

# FOREWORD

We are delighted to announce that the international research network ELLAS (Equality in Leadership for Latin American STEM) is collaborating with the present edition of the digital journal *Interfases*, published by Universidad de Lima.

A significant issue within the spectrum of career paths is gender disparity, especially prominent in the fields of Science, Technology, Engineering, and Mathematics (STEM). This disparity is evident globally, including in Latin American nations, where there is a notably lower representation of women in these sectors. Various strategies are being employed across academic, industrial, and public sectors to address this imbalance and promote gender equality in STEM. These strategies include empowering girls and women through education and support, conducting rigorous research, enacting policy reforms to achieve gender parity in leadership positions, and disseminating information about successful case studies.

The research initiative “Latin American Open Data for Gender Equality Policies Focusing on Leadership in STEM” is currently conducting research studies in Brazil, Bolivia, and Peru. This initiative operates in collaboration with the ELLAS Research Network. Each year, it organizes the ELLAS Workshop, colloquially known as WELLAS. The 2nd WELLAS, hosted at Universidad de Lima in Peru in 2023, convened a diverse group of multidisciplinary researchers, students, managers, and other stakeholders who are interested in gender equality and are involved in the project.

In partnership with the *Interfases* journal, we are excited to introduce this dossier, entitled 4 ELLAS. This edition features extended versions of the research papers initially presented at WELLAS, further enriching the discourse on gender equality in STEM.

We aspire to significantly enhance diversity, equity, and inclusion within STEM careers. To achieve this, it is crucial to promote research and practices that acknowledge and value diversity in a multifaceted and intersectional manner, considering aspects such as gender, race, nationality, and economic background. Additionally, it is imperative to develop technologies that address the genuine needs of all individuals, thereby offering tangible benefits to society at large. The articles in this edition, produced by

various authors, align with this objective. This edition features articles in English (8), Portuguese (5), and Spanish (1) emphasizing inclusivity through language.

The inaugural paper, authored by Bárbara Drummond, Luciana Salgado, Meirylene Avelino, Karen Ribeiro, Mercedes Cigüeñas, Guillermo Dávila, and Boris Branisa, delves into activity 4 of the ELLAS project. This study identifies and maps the diverse factors, actors, and policies that influence women's career progressions and leadership roles in STEM fields. It involves a comprehensive collection and analysis of relevant data. The research methodology included a systematic mapping study and an analysis of grey literature. The findings reveal eight distinct contextual factors divided into 196 sub-factors. Additionally, the study formulated several competency questions, providing a foundation for further investigation and future project phases.

In the second paper, Vanessa L. Souza and Rita Berardi explore the development of an ontology to understand women's presence in computer courses within Brazil, contextualized within the ELLAS project. This effort is part of a broader initiative to establish a linked open data (LOD) platform to bridge existing knowledge gaps. The current study contributes in three significant ways: first, by converting data from the higher education census from INEP into a resource description framework (RDF) format; second, by devising a methodology for ontology development that aids in analyzing women's participation and retention in STEM fields, and third, by applying this ontology specifically to higher education in computing in Brazil.

In the third paper, authors Nicolás Rodríguez, Elizabeth Jiménez, and Guillermo Guzmán undertake an analysis aimed at tracing the evolution of institutional frameworks—encompassing laws, rules, and regulations—designed to ensure equal employment opportunities for men and women in Bolivia. Their study emphasizes identifying and examining national regulations, including laws, supreme decrees, and international agreements. These legal instruments are scrutinized for their role in promoting gender equality, mainly focusing on their impact on integrating individuals into the labor market in STEM fields.

In the fourth paper, Thamires Faleiro Martins and Karen da Silva Figueiredo Medeiros Ribeiro propose an ontology to structure data on female leadership in computer science in Brazil to build an open and collaborative platform where data can be collected, organized, and classified to construct a folksonomy of the domain. The ontology addresses competency questions in the domain, such as the contextual factors that motivate Brazilian women to pursue leadership positions in computer science and the policies that promote such opportunities. The proposed ontology may benefit various users, including female computer science professionals, leaders, researchers, and policymakers.

In the fifth article of this edition, Patricia Santana Lima, Luciana de Castro Salgado, and Silvia Amélia Bim demonstrate the initial steps in integrating an open data platform

with an intersectional feminist lens. Feminist Human-Computer Interaction (HCI) is defined as the incorporation of feminist theory into all stages of HCI practice, including user research, prototyping, and evaluation. Despite advancements in this area, there remains a gap in research concerning integrating feminist principles with established HCI methodologies. One such methodology, value-sensitive design (VSD), focuses on human values and the potential impacts of technological artifacts. The current work explores the inclusion of Feminist HCI principles in HCI projects utilizing VSD. This research, conducted as part of the ELLAS project, aims to reduce gender disparities in STEM fields across Brazil, Peru, and Bolivia.

The sixth paper, authored by Gisane A. Michelon and Rita Berardi, presents a comparative study focused on tools for modeling, storing, and integrating data within the semantic web, specifically for the ELLAS network platform. The World Wide Web Consortium (W3C) provides a layered architecture that sets the standards, technologies, languages, and methods for developing semantic web domain applications. Utilizing this framework, the authors developed a data model for the ELLAS network platform. The primary goal of this study is to compare the leading tools for storage and semantic integration, aiming to develop an effective data model to facilitate mapping policies, initiatives, and factors influencing women's career development in STEM fields.

The seventh paper, authored by Leihge R. R. Pereira, Cristiano Maciel, and Indira R. Guzman, delves into an investigation of gender and leadership within STEM fields in higher education, specifically focusing on methodological design. The paper emphasizes that institutional actions and policies at universities can profoundly influence the inclusion of women in leadership positions within STEM areas. This article outlines the methodology the local ethics committee approved for conducting research in Brazil. The primary aim is to understand how discursive productions about gender impact women's career trajectories and leadership opportunities in STEM fields in higher education settings. Discursive productions in this context refer to power structures such as university policies, climate, culture, and projects. We anticipate the findings from this study will offer valuable insights and aid researchers with similar objectives, particularly in efforts to diminish gender inequalities in leadership in STEM.

In the eighth article of this edition, Waleska Gonçalves de Lima, Ana Lara Casagrande, and Cristiano Maciel present their ongoing research, which aligns the policy mapping activities of the ELLAS research network with the Brazilian new high school policy, focusing on gender-related issues in STEM. Through an in-depth analysis of documents related to this policy, the study identifies elements of gender considerations within STEM fields incorporated into national policy. The terms of loan agreements with the World Bank particularly inform this aspect of the research. We expect the findings to provide insightful connections between educational policy and gender inclusivity in STEM education.

The ninth paper by Ana Lara Casagrande and Eunice Pereira dos Santos Nunes focuses on public policies, gender, and STEM careers. This work scrutinizes the role of the State in formulating public policies that underpin the guarantee of social rights, explicitly addressing gender disparities as a historical consequence of discrimination against women, leading to their underrepresentation in STEM careers. The authors argue for the critical need to map existing public policies and advocate for progressive reforms to ensure women have equal access to work opportunities and leadership positions. This mapping is essential for addressing systemic barriers and advancing gender equality in STEM fields.

In their paper, Rodgers Fritoli and Rita Berardi propose an architecture for integrating knowledge graphs and a pipeline to transform spreadsheet data into RDF triple knowledge graphs automatically. This development is specifically for the open data platform used by the ELLAS research network. The primary objective of the ELLAS project is to generate comparable data concerning gender disparities in STEM across Latin America. Given this data's diverse sources and formats, the semantic web is employed to imbue the data with meaningful context. The proposed architecture and pipeline aim to streamline the extract, transform, and load (ETL) processes, enhancing data storage and accessibility for end users.

In the tenth article, authors Alessandra F. dos Santos, Ana Lara Casagrande, and Cristiano Maciel examine how public policies can address the multifaceted challenges associated with gender inequality in Brazilian high schools. Their research highlights the pivotal role of public policies in confronting gender disparities, specifically emphasizing high school education. This stage is crucial for overcoming obstacles to women's educational paths, particularly in STEM careers. The article delves into the effectiveness of these policies in creating a more inclusive and equitable educational environment, thereby fostering greater gender balance in STEM fields.

In their article, Gilmara Joanol Arndt, Marina Borges Gonçalves, Raquel de Barros Pinto Miguel, and Luciana Bolan Frigo investigate the participation of women in STEM fields within the Brazilian academic context. The central research question guiding their study is: What is the extent of national scholarly output on women's participation in the Brazilian STEM arena? To address this, the authors conducted a comprehensive literature search across several databases, including Scopus, Web of Science, Google Scholar, and Scielo, identifying a total of 47 relevant references. These references were meticulously analyzed and categorized into six distinct groups based on their primary focus. This classification provides a nuanced understanding of the current academic discourse on women's involvement in STEM in Brazil.

In the thirteenth paper, Giseli Duardo Maciano and Cristiano Maciel discuss the necessity of implementing interventional strategies within the school environment. These strategies involve continuous teacher training centered on a science, technology,

engineering, arts, and mathematics (STEAM) approach. The goal is to enhance the appeal of the teaching and learning process, stimulating increased interest among girls in STEM fields. To support their argument, the authors conducted a qualitative systematic review. The findings suggest that investing in STEAM-oriented actions holds significant potential for innovating educational practices and bolstering girls' participation in STEAM areas.

The concluding paper, authored by Marina Borges Gonçalves, Gilmará Joanol Arndt, Raquel de Barros Pinto Miguel, and Luciana Bolan Frigo, delves into women's place in technology. Addressing the global issue of gender disparity in STEM fields, the authors recognize the complexity and the continuous need for reflection and critical analysis. This study employs Pêcheux's discourse analysis to examine Brazilian Instagram profiles focusing on women in technology, as identified by the ELLAS network. Out of 63 profiles identified, 18 were selected for detailed analysis. These profiles primarily highlight educational content, offering insights on entering and advancing within the tech industry, thus contributing to a broader understanding of women's roles and challenges in technology fields.

This collection of 14 articles results from a collaborative effort involving numerous individuals and institutions. We extend our heartfelt gratitude to the Interfases team at Universidad de Lima for their dynamic, competent, and professional collaboration with the ELLAS research network. Special thanks go to Dr. Nadia Katherine Rodríguez Rodríguez, director of Interfases Journal; Dr. Hernán Nina Hanco, editor-in-chief, and the entire editorial committee, scientific reviewers, and management team, notably represented by Angelo Rodrigo Taco Jimenez. Our appreciation also extends to the International Development Research Center (IDRC) of Canada and Fundação de Apoio e Desenvolvimento da Universidade Federal de Mato Grosso (UNISELVA) for their financial support and administrative management of the ELLAS project. Lastly, we are indebted to the authors of the articles for entrusting their research to the 4 ELLAS edition!

We sincerely hope you find both enjoyment and valuable insights in reading these articles.

Ph.D. Indira R. Guzman, California State Polytechnic University,  
Pomona, United States (irguzman@cpp.edu)

Dr. Cristiano Maciel, Universidade Federal de Mato Grosso,  
Cuiabá, Brasil (cristiano.maciel@ufmt.br)

Guest editors

