

SPOC “Gender in Digital Education”: a Means to promote Egalitarian e-Pedagogy and Sustainable Development

Lilia Cheniti-Belcadhi^{1,* †}, Ghada El Khayat^{2 †} and Mohamed El Hadi Benelhadj^{3 †}

¹ Sousse University, ISITCom, PRINCE Research Lab, Tunisia

² Alexandria University, Faculty of Business, Computers and Information Systems, Egypt

³ Tamanrasset University, Algeria

Abstract

It is important to adopt innovative educational approaches to respond to new problems and challenges in the world, to consider diversity and to understand its imperative for problem-solving. It therefore becomes important to focus on education based on the seventeen SDGs allowing better use of human resources for better economic and social conditions. SDG 5 aims to achieve gender equality and empower all girls and women. Gender equality is indeed interconnected with the other objectives; everyone's actions will affect the achievement of SDG5. The Open2Sustain project (Open Education for Euro- Mediterranean Sustainable Development), funded by the Agence Universitaire de la Francophonie (AUF), is strongly inspired by SDG4, “ensuring equal access to quality education for all and promoting lifelong learning opportunities”. The project is action research that brings together university partners from Euro-Mediterranean countries to create a synergy of North-South cooperation to support the co-construction of sustainable development knowledge, to integrate SDGs into academic courses. In addition, this project aims to prepare the creation of a network of SDG facilitators in the region, through the development of a SPOC on the SDGs, the sharing of innovative open scenarios and educational resources relating to the SDGs. A pilot experiment was carried out and it will be detailed in this paper. Resources and scenarios contributed by professors will be reused by other professors. Subsequently, the analysis of traces makes it possible to recommend scenarios to future users. Using open educational resources and artificial intelligence for scenario recommendation purposes will encourage sharing and make it possible to contextualize and enrich the SPOC content, over time. Participants to be involved in the development and scripting of the content for possible sharing and dissemination based on intelligent recommendations, to the teaching communities.

Keywords

Digital Learning, Gender, Open education, Innovative learning,

1. Introduction

Inequalities between women and men in education need to be better understood by those who want to combat inequalities linked to sex and enable human beings to be freed from the limitations imposed on them by gender stereotypes. However, the problem cannot be reduced by taking exclusively into account the question of access to education. It must, therefore, be examined through how education takes place daily and more through digital platforms.

The 13th International Conference on Research in computing at Feminine, May 20-21 2024, Constantine, Algeria

* Corresponding author.

† These authors contributed equally.

✉ liliachenitibelcadhi@gmail.com (L. Cheniti-Belcadhi); ghada.elkhayat@alexu.edu.eg (G. El Khayat); benelhadj@gmail.com (M.E.H. Benelhadj)



© 2024 Copyright for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).

Universities are not neutral. Unfortunately, educational and training institutions take an active part, together with the family and dominant culture, in the formation of individuals who represent traditional gender roles.

Thinking about practices that would make education egalitarian remains a very important objective of universities, especially since academic and professional training constitutes an important prerequisite for women to engage in a career and to potentially compete with men in a fair egalitarian manner. In this context, the objective of this paper is not to report on gender inequalities in education and training systems because there is a lot of evidence on this, but to provide elements to develop more egalitarian practices through faculty training and using digital technologies. This objective is crucial for today's society where individuals, both men and women, need to be trained as entrepreneurs of their own lives, having to invest in lifelong learning to build and succeed in their careers. The spread of electronic platforms makes the problem more complex because of the scale at which stereotypes may be spread. Hence, the importance of digital egalitarian pedagogy.

In many countries, women than men pursue tertiary education, but with equal training women are many times paid less and the professions they choose do not benefit from the same prestige or recognition as those of men. Differences continue to exist regarding their education and training choices and the professions they decide to lead. There is a global agreement that women are earning less than men. This is true even among those who have completed the longest studies and who lead professions considered prestigious. The salary differences between women and men also increase as we move up the professional hierarchies. The professions in which women engage are also different from those predominantly practiced by men. They often are in professions with less prestige and lower remuneration. Regarding hierarchy, women are more often experts than managers. It is noticed that companies favor choosing men when it comes to planning the careers of managers. But how does this impact the sustainable development goals?

This contribution, committed to the Sustainable Development Goals, is justified by the following:

- Contribution to a sustainable future with interdisciplinary and collaborative approaches to education and awareness.
- Developing leadership in environmental education and sustainable development (ESD) within universities.
- Making a significant contribution to long-term local and global sustainability through ESD.
- Raising awareness among the university, students and employers about the concepts and application of sustainability in higher education programs.
- Promoting long-term economic growth.
- Solving the problems affecting societies in general.

In this paper, we present a research action project strongly inspired by SDG4. The central idea is to design a process of appropriation of the SDGs by universities through developing open and innovative SPOC for professors. The SPOC on incorporating SDGs in teaching allows the sharing of innovative open scenarios, and open educational resources related to SDGs. Focusing on SDG5 and open eLearning, cultural norms, and forms of marginalization, will allow us to understand the issues women and girls face, in the context of intensive development of Digital technologies.

Gender and digital education and AI research are multidisciplinary, encompassing education, computer science, sociology and gender studies. We are all aware of the Gender Bias in AI Algorithms. Indeed, numerous studies have found gender biases in AI algorithms that affect many facets of digital education, such as content suggestion, grading systems and student feedback. For example, in [1] authors highlighted racial and gender biases in facial recognition algorithms. We have also observed that the digital gender divide is investigated through research into access to and use of digital technology, especially online educational resources. In some research work, researchers have highlighted gender differences in digital skills and opportunities, such as in [2].

Research investigates the role of gender in Science, Technology, Engineering, and Mathematics (STEM) education, as well as how artificial intelligence (AI) can exacerbate or alleviate gender inequities. For example, the study in [3] analyzed the gender stereotype of school science subjects among female and male students and the impact of gender-science stereotypes on the career aspirations of young people. Scholars also investigate techniques for creating inclusive educational technology that accommodates different gender identities and learning styles [4]. Gender has been also examined in collaborative learning environments such as in [5], where we investigate the impact of group gender differences on the project assessment result depending on the 21st-century learning skills in a Project Based Collaborative Learning setting for an introductory programming course for postgraduates.

The following two questions were posed and enabled the design and development of an open e-course related to Gender in digital education:

- Is it possible to include gender principles in an online course?

What kind of constraints and specificities should be taken into consideration during the instructional design of open scenarios of e-courses with respect to gender?

The SPOC developed a pilot experience for training the trainers in designing and developing open innovative digital learning scenarios, taking into consideration the principles of SDG 5 has been carried out. The rest of the paper is organized as follows. Section 2 provides the methodology, the design and development, testing and results, discussion and conclusion are the subjects of sections 3 to 5 and the paper ends with the references list.

2. Methodology

The best way to get things done is to do them yourself. This statement is used in businesses, community projects, and national governments. These organizations rely on action research to cope with their unstable and constantly changing environment, in an increasingly interdependent world.

In real-world educational contexts, it is about using systematic inquiry and reflective practice to address real-world challenges, improve teaching and learning, enhance student engagement, and drive positive change in the world. within the education system. This is the method we used in this work.

Action research is a strategy that attempts to find realistic solutions to the difficulties and problems of organizations. It fundamentally refers to learning by doing. First, a problem is identified, then steps are taken to remedy it, the effectiveness of the efforts is measured and if the results are not satisfactory, the steps are repeated. It can be classified into three different groups:

- **Positivist:** This type of research is also called “classic action research”. She views research as a social experiment. This research is used to test theories in the real world.
- **Interpretation:** This type of research is called “contemporary action research”. She believes that business reality is the product of society and in this research she focuses on the details of local and organizational factors.
- **Critical:** this cycle of action research adopts an approach of critical reflection on the company’s systems and attempts to improve them.

All research is about learning new things. Collaborative action research provides knowledge based on investigations carried out. It starts with identifying a problem. Then, the search process takes place in the following steps:

- Plan
- Act
- Observe
- Reflect

The action research reported on in this paper proceeded with the following main activities in the presented order:

- Conducting a survey among different universities to find out what level of sustainability education is adopted and to identify the skills needs related to sustainability.
- Analyzing the survey results.
- Formulating the general and specific objectives of the SPOC as well as the learning activities of the latter.
- Designing of SPOC learning content, the learning activities and recording of video clips.
- Preparing the SPOC on the Moodle platform.

For the two SPOC Sessions, the following was done:

- Holding SPOC webinars and information sessions.
- Preparing for SPOC registrations, registration forms, selection, webinar account creation and ongoing resolution of any technical issues.
- SPOC Launching, with a kick-off webinar with participants.
- Tutoring learners.
- Evaluating of the learners, certification and evaluation of the first session of the SPOC.

3. SPOC eGender : Design and Development

SPOC stands for a Small Private Online Course. Running a SPOC provides a stepping stone to scaling a course from tens of people to hundreds and beyond. It allows you to:

- Reach more geographically dispersed people with your message.
- Have a better work/life balance (by not having to travel for training).
- Provide greater Customer Centricity by allowing customers to drive their own development through your course.

There are many different names for these types of training. So you can refer to a SPOC as a blended, online, virtual course with elements of eLearning. There is no reason why a SPOC cannot incorporate face-to-face (F2F) elements. For many, starting with an F2F/SPOC hybrid course is an ideal way to move into this area, i.e. offering F2F sessions with online content and social areas to grow and share.

The SPOC eGender aims to trigger an educational transformation within universities. A profound renovation in teaching and learning methods and an openness of the university to its environment are expected. The use and production of OER, allow learners to acquire digital transversal skills develop their autonomy in learning and facilitate the design and implementation of innovative learning scenarios. In a knowledge-based economy, the creation of new knowledge and its dissemination to as many people as possible play a central role. This is the objective pursued by the Open Education movement which works to develop open educational resources. According to UNESCO, these resources include "teaching, learning or research materials belonging to the public domain or published with an intellectual property license allowing their use, adaptation and distribution free of charge". Usually, a teacher creating a course, or a textbook sees his or her original work protected by copyright which defines its use and reuse. Because of this protection of intellectual property, the educational resource is made exclusive. It is possible to prevent someone from using it, and the author has a monopoly on its right of exploitation. Access to it is often paid for. Its reproduction, modification and distribution by others is limited, unless explicitly authorized by each user. Open educational resources make the educational resource non-exclusive and free to access. Its distribution is also facilitated and derivative works, modifying the course of the original textbook, are permitted thanks to existing free distribution licenses.

Besides, we have realized that Gender impacts all eLearning process stages: Scoping and needs analysis, Instructional design, Development of pedagogical resources, Deployment and testing of resources in the online Learning environment, Tutoring and Evaluation of the eLearning Process. This guided us in the design of Women friendly, nondiscriminatory eLearning environments. This is concretized through gender-inclusive language and non-stereotyping images.

The SPOC eGender was launched through the educational innovation centers and Learning Labs of the Universities of Sousse and Alexandria jointly with the University of Coimbra. Its general objective is to create a movement within universities in the Euro-Mediterranean region around open, innovative and egalitarian education, using educational technologies. The SPOC has the specific objectives of developing a culture within the university community at the level of partner universities, as well as in other universities in the Euro-Mediterranean region around

sustainable development and SDG5 in particular, contributing to the appropriation of the SDGs and in particular SDG5 at the level of university training through innovative and open educational scenarios, promoting the development and adoption of innovative educational approaches and the use and production of OER in relation to sustainable development and supporting the opening of the university to its environment through open resources responding to societal problems. The learning objectives of SPOC eGender presented to university teachers are:

- Identify the most relevant gender equality objectives for teaching.
- Propose learning objectives that will help learners/teachers ensure gender equality when using educational technologies for learning/teaching.
- Adopt innovative teaching approaches to ensure learners' engagement in sustainable development and the empowerment of all women and girls.
- Design digital learning scenarios and resources including the principles of SDG5 to be shared with other educators.

These objectives were broken down into three learning sequences: The learners were called upon to prepare an individual transversal project allowing them to integrate aspects related to gender into their digital teaching. Videos on the importance of gender in university education were also prepared by the participants and shared through the platform. The hourly workload of this SPOC was 12 hours 3 weeks.

4. Testing and Results

The Open2Sustain project started in June 2021 and lasted for two years. The SPOC eGender was designed in June 2022 and was deployed in October 2022 for the first time. The constructivist methods in a context of tutored training promoted learning autonomy and pedagogical reflection of learners for the scripting of new content for open education.

The adoption of these methodologies with the target group allowed the teacher participants in this initiative to use the same methodologies later with their students. The project mainly targeted the academic community of the Euro-Mediterranean region. More specifically, the teacher-researchers and doctoral students who participated in the project activities are residents of the following countries: Tunisia, Algeria, Morocco, Egypt, Sudan, Canada Djibouti, Lebanon, France, Portugal, Jordan, United Arab Emirates, Qatar and Saudi Arabia. The percentage of female participants exceeded 50

Our project presents an educational innovation that we call "Meta". It targets higher education students indirectly and has a huge impact. Instead of influencing a class of 100 students at a university, we managed to:

- Create a critical mass of university professors trained in sustainability education.
- Raise awareness among several universities in the Euro-Mediterranean region.
- Develop sustainability education in various disciplines.
- Design a SPOC syllabus for training a network of SDG 5 facilitators.

- Develop open teaching resources and scenarios relating to SDG 5 for its integration into academic training based on open educational approaches.
- Raising awareness of an inclusive approach using digital technology in universities. Two sessions of the SPOC e-Gender, with a duration each of three weeks, have been conducted. A total of 260 University teachers from MENA and south Mediterranean countries have been registered in the two sessions (134 for session 1 126 for session 2). At the end of the two sessions, 34 Certificates were awarded, and 50 other learners were able to work on most of the activities offered. University teachers registered in the SPOC and have been trained on concepts related to digital learning and Gender, methodologies to design open e-courses based on egalitarian pedagogy, and the role of artificial intelligence in the creation of stereotypes, and its contribution to gender equality. 25% of the learners finalized the activities proposed in the SPOC.

A questionnaire was deployed and showed that most of the learners appreciated the open learning scenario proposed and were able to acquire the necessary knowledge and competencies to design open scenarios based on egalitarian e-Pedagogy.

Through this research work, we have in addition designed a meta-model for open egalitarian e-Learning. In a previous work [6] we have proposed a meta-model for active e-learning, composed of three meta-models: instructional methods meta-model, skills metamodel and technological media meta-model. In [7] we proposed an open learner model that can support the open learning process in digital environments. Researchers in [8] have proposed a holistic meta-model to support decision-making processes in learning ecosystems. This meta-model integrates two meta-models: a learning ecosystem meta-model to support the definition of learning ecosystems based on open-source software and a dashboard meta-model to support the analysis of information to transform implicit knowledge into tacit knowledge. Designing a meta-model for open egalitarian eLearning will require a description of open learner specificities and characteristics. Our work is a contribution in this direction.

5. Discussion and Conclusion

In terms of teaching and research, recent decades have witnessed more women entering higher education with the student population dominated by females in some specialties especially the human sciences disciplines and today they are everywhere in scientific disciplines. But this is not enough. Equal access is something and equal success is another. Success in terms of access to education and some professions should not deceive us about the important work that remains to be done. Raising the question of educational practices and assessing them from a feminist perspective seems crucial to realize gender equality in society. Many believe today that in the field of training, equality is achieved. Maybe this is true in some settings when we examine the numbers. However, real equality is certainly not realized at all levels especially when trained women join the job market. The efforts done throughout the last century to improve access of women to education show the extent to which women struggle to have their right to be educated and trained like men.

But still today, some think that girls and boys are different, the former must devote themselves to household or simple activities, while the latter do sports, learn about the experiences of physics or geometry and information technology developments for example. With these same convictions, professors today ask girls different tasks than boys when working on a project in university education or doing a group assignment. Egalitarian pedagogy comes to stop this. Egalitarian digital pedagogy improves the situation on a larger scale.

Even if women have been the main beneficiaries of the democratization of studies, let us remember that the opening of training programs has been a way of meeting the ever-increasing demands for qualified labor by industry. The changes leading to better training for girls therefore did not only occur to propagate an egalitarian learning culture. It is therefore always necessary to link advances in the educational field with the evolving demands of the job market and not to forget other values and goals we want to realize in this regard.

The gap between more complete training for women and lesser professional prospects than those for men clearly indicates that although equal access to studies has been achieved in recent decades, equal success has not yet been achieved. If the obstacles and persistent discrimination are partly to be blamed on work organizations, including educational and training institutions, they also find their sources in educational practices which in fact offer curricula with gender stereotypes and adopt a pedagogy far from being egalitarian. Insisting on the fact that equal access to studies and equal success after studies is crucial to support the cause.

These reflections lead us to think about the role of education and training institutions in the production or reproduction of inequalities. Given the better academic success of girls, it is indeed difficult to say that they suffer from a dominated group situation in the university. On the contrary, they excel at it. Therefore, we must question how education and training institutions can correct this situation at all levels. The SPOC eGender was an important step to correct this situation.

The SPOC eGender gave us the opportunity to prepare educational content and open e-scenarios to achieve gender equality based on an innovative and egalitarian pedagogical approach. This approach requires involvement and support at the highest level in higher education institutions. This approach should also be comprehensive and inclusive given that the gender issue is the responsibility of male and female teachers and would involve all actors in the academic world. There is a need to set up an intelligent platform that would enable sharing and recommendation of innovative open scenarios based on egalitarian pedagogy. This platform will help academic staff and instructional designers to design e-courses taking into considerations Gender aspects.

The structure and the synopsis of the SPOC eGender can be extended to other SDGs, for in the academic paths. OER can be considered as an excellent tool for innovation and dissemination of a culture of sustainable development. Teachers provide resources and scenarios that can be reused by other teachers. The analysis of the traces of this reuse makes it possible to recommend scenarios to future users in several disciplines. Involving women in leadership and decision-making and challenging sexist language in the classroom and in the work are expected results over time. The SPOC concept is an example of sustainable development.

Certification is conditioned by the production of resources and open scenarios supporting the implementation of egalitarian pedagogy. Durability in the production of resources and scenarios is therefore guaranteed. The proposal to introduce the SDGs into university courses using open pedagogy and open educational resources triggers an educational transformation within universities. This transformation is based on a systemic change in the mission of the different actors (governance, teachers, students,) in a change management approach.

The major effect of this change will be a profound renovation of teaching and learning methods and a strengthening of the university's openness to its environment, in a quality approach. The following major impacts took place:

- On the society: Open scenarios integrating SDG5 and the creation of a community of referents.
- On the economy: SDG skills developed among teachers and higher education students. On the institution: The SPOC syllabus

This work is still being further developed and developments will be communicated in future research. A previous paper [9] raised awareness on the topic and the researchers will continue working on the use of digital technologies to promote SDG 5 and beyond.

Acknowledgments

This work has been supported by Agence Universitaire de la Francophonie Open2Sustain Project.

Declaration on Generative AI

The author(s) have not employed any Generative AI tools.

References

- [1] J. Buolamwini, T. Gebru, Gender shades: Intersectional accuracy disparities in commercial gender classification. In Conference on fairness, accountability and transparency (2018) 77-91. PMLR.
- [2] D.G. Campos, R. Scherer, Digital gender gaps in Students' knowledge, attitudes and skills: an integrative data analysis across 32 Countries. *Educ Inf Technol* 29, (2024) 655–693.
- [3] <https://doi.org/10.1007/s10639-023-12272-9>
- [4] E. Makarova, B. Aeschlimann, W. Herzog, The gender gap in STEM fields: The impact of the gender stereotype of math and science on secondary students' career aspirations. In *Frontiers in Education*, Vol. 4, (2019) 60. Frontiers Media SA.
- [5] A. Szlavi, S. Guedes. L. Cheniti-Belcadhi, Gender Inclusive Design in Technology: Case Studies and Guidelines. In *International Conference on Human-Computer Interaction (2023)* 343-354. Cham: Springer Nature Switzerland.
- [6] A. Hadyaoui, L. Cheniti-Belcadhi, Exploring the effects of gender in skills acquisition in collaborative learning based on the ontological clustering model. *Journal of Computer Assisted Learning*, 40(6), (2023) 2484–2495.
- [7] L. Cheniti-Belcadhi, S.A. Ghannouchi, How to Design an Active eCourse?: Meta Models to Support the Process of Instructional Design of an Active e-Course. *J. Inf. Technol. Res.*, 8, (2015) 82-106.

- [8] B. Fradi, L. Cheniti-Belcadhi, Towards a Conceptual Model for a Smart Open Learning Environment based on Computational Thinking. 2022 IEEE Global Engineering Education Conference (EDUCON), Tunis, Tunisia, (2022) 1981-1987.
- [9] A. Vázquez-Ingelmo, A. García-Holgado, F.J. García-Peñalvo, R. Therón, 2020, June). A meta-model to develop learning ecosystems with support for knowledge discovery and decision-making processes. In 15th Iberian Conference on Information Systems and Technologies (CISTI) (2020) 1-6.
- [10] L. Cheniti-Belcadhi, G. El Khayat, Towards Open Innovative Egalitarian e-Pedagogy: The SPOC “Gender in Digital Education. In womENCourage International Conference, September, 2023, Trondheim, Norway.