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# «I HAD TO SEARCH FOR INFORMATION ABOUT ICT COURSES BY MYSELF». GIRLS IN ICT UPPER SECONDARY PROFESSIONAL COURSES AND THE NEED FOR BETTER INFORMED EDUCATIONAL CHOICE-MAKING

# *«TUVE QUE BUSCAR INFORMACIÓN SOBRE LOS CURSOS DE INFORMÁTICA POR MI CUENTA». LAS CHICAS EN LOS CURSOS PROFESIONALES DE SECUNDARIA DE INFORMÁTICA Y LA NECESIDAD DE UNA MEJOR ELECCIÓN EDUCATIVA INFORMADA*

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Abstract: The Portuguese educational reform, fueled by transnational policies (Álvares, 2019) and implemented in 2004, introduced professional courses in public schools. This educational offer accounted for 47 % of upper secondary enrollment in 2019 (DGEEC, 2021), running parallel to initiatives promoting gender equality in STEM fields (science, technology, engineering, and mathematics). Over the last few decades, international research explored the connections between gender and STEM education, mostly in higher education but in Portugal, few studies analyze the participation of girls in technical vocational education and training (TVET) from a gender perspective. Preliminary results from Doctoral Research in Adult Education and Training (funded by UIDP/04107/2020 and UIDB/04107/2020) show a diversity of elements supporting the decision-making process of girls attending professional courses in Information, Communication and Technology (ICT) field. This paper discusses the information-gathering processes that form the decision-making of girls for ICT courses and their perspectives on the school's role in them. **Method:** This is exploratory qualitative research, focusing on the experiences of 8 girls enrolled in ICT professional courses in schools across different regions of Portugal. The research method involves 1) semi-structured in-depth

interviews and 2) analysis of secondary statistical data (DGEEC, 2021). The Bardin's (1995) content analysis method based the interviews' analysis using categories developed from the Learning Process and Dimensions proposal from Knud Illeris. **Results:** Some results show participants choose professional courses in ICT due to inner motivation and agency, despite the lack of information from some school's vocational guidance services. **Conclusion:** The narratives emphasized the importance of agency and the need for proper vocational guidance programs for girls' participation in ICT courses.

Keywords: TVET; gender; STEM education; girls in STEM.

## 1. INTRODUCTION

This paper reports on some of the findings from the Doctoral Research in Adult Education and Training, conducted at UIDEF of the Institute of Education at the University of Lisbon, Portugal, supported by FCT/ IP/MCTES/Portugal, through the funds PIDDAC UIDP/ 04107 2020 and UIDB/ 04107 2020.

Technical and vocational education and training (TVET) and its education modalities have a long tradition in the Portuguese context, but enrolment rates reached their highest point in initial vocational education after the introduction of professional courses in public schools in 2004, following the secondary education reform, aiming to align with transnational strategies from the European Union (Duarte, 2015).

TVET covers various forms of learning and education for different occupations, sectors and life stages (UNESCO, 2015) and includes apprenticeship training, technical education, vocational education, occupational education, career and technical education, workforce education, workplace education, and many more (Hollander & Mar, 2009).

TVET has been given a significant role in the recovery and resilience of European economies by public education policies at different levels, as a strategy to facilitate the transition of young people from school to work with adequate skills that match the demands of employers and society. However, this discourse is not uncontested. The new political economy of skills theoretical approach criticizes the human capital orthodoxy and the knowledge-based economy (Guide & Livingston, 2012).

Professional course (PC) is a modality of dual vocational education certification launched in Portugal in 1989, initially offered in Vocational Schools created for this purpose, but which started to be provided in secondary schools from 2004 onwards. It has a duration of three years, leading to an upper secondary diploma and a specific professional qualification of level 4 of ISCED-F-2013. These courses prepare young people for qualified entry into the labour market and allow access to post-secondary and higher education studies.

The ISCED-F-2013 - International Standard Classification of Education Fields from 2013, is an international standard reference developed by UNESCO to classify and categorize the different fields of education, dividing education into levels, according to the complexity and specialization of the study programmes.

The growing transnational and national investments in expanding the enrolments in TVET at secondary education provisions highlight the need to understand the factors that affect students' choices and preferences for this type of offer.

Considering that in 2019/2020, 116.305 students were enrolled in professional courses (DGEEC, 2021) in schools in Portugal, accounting for almost half of all secondary enrolments in that year, it is evident that analyzing the learning experiences of students in these courses is crucial for verify the individual and societal outcomes from the policies related to PC.

Various studies have been conducted on educational contexts at the national level, covering topics such as educational policies, pedagogical practices, educational trajectories and professional integration of young graduates, as in Alves (2008), but very few have focused on professional courses with a gendered perspective.

As the number of students enrolled in PC in secondary education increases, so do the discussions and initiatives on gender equality and female participation in education and the labour market, especially in the STEM fields (science, technology, engineering, and mathematic).

Diverse initiatives, policies and programs to encourage girls and women in studies and careers in STEM are starting earlier and earlier, still in elementary school, and extend throughout all phases of lifelong learning, seeking to encourage and recognize women's interests, skills and sucess in these areas.

In addition to the mentioned, the promotion of women in STEM is directly related to the urgency of filling the gaps in the labor market in these areas in most economies. Observable situation in TVET in Europe, which suffers strong direction to this need (Olagüe-Smithson, 2017). STEM professions offer high remuneration and a wide range of job opportunities, which can enhance the material conditions of women and help reduce youth unemployment. By pursuing STEM careers, women can also challenge the gender pay-gap and achieve greater economic equality with men.

In Portugal, there is a variety of research on gender and STEM, mostly focusing on careers and higher education, such as the ones conducted by Saavedra and colleagues (2010, 2013). However, none of them have examined PC with a gender lens.

After a meta-analysis study completed in November 2021, based on data from the virtual repositories of all Portuguese universities and three scientific journals, only fifteen doctoral theses and twenty-one scientific papers focused on professional courses, and none of them explored the participation of young women in STEM professional courses.

In the academic year 2019/2020, there were 11,202 young men and 829 young women enrolled in Information, Communnication and Technology (ICT) professional courses in public secondary schools in mainland Portugal (DGEEC, 2021). The female students accounted for an average of 7 % of all enrolments in this year and are experiencing declining rates year after year. This is a significant gap that needs to be addressed.

Therefore, the problem of low participation of young women in these courses in Portugal was hidden. This Research aims to fill this gap and contribute to a better understanding of the factors that influence the educational choices of young women in STEM fields.

In this paper, we will only analyse and present the information-gathering process that supports the vocational choice-making as it is comprehended as one of many experiences underpinning the biographicity process (Alheit, 1994, 2003) that «[…] is developed as a junction of reflexivity and personality» (Illeris, 2007, p. 255).

The Doctoral Research's theoretical framework is supported by the Feminist and Intersectionality Studies and Life Story and Biographical approaches, linking vocational choice to a learning experience influenced by incentives interaction and content, based on the *Learning Processes and Dimensions* proposition from Knud Illeris.

Illeris's perspective understands the learning process as one that «[…] always played out on an individual and a social and societal level at the same time, and the learning result has the character of an individual phenomenon that is always socially and societally marked» (p. 253). In this vein, an educational-choice (as a learning experience) involves the *three dimensions of learning*: incentive, content and, interaction. The educational-choice is protagonized by an individual (personality and identities) reflecting upon the internal and external *incentives* (e.g. life projects, professional courses outputs, future career expectations, educational interests, objective reality), the learning *contents* (e.g. ICT disciplines, ICT experiences, course activities) and the *interactions* (family, school, teachers, peers, media and other institutions), who is deciding (biographicity) for a course that fits better to her expectations and needs at that specific time and place.

## 2. METHODOLOGY

### 2.1. Design

This is a qualitative research with exploratory case studies (Meirinhos & Osório, 2016) focusing on the learning processes and dimensions (Illeris) that influenced the interviewee's vocational-choices with a gender mainstreaming perspective (Schiebinger, 2010).

It was adopted a naturalistic interpretive paradigm to explore the educational choice-making process for ICT professional courses. It recognizes that such processes are shaped by multiple factors, such as the biographical trajectories, experiences, education trajectories, external influences, motivations and other aspects of young women's lives. By using this paradigm, the research expects to capture the complexity and diversity of these factors and how they interact with each other in the context of educational choices.

The driven questions that aimed to capture their information-gathering process for ICT PC choices were: How did you gather information about the course you choose? What do you think the schools, educational team and government can do to attract more girls to the ICT professional courses?

Considering the lack of consensus on STEM courses and no existing definition for the level 4 (CP) in STEM education, it was decided to apply Tikly, Vogel and Kurvers definition of STEM on TVET as «STEM-related TVET refers to TVET programmes that aim to qualify students to proceed to occupations where STEM skills are needed» (2020, p. 11). The ICT

courses proposed in their work for the level 4 of education are grouped under the code 06 of ISCED-F-2013, namely Information and Communication Technology (ICT).

### 2.2. Participants

There were interviewed, at the time of this Conference Communication, eight young women enrolled in professional courses in the ICT field, from any year of the upper secondary cycle, on public and private schools those offer these courses, from different regions of Portugal.

### 2.3. Instruments

There were applied semi-structured in-depth interview; and statistical data analysis from the government's Directorate-General for Education and Science Statistics (DGEEC), to comprehend the scenario of young women's participation in ICT education in Portugal.

### 2.4. Data processing

The content analysis method (Bardin, 1995) was applied on the empirical data organizing the interviewees' information-gathering processes elements on a subcategory of each learning dimensions of incentive, content and, interaction categories, based on Illeris' framework.

These greater categories on the three dimensions of learning were built upon the following construct: the content dimension, in which what is analyzed is what is being studied, developed and learned; the incentive dimension, in which the intrinsic elements of motivation, volition and so on, interact in the interest for the content, both dimensions related to the individual processes of acquiring knowledge and, finally, the interaction dimension with the social interaction of the learner, the environment (and cultures) and the people surrounding her (Illeris, 2007).

## 3. RESULTS

As the answers for the questions — How did you gather information about the course you choose? What do you think the schools, educational teams and government can do to attract more girls to the ICT professional courses? — brought elements from the three main categories of analysis (incentive, content and, interaction), it was possible to observe how information plays a huge role in vocational-choices.

From the lack of details from the ICT professions and courses, to the few accessible languages applied on the promotional material of the courses, all interviewees stressed the

need to improve the information available at the decision-making point of students for upper secondary education.

Jasmine, a final-year student of an ICT professional course, discussed how presenting the broader aspects of the ICT courses could make them more attractive for girls. She explained that the hardware disciplines of the course are more recognized by the students, but they do not appeal to some girls as much as they do to boys:

> […] when people [school's team] speak about ICT [courses] they don't go into what we actually learn about it, they just talk about hardware and that's not all it is. So, they need to appeal more to girls and show what it has to offer because they [girls before choosing the courses] didn't know what we did. I didn't know [before starting the ICT PC] we did programming, I didn't know we would do electronics, I didn't know anything about this stuff and it is really fun and interesting, I didn't know about the analytical side of this. I know that if we appeal to what we have to offer [with the ICT PC] more girls would find it interesting and join it.

Daniela expressed her difficulty in comprehending the promotional material of the ICT course and said that she had to seek help from other students who were already enrolled in these courses to clarify the content of a subject, indicating that the course information was not accessible to students at the entry level of the course, as illustrated below:

> Now that I'm in this course [ICT PC], I know very well what it promotes. For example, at the beginning, when I was looking at the course, the subjects it had, there was a subject that said DSCA, which means Digital Systems of Computer Architecture, and I looked at that and thought — What is this? I was looking at that and it was impossible to understand. When they [other students in the same course] told me that basically, it was Programming, I thought — Oh, such a big name. Why such a big acronym? — then I realized that it was not so difficult to understand.

The students also felt that there was a lack of adequate encouragement for girls to pursue ICT courses from various sources, such as the vocational guidance service, the teachers, and the school. None of these actors addressed the issue of gender stereotypes on STEM professions and courses with them or supported them to overcome the fears of entering a course dominated by men.

Cecile said she missed a presentation including all options of the professional courses available for girls, especially in ICT. She said that she had to do her own research with the help of her friends from school and online sources and that she felt anxiety about pursuing a career in a course that was predominantly, male dominated.

> I think they [school actors] could give us the information that there are all these courses [in ICT], what we could do in the course, what the disciplines mean… Because by not informing us of that, we [girls] are a bit blind on them and there is not so much that idea [of girls doing the ICT PC]. We only know [about the ICT field] what we hear [from peers] and what we see [few girls in the ICT PC] and from the experiences they tell us [other students already in these courses].

According to the data analysis, the girls who opted for ICT professional courses had a high level of interest in this field, but also faced various challenges and barriers that could discourage them from pursuing this career path, as they lacked proper motivation, sufficient content and constructive interactions with the school's actors at the decision point.

The narratives showed that they had a strong sense of agency to seek information on their own and from their peers (positive interaction) to determine if the ICT professional course suited their interests and abilities. Although they had vocational guidance sessions in the 9th year, when they had to choose the modality of the upper secondary education, there was no discussion about gender equality and stereotypes in STEM professions to empower all girls to follow the same choices they made.

## 4. CONCLUSION

The main findings of this study suggest that the girls who enrolled in ICT professional courses were driven by their own motivation, agency and family/peers support, rather than by school incentives. The school and its actors did not provide adequate support for the information-gathering process at the three dimensions of learning applied in this Research: they did not offer any gender-specific incentive, they did not explain the content of the courses and their activities and outcomes clearly, and they did not interact effectively with the students during the vocational guidance sessions or by the educational team.

This is significant, considering that the school's vocational guidance services should be the main source of support and encouragement for the students' interests, especially in a broad and complex field like ICT, where there are many specialized activities and strong male dominance.

If girls are unsure about the course's content, outcomes, and characteristics and do not receive proper guidance from school, they may avoid the uncertainty and opt for a more familiar course option expected for girls. The lack of proper guidance was mentioned by the interviewees as one of the possible reasons why other girls do not chose these courses, in addition to the fact that they were predominantly male.

The results indicate that there is a need to improve the quality of the activities carried by vocational guidance services to spark interest among female students in male-dominated courses. It is also necessary to develop specific programs that can help girls make more informed and confident decisions about ICT TVET courses and careers.

These TVET provisions can offer a valuable opportunity for girls to acquire relevant skills and qualifications that can enable them to enter or advance in the ICT careers, as well as to challenge the gender stereotypes and norms that persist in this male-dominated field.

## REFERENCES

Alheit, Peter. (1994). The «Biographical Question» as a Challenge to Adult Education. *International Review of Education / Internationale Zeitschrift Für Erziehungswissenschaft / Revue Internationale de l'Education*, *40*(3/5), 283-298. http://www.jstor.org/stable/3444115

Alheit, Peter. (2013). Aprendizagem biográfica: Dentro do novo discurso da aprendizagem ao longo da vida. In Knud Illeris (Ed.), *Teorias contemporâneas da aprendizagem*. Penso. ISBN: 9788565848305.

Álvares, Maria Eugénia Cotta Patrício. (2019). *Discursos de mudança: igualdade de oportunidades em 30 anos de políticas educativas em Portugal* [Tese de Doutorado, ISCTE-Instituto Universitário de Lisboa]. http://hdl.handle.net/10071/20504

Alves, Natália. (2008). *Juventudes e inserção profissional*. Coleção Ciências da Educação. Educa/UI&DCE. http://www.ie.ulisboa.pt/publicacoes/juventudes-e-insercao-profissional

Bardin, Laurence. (1995). *Análise de conteúdo*. Edições 70. ISBN: 972-44-0898-1.

DGEEC. (2021). *Perfil do Aluno 2019/2020*. Direção-Geral de Estatísticas da Educação e Ciência. https://www.dgeec.mec.pt/np4/97/%7B$clientServletPath%7D/?newsId=147&fileName=DGEEC_DSEE_2021_PERFIL_DO_ALUNO_1920.pdf

Duarte, Alexandra Isabel Francisco. (2015). *Condições de formulação das políticas públicas: O caso da generalização do ensino profissional, 2004-2009* [Tese de doutoramento, Instituto Universitário de Lisboa]. http://hdl.handle.net/10071/11324

Hollander, Astrid & Mar, Naing Yee. (2009). Towards achieving TVET for all: the role of the UNESCO-UNEVOC international centre for technical and vocational education and training. In Rupert Maclean & David Wilson (Eds.), *International handbook of education for the changing world of work: Bridging Academic and Vocational Learning* (pp. 41-57). Springer & UNEVOC. https://link.springer.com/book/10.1007/978-1-4020-5281-1

Illeris, Knud. (2007). *How we learn: Learning and non-learning in school and beyond* (First Edition). Routledge.

Livingstone, David & Guile, David. (2012). *The knowledge economy and lifelong learning a critical reader*. Sense Publishers. https://link.springer.com/book/10.1007/978-94-6091-915-2

Meirinhos, Manuel y Osório, António. (2010). O estudo de caso como estratégia de investigação em educação. *EduSer Revista de educação*, *2*(2). https://doi.org/10.34620/eduser.v2i2.24

Olagüe-Smithson, Carlos de. (2017). From coal to knowledge: A history of the VET policies in the European Union [Article]. *Revista Espanola de Educacion Comparada*, (29), 179-201. https://doi.org/10.5944/reec.29.2017.17532

Saavedra, Luisa, Araújo, Alexandra M., Taveira, Maria do Céu & Vieira, Cristina C. (2013). Dilemmas of girls and women in engineering: A study in Portugal. *Educational Review*, *66*(3), 330-344. http://dx.doi.org/10.1080/00131911.2013.780006

Saavedra, Luísa, Taveira, Maria do Céu & Silva, Ana Daniela. (2010). A subrepresentatividade das mulheres em áreas tipicamente masculinas: Factores explicativos e pistas para a intervenção. *Revista Brasileira de Orientação Profissional*, *11*(1), 49-59. https://hdl.handle.net/1822/11636

Schiebinger, Londa. (2010). Gender, science, and technology. *EGM/ST/2010/BP.1*, *28*, *Outubro*. United Nations Division for the Advancement of Women (DAW, part of UN Women) & United Nations Educational, Scientific and Cultural Organization (UNESCO). https://www.un.org/womenwatch/daw/egm/gst_2010/Schiebinger-BP.1-EGM-ST.pdf

Tikly, Leon, Vogel, Epke & Kurvers, Carmen. (2020). *Boosting gender equality in science and Technology - A challenge for TVET programmes and careers*. UNESCO & UNESCO-UNEVOC International

Centre for TVET. ISBN: 978-92-3-100417-9 (pdf). https://unevoc.unesco.org/pub/boosting_gender_equality_in_science_and_technology.pdf

UNESCO. (2015). *Recommendation concerning technical and vocational education and training*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000245178

UNESCO. (2017). *Cracking the code: Girls' and women's education in science, technology, engineering and mathematics (STEM)*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000253479