10.9% of the population aged five years or older has at least one disability. Despite significant progress in Portugal regarding awareness and improved living conditions for people with disabilities, disparities in inclusion and accessibility persist, particularly across different regions and sectors. The challenge proposed by APADI seeks to create environments that not only prioritise accessibility but also embrace and celebrate diversity. The outcome of this co-creation process was an "Inclusivity Workshop for Kids," designed to raise awareness among future generations regarding human diversity and to foster inclusive attitudes. The workshop plan comprises various activities, including "Can You Do It?" ("fig. 1") challenges, which encourage children to undertake tasks simulating different disabilities, thereby promoting empathy and understanding. Target groups included teachers and children (aged 7–10 years), aiming to educate educators and directly influence students' perspectives. The project intends to expand its reach through collaboration with higher education institutions and teacher training workshops, adapting the programme to the needs of different age groups. Additionally, research into technological development will be pursued to enhance the workshop's interactive elements and explore novel methods for inclusivity education.

Figure 1: Game "Can you do it?"

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Event Relevance Assessment for User/Contact Engagement

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ABSTRACT

Pin2Give is a platform developed by Aresta Binária that proactively facilitates the characterisation of users and their network of contacts. It utilises this information to notify users of imminent commemorative events and suggest appropriate actions. These may take the form of a text message, a postcard, or even a video, or involve recommending products based on the recipient's characteristics, the event, and prevailing market trends. As part of this project, the authors explored the use of graph databases to support the platform's functionalities.

In this instance, the challenge was to construct a graph database to determine the relative relevance of available events for a given user or contact. Neo4j was selected for this purpose, and three entities were created: Users, Contacts, and Events. These nodes are connected through relationships; for example, a user and a contact may be linked by kinship or friendship. This connectivity enables the analysis of which events are more or less relevant to a particular user or contact, with the relationships possessing properties that contribute to the algorithmic calculations.

To calculate the relevance of events for a given user, taking into account the significance of the relationships between the user and their contacts, specific parameters and conditions were defined. Initially, the most influential user data parameters were selected: Age, Sex, and Religion. Subsequently, the relevance of each event to the user was calculated, constituting only half of the final equation. Thereafter, the same parameters were evaluated for the user's contacts, with a modification: these values were weighted according to the importance of each contact's relationship with the user.

Upon completion of all calculations, the results for a given user are presented in descending order of relevance, from most to least significant.

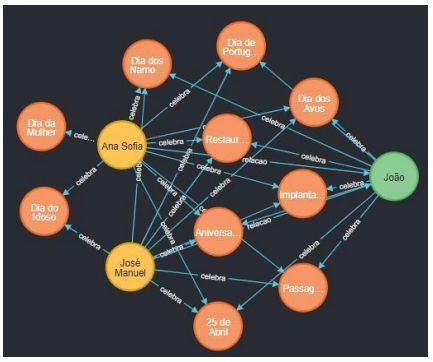

Figure 1: Example of a graph with a user, his contacts and the events related

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Rural Learning Lab: A World of Experiences

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ABSTRACT

In an increasingly urbanised and digital world, numerous studies confirm the mental health and cognitive benefits of contact with nature [1][2][3][4].
Within the partnership between the Demola Project and Quinta da Ponte in Carvalhais—a rural area of Mirandela offering an immersive nature experience primarily linked to farming—the challenge is to design innovative solutions addressing accessibility, inclusion, and rural education, with the aim of diversifying farm activities and attracting visitors of all age groups.
To characterise and contextualise the challenge, an interview was conducted with the site owner alongside a field visit to Quinta da Ponte, followed by a benchmarking exercise to explore comparable initiatives elsewhere. This research provided the basis for a work plan focused on creating an energy self-sufficient environment and developing onsite environmental education activities through innovative attractions and virtual tools. Proposed activities include educational walks, sensory trails, exploration of native flora via a mobile application under development, animal sponsorships, and workshops on new technologies and sustainable practices. These may encompass rainwater harvesting, repurposing animal or food waste for energy, or constructing wild bee hotels. Ultimately, the project seeks to foster learning among younger generations while enhancing the overall visitor experience at Quinta da Ponte.

Figure 1: Photos of Quinta da Ponte

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Platform for Innovation and Collaboration: Scientific Mission

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ABSTRACT

Within the partnership between the Demola Project and EU-Life, an alliance of leading life science research centres sharing best practices in the management of research institutes, the challenge addressed was how to enhance scientific research by considering all stakeholders involved in scientific progress.

The process began with the collection and analysis of data. The group recognised the importance of reviewing studies relevant to the challenge, alongside conducting original data gathering. During this phase, three principal stakeholders were identified: researchers, the general public, and investors (public or private). Recognising researchers and public perception as central stakeholders, the aim was to improve communication and collaboration between them.

Initially, an interview script for researchers was piloted to ensure that the questions elicited authentic responses. Simultaneously, a public survey was designed to assess understanding of the research profession and the scientific process. Analysis of responses highlighted issues such as the undervaluation of researchers. Through interviews and surveys, key obstacles were identified, providing a foundation for strategies to improve research practices moving forward.

We propose the development of a platform to strengthen connections between the business sector, potential patrons, and research, facilitating increased funding and, consequently, enhanced outcomes. Beyond structural improvements, artificial intelligence (AI) and virtual reality (VR) may be employed to simulate laboratories and experiments, aiding the streamlining of the research process. Ultimately, it is essential to reinforce efforts to value researchers, ensuring that their vital contributions to society are recognised, supported, and continually developed, thereby driving greater excellence in both scientific output and knowledge transfer.

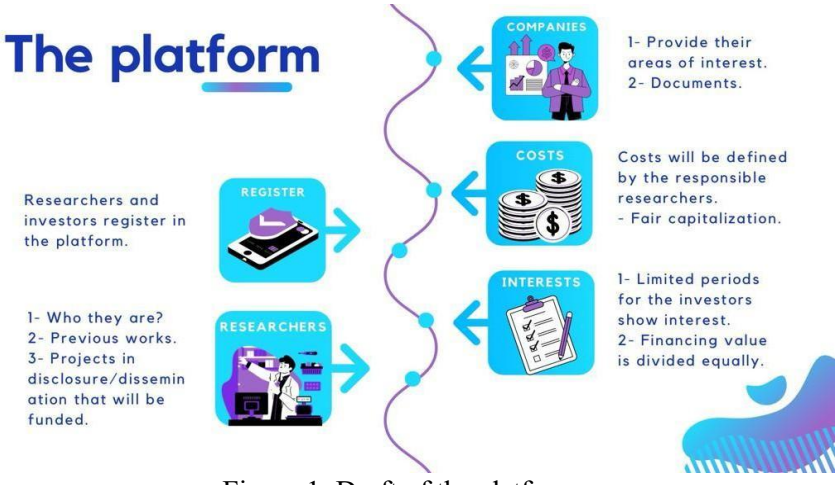

Figure 1: Draft of the platform

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Challenge and Conceptual Solution for Young Football Players in Portugal

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ABSTRACT

The challenge titled "Footballer's Journey Upgrade" aims to improve the living conditions and safety of young football players arriving in Portugal to play professionally, who face financial and social instability. The proposed solution involves the development of a computer/mobile app that functions as a support platform for these players. This platform will offer job proposals from support groups and legal information about transfers/registrations in football leagues. Additionally, there will be a system allowing players to freely and anonymously share their experiences with agents and clubs. This project represents an innovative effort to provide support and security to young football talents in Portugal, addressing critical challenges they face at the beginning of their professional careers.

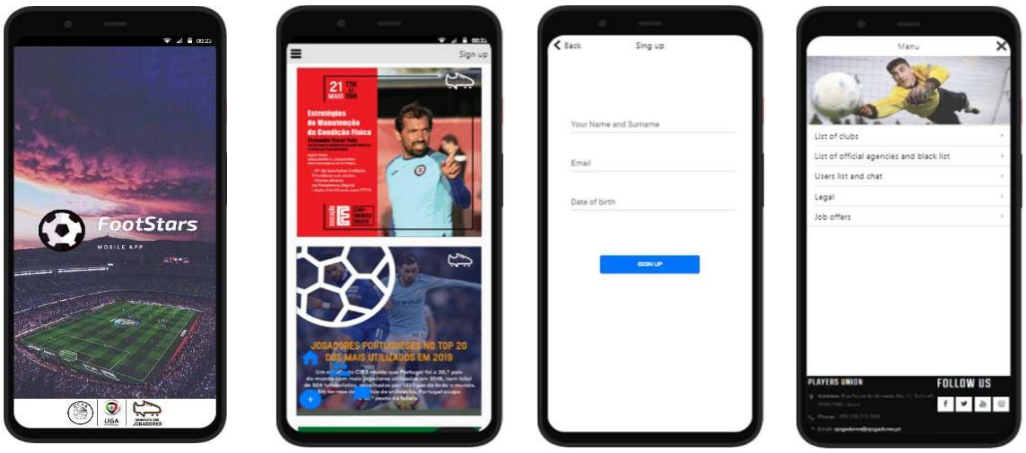

Figure 1: prototype/ result achieved.

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Enhancing Team Engagement and Notoriety for Youth: Strategies for GDB

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ABSTRACT

The proposed action plan of the co-creation challenge seeks to increase the engagement and visibility of a sports team, with particular emphasis on attracting young people and diverse audiences. The central issue addressed is the lack of engagement, which has resulted in declining relevance, motivation, and revenue streams for the team. The proposed solution adopts a multi-faceted approach comprising a digital marketing plan, the organisation of an open day, and the hosting of e-sports tournaments. These strategies are intended to bridge the gap between younger audiences and the team, create new revenue streams, engage e-sports players, and promote diversification into other sports. This initiative represents an important step towards revitalising the team's presence and appeal within a rapidly evolving sports and entertainment landscape.

Figure 1: prototype/ result achieved

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Pre-build a sustainable future: modular prefabricated concrete

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ABSTRACT

The use of prefabricated modular concrete systems can render housing construction more profitable, sustainable, and adaptable. This system surpasses the current construction market by introducing two key concepts increasingly essential in today's world: innovation and sustainability.

Prefabricated modular systems have gained growing recognition in recent years owing to their association with cost-efficiency, sustainability, and the customisation of construction. Manufactured in a controlled factory environment, these modules comply with strict quality standards. Once completed, they are transported to the final site, where they are connected to electricity and sewage networks. The challenge set through the partnership between Project DEMOLA and PAVIMIR, a company specialising in the production of prefabricated concrete for construction, is the implementation of a production line for prefabricated modular homes.

An initial reference search was undertaken to obtain insight into technologies and design principles. Subsequently, a report was compiled proposing solutions for each construction stage (architectural, structural, hydrosanitary, and electrical). Finally, a design for a modular concrete house was presented. The project encompasses the entire process from manufacturing to customer delivery, resulting in a passive house. Anticipated benefits include a fast and scalable system, reduced construction costs, lower waste and water consumption, and greater reuse of raw materials. These advantages, combined with the improved quality of life offered by a versatile, efficient, and accessible system, contribute to enhanced comfort in permanent residences, holiday houses, or local accommodation. This collaborative project aspires to contribute to a more sustainable future.

Figure 1: Concrete module layout design

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Navigation Change: Recommendation Systems Upgraded for Modern Markets

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ABSTRACT

Pin2Give is a platform developed by Aresta Binária that proactively promotes the characterisation of users and their networks of contacts. It employs this information to notify users of forthcoming commemorative events and provide tailored suggestions. These may take the form of text messages, postcards, videos, or product recommendations based on the recipient's characteristics, the event, and market trends. Within this project, the use of graph databases was explored to optimise recommender systems by fine-tuning suggestion lists with market trends, user and contact data, events, and a curated selection of products and services. The core challenge lies in the scarcity and constant evolution of data, coupled with the unpredictable nature of items and the ever-changing landscape of user preferences [1]. The effectiveness of recommender systems depends on the availability of both item and user data, which algorithms process to refine the accuracy of recommendations. However, the dynamic nature of trends creates difficulties in predicting responses to a wide range of uncertain items. The project prioritises delivering meaningful recommendations by striking a balance between global trends and individual user characteristics. It leverages Pytrends to access Google Trends reports and applies web scraping techniques on Amazon to compile diverse search trend data. This dataset is enriched through the Zyla API, which provides additional information on product categories. To investigate the intricate connections between search trends and user preferences, the project employs a Neo4j graph database. This graph-based NoSQL system uncovers complex relationships, enabling the identification of trends aligned with specific user preferences through advanced queries. Development of the web API is streamlined using FastAPI, which ensures efficient integration with Neo4j, facilitating the management of highly connected graph data and simplifying CRUD operations, including the retrieval of nodes by identifiers. This comprehensive approach not only harnesses the full potential of property graph databases but also strengthens the system's capacity to detect trends that resonate with diverse user preferences. The project has successfully established a robust framework for recommendation systems by integrating global trends, user characteristics, and advanced database management. Future work will seek to further improve system accuracy and responsiveness by incorporating advanced machine learning techniques and expanding the scope of data sources for a more nuanced understanding of user preferences.

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Guide To Digital Educational Technologies: From Idea to Web Product

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ABSTRACT

This communication aims to present the process and outcomes of the Challenge-Based Innovation (CBI) training programme at Bragança Polytechnic University, which took place in the second semester of 2022/23. The challenge was to develop an online teaching guide on the use of digital technologies applied to remote teaching, addressing the technical and pedagogical needs of teachers. The following methodology was adopted: (i) selection of digital tools to be included in the guide; (ii) bibliographical and web research to produce the State of the Art on digital tools; (iii) development of the educational web product with a focus on handling digital tools to support teachers' informal continuing training; (iv) implementation and dissemination of the product (https://guiadigitaldoprofessor.blogspot.com); and (v) evaluation of the product through field research involving teachers from Portugal and Brazil. The research yielded highly satisfactory results, demonstrating the efficiency and effectiveness of the digital teachers' guide as a tool for informal continuing education, thereby contributing to the digital transition. It should be noted that the research may be extended further, broadening and updating the digital teaching guide for exploration in future studies.

Figure 1: Digital teacher's guide

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SCAR BE GONE: Upcycling Banana Peels into an Eco-Friendly Cellulose-Derived Hydrogel for Acne Scar Treatment

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ABSTRACT

Around 121 million tonnes of bananas are produced worldwide each year, with peels accounting for 40% of this mass [1]. These are generally discarded by individuals and companies, although they are known to possess numerous medicinal properties and could be upcycled by the pharmaceutical and cosmetic industries. In this context, the present work proposes the development of a banana peel-based cellulose hydrogel designed to soothe and treat acne scars on facial skin. For this purpose, banana peels (collected from the IPB canteen) were used to extract cellulose through a multi-step chemical reaction process, combined with an extract rich in flavonoids and amino acids. The cellulose obtained was hydrated with a mixture of water and banana peel extract to yield a semi-solid hydrogel with a moisturiser-like texture. This hydrogel, the SCAR BE GONE prototype (Logo shown in Fig. 1), seeks to provide an alternative, eco-friendly solution for the treatment of acne scars.

Figure 1: Logo of the SCAR BE GONE product.

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VITAGOM: Biotin-Rich Gums Obtained from Apple Biowaste

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ABSTRACT

In today's health-conscious society, the demand for biotin supplements has risen, particularly in appealing formats such as gummies [1]. Biotin, or Vitamin B7, plays an essential role in maintaining healthy skin, hair, and nails, while also supporting metabolic functions [2]. VitaGom, fully vegan, provides a practical and enjoyable way to integrate this vital vitamin into daily routines, delivering a rich source of nutrients and antioxidants in an eco-friendly and sustainable format. The brand's logo is presented in Figure 1.

For gummy production, apple residues were used to extract biotin and pectin from the pulp and skin, respectively. Additional natural ingredients, including honey and vanilla, recognised for their nutritional properties, were incorporated to enhance flavour and nutritive value [3-5]. The mixture of pectin and biotin-rich applesauce was then processed and moulded into gummies, yielding a tasty, sustainable, and affordable product. The inclusion of flavours, natural sweeteners, and vitamins allows for flexibility and customisation. These gummies not only reduce food waste but also offer a product that fosters both health and environmental awareness.

Figure 1: Logo of the VitaGom product

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TROPCARE: Development of Cosmetics from Mango Seeds

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ABSTRACT

Tropcare products are designed to address consumer demand for sustainable skincare and youth-enhancing alternatives. This project explored the valorisation of agro-food processing by-products, namely mango seeds, thereby creating a sustainable product while mitigating residual pollution. Mango seeds account for 30–45% of the total fruit weight, and with global mango production exceeding 46 million tonnes annually, they represent a significant waste stream [1]. Within this context, the products target cosmetics development, specifically a facial powder and a moisturising cream derived from mango residues, with the brand logo displayed in Figure 1. To extract the starch, mango seeds were crushed, weighed, and dispersed in distilled water (100 mL/10 g of seeds), followed by filtration and drying. The isolated starch was then used to produce the facial powder by dissolving it in water, heating, and progressively drying. Furthermore, bioactive compounds and oil were extracted from the seeds using sweet almond oil, which served as the base oil for formulating a moisturising cream

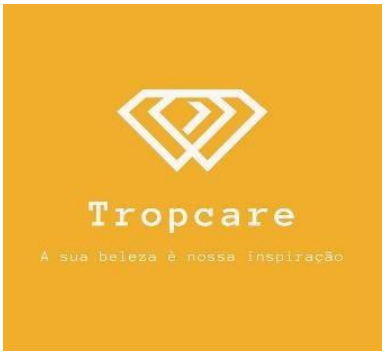

Figure 1: Logo of the Tropcare product

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Chemistry Project: An Introductory Approach to Chemical Product design

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ABSTRACT

Chemical Product Design (CPD) has gained importance due to major transformations within the chemical industry, which require the development of these skills in chemical engineering students from early stages of their academic careers. According to Cussler and Moggridge [1], the process can be structured into four distinct steps: 1) Customer needs: What requirements must the product satisfy? This step should yield a clear definition of product specifications; 2) Idea generation: What alternative products could meet these needs? The outcome should be a pool of ideas, from which a limited number of feasible options are selected; 3) Selection: Which alternative is the most promising? The procedure involves ranking feasible options; 4) Manufacture: How can the product be produced in commercial quantities? This step addresses both product and process design, including prototype development [2].

The Chemistry Project curricular unit provides an introductory approach to CPD. It is oriented towards "ecological" business drivers, namely the development of environmentally friendly, sustainable bioproducts, and prioritises prototype development at laboratory scale. Each year, a new challenge is assigned to students, such as the valorisation of agro-industrial residues. Figure 1 illustrates some prototypes developed during the 2022/2023 academic year: Orgahollic (creamy eye treatment with apple and chia seeds), Royal Cocoa (cocoa face treatment; exfoliant and moisturiser), Marmalade (100% organic orange jam), and Perséfone (pomegranate body treatment; exfoliant and moisturiser).

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Development of a Set of Folding Tables: In Cooperation with Carpintaria Mofreita Lda.

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ABSTRACT

The work presented here was part of the Design Project curricular unit of the Art and Design degree (Minor in Design), to create exclusive furniture in collaboration with the Mofreita carpentry company and the Cercimac institution. Mofreita carpentry, which is located in Macedo de Cavaleiros, in the district of Bragança-PT, specialises in creating furniture and other wooden elements.

Cercimac, also located in Macedo de Cavaleiros, is a charity that promotes the social inclusion of people with disabilities through specific intervention measures, in conjunction with public and private services. This project aims to create exclusive furniture, with the profits being converted into financial funds for the Cercimac institution. Research was carried out to gather information on market trends, anthropometry, and the practicality of the furniture. Reused materials supplied by Mofreita, which will also be responsible for the technical side of the process, will be used in its production. As a partnership, the project will be carried out by patients from the Cercimac institution, who will oversee assembling and perfecting the pieces. In order to design the project, field visits were made to understand the resources available and thus enable the creation of unique furniture.

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From grape pomace to Viola Pasta

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ABSTRACT

Grapes are among the most cultivated, demanding, and valued conventional fruit crops worldwide. Annual production approaches 70 million tonnes, with approximately 80% used for wine production, while 20% of processed grapes generate a by-product waste known as pomace [1]. Grape pomace, produced by the wine industry, consists of peels, seeds, pulps, and stems, all recognised for their natural antioxidant and antimicrobial properties [2]. Its beneficial characteristics, wide availability, and low cost make grape pomace an excellent candidate for exploration as a functional ingredient.

One strategy to valorise this by-product involves transforming it into grape pomace flour through drying and grinding. Pasta, a low-cost staple consumed globally, presents an attractive vehicle for flour incorporation. This approach led to the prototype product, Viola Pasta (Fig. 1), created by combining grape pomace flour with wheat flour and eggs. After multiple trials, the optimal substitution level was determined as 25%. This concentration ensured appropriate softness, balanced bitterness and astringency, along with a slight increase in volume and weight and a distinct purple coloration. No significant flavour difference was observed compared with conventional pasta. Consequently, Viola Pasta emerges as a colourful, healthier alternative, enriched with added benefits such as antioxidant properties and dietary fibre content.

Figure 1: Viola Pasta's logo

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The Quality Evaluation of Lithuanian Municipalities Websites

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ABSTRACT

The progress of information technology led to the creation and development of e-governance on the Internet. The provision of e-services encourages citizens to visit the municipality's website more and more often and to use various e-services. Various e-services and functions provided to citizens are increasing on the websites of Lithuanian municipalities, so it becomes important to discuss the communication between local authorities and citizens in the virtual digital space. The interaction between local government and citizens influences the political decisions made in the community. Websites represent the image of a political institution in the public digital space. The purpose of the article is to assess the applicability of the quality assessment model of Lithuanian municipalities' websites. It is important to reveal the main participants in the evaluation model of the websites of political institutions and to distinguish the evaluation criteria that determine the quality of the website. In the theoretical part of the article, models for assessing the quality of online websites are analysed, the research methodology is formed and a qualitative study of the websites of Lithuanian municipalities is conducted. The article uses the following methods: analysis of scientific sources and content analysis. The result of the work is the revealed assessment of the quality of Lithuanian municipalities' websites, which helps to explain the operation of the implemented functions and reveal the interaction factor between local government and citizens. The assessment of websites is ambiguous, as it depends on the type of website, the activities of the institution implemented and the participants. Lithuanian municipalities, taking into account the possibilities of the website platform, use e-mail. government services to citizens, but the interaction between citizens and local authorities is limited to individual consultations. Responsiveness can only be achieved through personal communication. In this case, the interaction is conditioned by the competence of the employee of the relevant municipality.

Keywords: Communication, Local government, Website.