



The Education of Gender The Gender of Education Sociological Research in Italy

Maddalena Colombo
Luca Salmieri

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Published by

ASSOCIAZIONE "PER SCUOLA DEMOCRATICA"

Via Francesco Satolli, 30

00165 – Rome

Italy



Published in Open Access

APA citation system:

Colombo, M., Salmieri, L, (2020), The Education of Gender. The Gender of Education. Sociological Research in Italy, Rome, Associazione "Per Scuola Democratica"

This book is digitally available at:

<https://tinyurl.com/ScuolaDemocraticaOpenAccess>

and

<https://www.ais-sociologia.it/?p=4096>

ISBN 978-88-944888-3-8

Published by



ASSOCIAZIONE "PER SCUOLA DEMOCRATICA"

This volume includes contributions from authors who participated in the panel "**Gender and Learning. New Cognitive, Didactic, and Educational Challenges. Teaching, Learning, and Future Scenarios**" held at the AIS - Italian Association of Sociology - XII National Congress, 2020 January 23-25, University of Naples, Federico II.

Under the coordination of:



ASSOCIAZIONE ITALIANA DI SOCIOLOGIA
Sociologia dell'Educazione
and
Studi di genere

ISBN 978-88-944888-3-8

2020 november, edition in open access
2020 by Associazione "Per Scuola Democratica" Rome

Graphics by Ansaldi

ISBN - 978-88-944888-3-8

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1
Gender and Education in Italy

Maddalena Colombo and Luca Salmieri

INTRODUCTION

Historically and culturally, gender seems to be the most die-hard inequality. Gender equality is no doubt a current global and local priority for organizations, policy makers and progressive thinkers in society at large and is inextricably linked to efforts to promote the right to education and support citizens' achievement in relation to a fast-growing set of societal, economic, political and cultural challenges. Yet, although there are laws and regulations sanctioning inequality and promoting equality between women and men in almost all the countries of the world the status of women remains lower than that of men whatever indicator is chosen. Globally, there are gaps between women and men in almost all areas of social life (ILO, 2019). Worldwide, barely 55% of women are active in the labour market compared to 78% of men, and in no country does the share of women in employment approach or equal that of men. Inequalities are also evident in terms of the wage gap: women earn 40% on average less than men. Their presence at the helm of companies is limited: globally, just 18.2% of companies are headed by a woman (WEF, 2020). In developing countries, most women in waged employment are positioned in the informal sector, where workers lack protection, exploitation is widespread, social security rights are not guaranteed and working conditions are very harsh (UNDP, 2019). The combination of low wages and family members dependent on women's economic income also leads women to be over-represented in the poor population. Inequalities in the political realm are even more marked: in 2019, women occupied just 25% of parliamentary seats and 21% of ministries worldwide (WBG, 2019). Women's political representation is often violently opposed and subject to harassment and, where it is scarce, women are also more often the victims of violence and threats (WHO, 2013).

In most developing countries, girls leave education earlier than their male peers. Only about 60 out of 150 countries had achieved gender parity in access to primary and secondary education in 2019 (UNDP, 2019). Furthermore, on a global scale, more girls than boys are not in school; 16 million girls will never set foot in a classroom and women account for two-thirds of the 750 million adults without basic literacy skills. However, in Western countries and the countries of the Northern hemisphere,

educational gaps between men and women have been eliminated over the last few decades. Data even show women overtaking men in university enrolment rates and total graduates (Becker et al., 2010; Pekkarinen, 2012).

Nevertheless, a substantial body of analyses and research carried out by gender studies scholars has highlighted that the very recent dominance of young Western women in secondary and tertiary educational attainment has not yet translated into a reducing of the gender gap in the labour market, politics and contemporary social gender relations of power (Blossfeld et al., 2015; Eurofound, 2018, 2020; Paxton et al., 2020). The finding that women's rising educational prestige does not convert into higher economic, social, and political returns relative to those of men requires further analyses focused on the social factors influencing gender inequalities at large.

Despite a universal consensus that gender equality requires policies ensuring that girls and boys not only have access to and complete educational cycles but are «empowered equally in and through education» (UNESCO, 2016: 28), several forms of gender difference and imbalance persist. These can be seen in the realm of study programs and content choices, in the context of preferences and learning orientations, and in the ways in which teachers, counsellors, families and peer groups treat and condition the educational careers of girls and boys. Additional trends that play an equally significant role in reproducing old and new forms of horizontal gender segregation include the continuing feminization of the teaching workforce in preschool, primary and secondary schools, the advent of new teaching practices, methodologies, tools and technologies and key, innovative disciplinary fields of learning. The multi-faceted relationship between education and gender is therefore one of the central themes of the 21st- century social sciences not only in terms of disparities but overall, as regard to neglected differences.

In this volume, we examine the relationship between gender and education with respect to the Italian context. The purpose is to forge a space for a progressively varied and dense area of interdisciplinary research on gender and education. As new gender studies fields are rapidly developing and becoming pivotal in the traditional social disciplines of sociology, educational studies, pedagogy, anthropology, we felt a greater need for a dynamic and intersectional examination that plots emerging definitions and debates while uncovering the critical complexities of gender and education in Italy. These include issues relating to:

- the influence that family socialization and pre-school education have on both the formation of gender identities and the development of educational paths;
- the female hegemony in the demography of the teaching staff and the repercussions of this numerical dominance for both male and female colleagues and students in terms of patterns and methodologies;
- the reproduction of women and men's traditional choices in fields of study such as STEM in the tracks of the Italian secondary education and university system;

- the barriers to a gender neutral vision of university career choices; the influence of parents' educational attainment – especially that of mothers – on the educational achievements of younger men and women over time;
- the growing importance of learning IT and digital skills for employability - especially for women;
- the efficacy of experiments in coding, robotics and computational learning as part of innovative programs for pupils;
- gender gaps in financial literacy and gender divides in more complex financial skills;
- the social construction of gender categories in standardized assessments of adolescents' competences. In adopting a critical approach to gender and education as the complex intertwining of these crucial issues, we recognize the importance of probing beyond the boundaries of specific domains in order to develop a more intersectional focus.

We are interested in addressing both the *education of gender* – given that gender identities are not only causal factors but also educational outcomes – and the *gender of education* – given that education is itself gendered. By the education of gender, we mean the set of processes, actors and educational contexts that directly and indirectly shape the development of gender identities and, above, all the complex formation of students' preferences, orientations, practices and experiences as they pursue learning paths, experience academic (in)success, and enter into both the labour market and adult life. We use the phrase “gender of education” to refer to gender differences in the multiple dimensions of education that involve observing and analysing education and learning systems according to a gender perspective. That is, we propose to also focus on the comparison between female and male learning paths, women's and men's learning achievements, gaps in the return on such investment in the labour market and other social dimensions more generally. At the same time, the gender of education also concerns teachers and other staff involved in education, the currently consolidated trend of feminization and the power relations stemming from gendered teaching models.

1. THE EDUCATION OF GENDER

Despite centuries and decades of progressive thought, intellectual advancements and women's struggles for equality, it was not until the 1960s that there developed a consensus around the principle that men and women are biologically born equal, and it is instead social-cultural factors and mechanisms of distinction and discrimination that go on to render them unequal. A revolutionary concept exported from feminist studies – the idea of “gender” – aided in this process and made its way permanently into the social sciences. This long silence explains at least in part the

difficulties that feminists in the Sixties and Seventies faced in trying to incorporate the concept of gender into the body of scientific theories and convince scholars of various approaches that gender should join established terminology and scientific speculation.

What exactly does “gender” mean and why was it preferred to “sex”? Gender is the word for the sexually differentiated way in which human beings are perceived in and by society. Two sexes coexist in society, and the term “gender” signals their dual presence: men as well as women constitute gender. However, it also signals the set of processes by which each society shapes biological sexuality into products of human activity and thereby structures the lives and experiences of men and women according to differentiated and opposite categories, usually prohibiting the coexistence of other genders. The physical and biological substratum of sexual difference, the body, is subsumed into the concept of gender: diverse historical and social contexts have attributed changing cultural meanings to this founding layer, but this layer has ubiquitously served as an axis of discrimination. In other words, gender is not some kind of “garment” passively hanging on the “coatrack” of biological sex; gender also actively shapes sex. According to the scholar Linda Nicholson (1994), gender is itself a plastic entity, an active changing medium; this plasticity has been demonstrated by comparative research in history and anthropology and can be seen in the claims made by the many individuals who refuse to be shoehorned into one of the two available and opposite categories of male and female.

Two essential corollaries go hand in hand with the introduction of the notion of gender. The first concerns inequality between the sexes and, therefore, the distribution of power. «Naming gender immediately means evoking power» warns historian Joan Scott (1986: 1067), alluding to one of the historical constellations with which feminist research has been most concerned: patriarchy. As scholars have documented, relationships between men and women have proceeded in an unbalanced, asymmetrical, and unequal way in the historic race taking place over the centuries. Differences between the two sexes found in nature - a female body which has its own characteristics, different from those of the male body - have lent themselves to the construction of a disparity that has been perpetuated over time. Taking advantage of this disparity, men have been able to establish an advantage in the division of labour and privileged access to the intellectual and symbolic sphere to the detriment of women. Feminism challenged the legitimacy of this historical advantage and the supremacy that men had assigned to themselves. The first target of the feminist movement was therefore inequality and the asymmetrical distribution of power between the two genders.

The second corollary has an epistemological value. The creation of the unprecedented category “gender” opens up a new horizon of freedom and reveals the presence of masculine and feminine models in all areas of human and social experience, in terms of both their diversity and their intertwining. As such, the concept of gender has the disruptive potential to reformulate traditional concepts, the analytical tools with which social observers operate, and to introduce a new perspective in the act of interpreting phenomena.

Systematic attention to gender has indeed helped to combine the questions posed by scientific investigation and critical reflection in a more complex and articulated way, to equip them with a sharper eye and more sophisticated methods. In other words, the theoretical development linked to the category of gender has not only added new information to the already available data on inequalities, but has given rise to different perspectives on the objects of study available to the social sciences. Not only to fill a gap – as if “gender” concerned only the female sex, so long neglected by history – but to critically reassess all the premises and parameters of social investigation, history, politics, economics and even the hard sciences.

Simultaneously, however, our ability to overturn both social structures and common sense about gendered realities is blocked when we are faced with the observation that inequalities between men and women persist. The challenging project of reshaping existing policy projects, including those concerning equal opportunity in education, is progressing relatively slowly.

In this book, we approach gender as it relates to behaviour, not just a label but a form of acting and doing. From this standpoint, gender can be defined as a complex set of institutional and individual practices that are culturally reinforced if not overdetermined, although not necessarily consciously, and frequently contested. In examining behaviour, psychology, pedagogy, sociology and gender studies initially delved more deeply into the family and parents’ roles and only subsequently began to focus on formal educational contexts, on the belief that universalistic education is concerned only with guaranteeing and stimulating girls’ access while maintaining as neutral as possible a stance in the face of gender differences. Targeting the dynamics through which stereotypes and inequalities are produced and reproduced meant prioritising the family and its early childhood socialization practices as the primal core of “doing gender”. Almost all disciplines paid relatively little attention to gender issues in education until the Seventies. But the same can be said for gender differences and female subordination in many sectors of social life such as labour market, politics, science, knowledge, health, technologies. Based on manifest evidence that family contained the basic relations of male societal dominance, this realm was shaken by feminist consciousness and subjected to critical scrutiny in the preceding decade, the ‘Sixties (Mitchell, 1968; Thompson, 1975; Chodorow, 1978; Baumrind, 1980; Hartmann, 1981; Roopnarine, 1986; Ferree, 1990).

However, it was later recognized that the school environment is by no means “neutral” in the face of gender and, if anything, is of primary importance in forging preferences, attitudes, talents and points of reluctance, as well as in orienting students’ choices of programs, subjects, and fields of study as they advance in their educational careers. Researchers thus began to view pre-primary and primary education as the encompassing problem area where it was necessary to address the stereotypes and established gender roles nurtured in the domestic realm: psychology, pedagogy and educational sciences embarked on the challenging enterprise of understanding and eventually deconstructing the mechanisms through which the school environment differently forged preferences and

attitudes, roles and representational schemes according to gender (Wilkinson, Marrett, 1985; Measor, Sykes, 1992; Torne, 1993).

Researchers in Europe and the USA observed the prevalence of gender stereotypes in books for children. Numerous studies showed that females were typically portrayed as passive, dependent and generally incapable, while males were predictably portrayed as active, independent, and generally competent (Weitzman et al., 1972; Sadker, Sadker, 1980; Abraham, 1989; Crabb, Bielwaski, 1994; Gooden, Gooden, 2001). Stereotypical patterns were found to be consistent across a variety of reading materials, including picture-books, fiction for older readers and of course textbooks. Researchers have been investigating the potential effects of such stereotypes on students for years (Lloyd, Duveen, 1990; Peterson, Lach, 1990; Blumberg, 2009). Undoubtedly, increased awareness about the potentially detrimental effects of gender stereotypes has encouraged editors to exert greater control over textbooks intended for students. Nevertheless, such stereotypes are an integral part of an entire mass culture and the classical pillars on which it rests: it is a very challenging task to eradicate the impact of this full culture. On one hand, it is still necessary and deserving to discuss the effects of gender stereotypes conveyed by textbooks on the affective and cognitive development of children; on the other hand, it might be time for a new pathway involving well-reasoned critique among teachers and students about the stereotypes populating classical and contemporary mass culture.

In the very recent past, a widespread understanding of girls' accepted role was so commonplace that it drew little attention from the general population. Up until the mid-century, most girls across Western societies were seen as destined first and foremost to become wives and mothers, and their schooling thus centred on developing domestic economy, care-taking and arts. In the last five decades, girls have shed this quiet image of standing on the side-lines and emerged instead as first-class students and top performers in school subjects and examinations, recognized as reliable in school-related tasks such as homework, with neat writing, excellent bookwork, and good classroom behaved (Albisetti et al., 2010). They are "model pupils" whose achievements might well be expected to lead them to serious higher education careers and then whatever high-profile positions and professions they choose. Only to discover, as is especially common in the Italian context, that the labour market tends to betray these meritocratic expectations (Colombo, 2003; Furno, 2014; Salmieri, 2017). A partial explanation for this betrayal might lie in the fact that old stereotypes have evolved into new ones while the realization of both female and male expectations are still intensely conditioned by inequalities. For instance, in accordance with new gender stereotypes, teachers as well as parents view STEM subjects as suitable for top-performing girls provided that these girls go on to choose caregiving roles from within the STEM professions; on the flipside, they consider languages and teaching less suitable for boys even when these latter express an inclination for language- and education-related jobs.

Gender stereotypes are extremely important for individual development. Agents of schooling – teachers, school settings, and peers' interactions – transfer these gender-stereotyped expectations to students,

resulting in the perpetuation of gender stratification. Students tend to behave in the way culture defines appropriate for their gender (Berenbaum et al., 2008). Social learning theory has found that children's gender-appropriate behaviour is explicitly reinforced by important others such as parents and teachers, alongside indirect learning via observation and modelling (Mischel, 1966; Bandura, 1986). Cognitive-developmental theory posits children's cognition about their own gender as the basis for gender-typical preferences and differentiation, and stresses the importance of recognizing that a person's gender is stable over time and in spite of situations involving gender typing: a child knows about his/her gender before showing gender typical behaviour (Kohlberg, 1966). At any rate, both approaches have their foundations in the recognition that school settings, teachers' unintentional or explicit stances, the content of curricula and peers' tendency to gender differentiation between the sexes and isomorphism within them contributes a great deal to reproducing stereotypes and influencing the education of gender. Children then adjust their behaviour to align with the gender norms of their culture, gender norms that school environments and educational curricula as well as teaching patterns tend to reproduce in the classroom, serving as factors of influence. Children learn to recognize and organize incoming information into gender-based categories that can be framed as schemes. A gender schema comprises networks of ideas and information that filter children's perceptions even before they are aware of this process. The gender schematic processing implies automatically a whole alignment of objects, qualities, and behaviours into rigid and opposite categories of masculine and feminine. This happens irrespective of how different they might be in areas apparently irrelevant to gender (Bem, 1981; 1983).

Due to widespread changes in the roles and activities of men and women, people witness violations of these gender stereotypes every day. Nevertheless, the content of gender stereotypes has not changed much over the years (Prentice, Carranza, 2003) precisely because of reinforcing agents such as school and the family. Whereas all categorical stereotypes (presumably) contain descriptive information about category members, gender stereotypes have both descriptive and prescriptive components; as such, they tend to be reiterated over time. The descriptive component of gender stereotypes leads to disadvantages for women or men who are perceived as lacking the necessary attributes to succeed in fields dominated by the opposite gender; the prescriptive component, instead, leads to disadvantages for women or men who violate shared beliefs about how women or men should behave (Burgess, Borgida, 1999).

Traditional gender expectations especially affect the interests, passions, skills, and professional predispositions credited to girls and boys. It is precisely these expectations that produce a sharp effect on the choices and educational paths of girls and boys. Very often students' understandings of what teachers' beliefs are in a school subject - i.e. what teachers value in students and their idea of the prestige of that school subject - classroom fixed goals - i.e. approaches focused on performance - and expectations of which students will be successful in assigned tasks seem significantly impact girls' and boys' intentions of pursuing careers in STEM fields (Lazarides, Watt, 2015). Likewise, individual actions by

sympathetic teachers have been proven to help girls break down the filter in the STEM pipeline and foster equal participation (Clark Blickenstaff, 2005).

Gender differences continue to manifest not only in student motivations, but also in student performances (Meece et al., 2006; Wigfield et al., 2002). For instance, in most western countries, girls perform better than boys in reading but worse in mathematics. There has been a long-standing debate about whether the gender gap in maths achievement stems from biological differences in brain functioning or from culture and social conditioning (Baron-Cohen, 2003). Wide variations across countries support the latter view: cultures in which gender stereotypes are weaker show a smaller gender gap in maths performance (Guiso et al. 2008; Nosek et al. 2009). The crucial issue is that the factors behind these gender gaps include the organisation of school systems, students' and teachers' expectations, and macro-societal elements. This is a sign that educational systems, teaching practices and the value models used in education can be shaped in ways that effectively reduce gender gaps in learning (Marks, 2008).

While the differences in girls' and boys' interests or performance in early childhood and in the first years of schooling are slight, they become increasingly apparent at adolescence (Evans et al., 2002; Retelsdorf et al., 2015). The gender differences outlined here thus indicate that socialization increases gender disparity in education and restricts men and women from realizing their full potential. At the same time, however, socialization is not a fixed and rigid set of processes; it can be altered and shifted in the course of educational careers.

It is common that a double version is on, a chasm between the way teachers present themselves and the way they actually behave: they can loudly affirm to be progressive, but then in the closed classroom they may even implicitly transmit traditional visions of gender roles. Symbolization of the world and representations gender norms and identity that teachers convey in this way be predominantly detrimental to students as they alter the development of educational self-concept. The most dangerous among stereotype is when teachers become convinced that specific fields of study fits better to boys than girls or vice versa (Gunderson et al., 2012) and implicitly replicate these stereotypes via classroom instructions and evaluations (Philipp, 2007). Teachers' defective expectations can also lead to a self-fulfilling prophecy (Rosenthal, Jacobson, 1968) whereby previous gender biases are self-confirmed, as generally happens in social labelling processes at large: it can happen that flawed teachers mat set a lower than average threshold for males' achievements rather than for females' ones or vice-versa on the extent to what is considered too difficult for males or females or they unconsciously prefer to encourage one gender at the disadvantage of the other.

Finally, the education of gender speaks to the fact that school curricula and programs, teachers and/or out-of-school experts can play a significant role in providing and conveying content on "learning about gender" via gender-responsive pedagogy in childhood education. It is not only a matter of recognizing the entire gender spectrum and implementing anti-sexist approaches to the education of pupils: before venturing to teach

students about gender, it is critical for teachers to be fully aware of the preconceived notions most of their students may hold about, because the concept of gender and its implications are difficult to grasp and dismantle for students. A misleading ideological position that equates gender theories with attempts to impose and forge sexual behaviours, preferences and orientations has hampered or slowed the introduction of educational policies designed to give all pupils the information they would need to acknowledge and develop an awareness of gender roles and inequalities (Besozzi, 2003). The strong partisan ideologization of gender issues in the Italian public education is also confirmed by the so-called “question of gender”, raised in 2015 when a reform of education system was promulgated by the left-wing government. The article 5 of Law n.107 (“The Good School” reform) mentioned the duty of each school to «promote the realization of equal opportunity for girls and boys, by teaching the *education of gender parity* in every school grades, the prevention of gender violence and of all forms of discrimination, through sensibilization and information». A strong movement, inspired by some conservative and fundamentalist Catholic groups, claimed for removing this article, envisioning the danger the law would have generated by “dictating all children to learn sex at school” and “prescribing all children to betray their own gender and in order to become transgender”. Such a claiming discourse confirms that there are many taboos about sex and gender operating underneath the Italian culture (and not only because of the Catholic Church magisterium): talking to youth about gender issues rises among lay people a moral censure and disapproval however it takes place.

2. THE GENDER OF EDUCATION

As above mentioned, social scientists and educational researchers paid relatively little attention to gender issues in education until the Seventies, when questions emerged about the lack of equity in girls’ and women’s access to education across the world (Becker et al., 2010). In the context of development policies in emerging countries, surging female representation in primary, secondary and tertiary education has long been mentioned as a key factor in promoting national economy and citizenship rights, and therefore fittingly seen as vehicle for change and social improvement.

Despite differences in national and regional teacher education programmes in terms of content, duration and qualification levels, women make up the vast majority of teachers at the primary and secondary levels (OECD, 2019a). However, female teachers are much less present at the tertiary levels and hold many fewer senior decision-making positions in schools and teacher-education institutions (OECD, 2019b).

Teaching, like all other occupations, has been organized, changed and framed by gender. While the number and kinds of teaching jobs that are available have changed over time and the global expansion of formal

teaching positions has provided opportunities for many women, teaching jobs have been continually reorganized and redefined so that women remain in low-status positions relative to men. The women who teach has consistently been framed through images of traditional femininity, described and represented through maternal metaphors, and equated with social or, even worse, familial and care-taking work rather than intellectual labour. It is not by case that often university professors (a mostly male job) are not considered as a teaching job. but something more in terms of wages, autonomy, and status. It is itself a reflection of gendered conceptions of work. Given that university teaching is intertwined with research activities, it is in fact associated more with intellectual development than social development. And yet, one of the principal tasks of university professors is to teach students.

Teaching around the world has become a more feminized occupation over the last few decades (Albisetti, 1993; Cortina et al., 2006; Drudy, 2008). Nevertheless, women are most highly represented at the primary level. In most countries including Italy, women make up 80% or more of the teaching staff in public and private education (OECD, 2019a). At the secondary level, women are somewhat more evenly represented (Acker, 1989). There is also a gender differentiation by field which becomes pronounced at the secondary level of education, where men are more likely to teach business, science and technology while women are more often found in the languages, history and special education. In Italy, the gender division of teaching fields parallels the tripartition of the upper secondary system: male teachers are more likely to work in technical and vocational schools that tend to enrol more male students than female ones, while female teachers are more likely to work in *licei* where female students are more likely to study.

Our portrait of the gender of education would not be complete without considering the role of men and women in school leadership. At the primary and secondary levels, administrative jobs are overwhelmingly held by men (OECD, 2019b). Many of the findings regarding men's and women's positions as teachers or school leaders/supervisors reflect the same patterns of gender segregation and the devaluing of women's work seen in the larger labour market: cross-countries comparisons have shown that the higher the teaching job in relation to the average pay for other jobs, the higher the share of men among the teaching population. Gender segregation contributes to women's lower pay and degree of authority because occupations that are predominantly female tend to pay less than male-dominated ones. Furthermore, the devaluation of women and their work is a prime factor in reproducing the pay gap between the genders (Cohen, Huffman, 2003).

There is also an extensive body of literature on women as educational role models, suggesting they are more likely to emphasize relationships, collaboration and "caring" than trouble-making and change. And yet this discourse is far too essentialized and decontextualized. Changes and reforms in the organization of teaching may explain how female teachers likewise display contesting and conflictual attitudes. Teachers often fight for their autonomy to make one specific pedagogical and didactical choice rather than another, and they are eager to prevent centralized

hierarchical and bureaucratic intrusions from interfering in the content of their jobs (EIGE, 2017; OECD, 2019b; EPRS, 2020).

While men have historically received more education on average than women, women began to outperform men in tertiary education in the last decades of the twentieth century in a growing number of high- and middle-income countries (Schofer, Meyer, 2005). In American and European media and popular books, the reversal of the gender gap in education has given rise to accounts of the “decline of men” and concerns about the excessive size of the gender gap in higher education. However, as male dropout rates and the share of boys accounting for low-performing primary and secondary level students began to increase in many western countries and especially Italy, the feminization of teaching trend came under harsh scrutiny (Colombo, 2019). Calls have been made for more male teachers as role models in elementary schools and a variegation of manifestations of «recuperative masculinity politics» (Douglas, Lingard, 1999), thus overturning the debate on gender equality in compulsory education. On the shortage of male teachers in primary schools, it was pointed out that there is a clear difference between neoliberal education policies claims and the accurate findings of research-based literature, the latter stressing a complex reality in which the impacts of gender relations on male teachers’ lives and professional identity are nuanced, heterogeneous and not necessarily negative in outcomes. Evidence suggests that what is really happening is that male role model rhetoric is being exhumed and revamped as a basis for understanding the politics of “doing women’s work” and anxieties about the status of male pre-primary and primary school teachers’ masculinity that such politics provoke. Popular media outlets seldom convey such anxieties about the extinction of male teachers. The hidden model that resurfaces in cases of “men doing women’s work” is often based on homophobia, compulsory heterosexuality, and hegemonic masculinity. While refuting arguments about the supposed detrimental repercussions that the feminization of elementary schooling has on boys, it must nonetheless be stressed that the debate about male teachers has the potential to open up rather than foreclose opportunities for raising critical questions about the de-gendering and re-gendering of infant elementary school teaching (John Martino, 2008).

The discourses that have been used to frame debates about boys’ schooling are unhelpfully narrow in their conceptualization of the terms “achievement” and “education”, masculinist in style, and lacking in historical perspective. It is counterproductive to set up a binary opposition between the schooling of girls and that of boys according to which one group wins at the expense of the other. Rather, we argue that the key to understanding what is happening in schools lies in questions of equity and difference both *among* boys and girls and *between* them. In this regard, the “gender of education” refers to the urgent need to investigate the different versions of masculinity that are available to and adopted by boys in schools, examining how these models may produce problems for educators and or boys themselves, and how boys come to inhabit them.

Another key discourse that has achieved the status of general common sense is that of “boys will be boys”. This problematic idea manages, at one and the same time, to posit an unchanging and unchangeable “manliness”

characterized by aggression, fighting, competition, rebellious and anti-schooling behaviour as well as delayed maturity even while framing poor educational achievement as extrinsic to boys themselves. Too often, this set of assumptions implies using girls to police, teach, guide and control boys (Skelton, 2002; 2012). This should not surprise us, for it draws on well-established notions that women are responsible for controlling men across a range of activities, but especially in relation to sexuality. Not only will boys be boys, but it also seems they will be heterosexual and hyper-masculinized boys on whom, presumably, girls' civilizing influence will operate.

Most studies of gender and students' social relations have adhered to this "two worlds" model, describing and comparing the subcultures of girls and of boys separately. The separate worlds model essentially involves searching for sex-based differences between the groups and, as such, it is hampered by the same limitations as individual sex difference research. Differences tend to be exaggerated and similarities downplayed, with little theoretical attention paid to the integration of similarity and difference. The problem with this approach is that sex segregation is not static but a variable and complicated process. A full understanding of gender and educational relations should encompass cross-gender as well as intra-gender interactions.

At times it seems scholars grant too much emphasis to gender divides in educational performance and attainment: there is more overlap between the attainment of boys and girls in different subjects and at different levels than there is divergence and, while there are many substantive gender gaps in favour of boys or girls, comparisons are based on averages. The bigger the assessment scale used in the research, the more standardized is the test claiming to measure divides in competences. This tendency holds true, even though any population of students not performing well on school tests includes many individuals who are doing very well indeed in their practical daily use of competences. The analytical and comparative measurement of boys' and girls' scores on standardized tests do not seem to us the area most deserving of attention, unless these results indicate remarkably significant differences. At least for Italy, we would do well to instead reflect on two issues: *i*) the decrease in the share of male young students who enrol in tertiary education and in the share of male university students who succeed in obtaining a degree, as compared to the corresponding female populations; *ii*) the persistence of horizontal gender segregation in secondary and tertiary education, a tendency that continues to manifest under new guises: although scholars have pointed out the divide between humanistic and scientific fields, recent trends show that the degree of gender imbalance is becoming variable within scientific fields as well as within humanistic fields, while there are increasing and equally significant gender gaps to be seen along the care-technical divide. This finding suggests that cultural pressures, gendered expectations and traditional sex-role stereotypes underlying gender segregation are proving resilient despite women's generally increasing participation in tertiary education.

3. EMBEDDING THE GENDER-EDUCATION NEXUS IN THE ITALIAN CONTEXT

With one of the largest gaps between high and surging female rates of educational achievement and the lowest female employment rates among industrialized countries, Italy is undoubtedly a national context for which it would be worthwhile to keep research and discussion focused on the articulation between gender and education. The feminization of Italian higher and tertiary education and women's overtaking men in enrolment and educational achievements do not seem to be curbing gender inequalities in the Italian labour market, but they do signal the rise of an opposite cultural pattern in young men's investment in education.

There is no simple relationship between education and gender equality. As with social class relations, education both reinforces evaluation of student's background and create new possibilities for liberation, and this contradiction appears at every level and in every aspect of the Italian educational system (Biemmi, 2015). Schools and universities are sites of intensive gender socialization, but they also offer girls and boys the opportunity to exploit their gifted talents and develop their skills. Education, therefore, is not limited to reproducing gender inequalities; sometimes it spurs students to think beyond the ideological limits set for them by society. In the past as well, the Italian feminist movement made visible both the entrenched gender discrimination of schools and young women's rebellion against such challenges and barriers (Gianini Belotti, 1973). Research and analyses on the nexus between education and gender in Italy have been expanding the range of topics and issues under investigation since the vibrant peak of the last feminist wave in the Seventies: fifty years of changes and shifts in the Italian educational scape have accompanied reflections on gender inequalities and segregation, male and female achievements, men's and women's educational choices, their preferences for subjects and the reversing gap in secondary and tertiary education enrolment and attainment. Nevertheless, for many reasons this whole body of reflections and achievements suffers from alternate fortune in visibility and invisibility, hangs on cultural revivals and cultural removals, receives appreciations and dismissals both from the female and the male audience.

Now it is time to reinvigorate the framework and provide new evidences by investigating – through updated gender perspectives – challenges and opportunities such as digital educational tools, counselling schemes to guide educational choices, innovative teaching and learning methodologies, teacher training on gender issues, policies and programmes to combat male dropout, and new sociological approaches to critically interpreting the data from large-scale assessments.

Moving from this purpose, a double session of paper presentations on the gender-education nexus was held by AIS (the Italian Sociological Association), within the 12th national congress *Sociology in Dialogue* (Naples, 23-25 January 2020). The session dealt with *Gender and learnings: new cognitive, didactic and educational challenges* and hosted two paralleled debates on *Teaching and Learning* and *Outlooks for the future*.

This volume stemmed from the initiative: many of the essays collected here were selected during the AIS meeting, with the attempt to bridge the gap between the sociology of education and gender studies.

The chapters focus on several topics, such as cognitive development and the impact of gender stereotypes; playing, games and learning experiences during socialization; gender inequalities in education and training; peer groups, digital devices and lines of gender differentiation; coding, robotics, STEM and web-based skills; gender and teaching at schools and universities; graduate women's effective opportunities to secure high-profile jobs; and the overwhelming presence of female teachers primary and secondary schools as well as the contributions made by the few male teachers. This list is by no means exhaustive; many of the foremost features of the relationship between gender and education remain to be addressed. The volume is only a seminal starting point, however, and we leave to readers the task of judging whether and how the contents of the chapters interact with each other, enriching the overall landscape of the Italian state of the art in this field.

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2

Girls and Boys at School Do Gender Differences Still Matter?

Fabio Corbisiero and Antonella Berritto

INTRODUCTION

There have been several phases of analytical attention to gender in society. Initially, scholars' main concern was differences between men and women and the extent to which these differences might be based on biological attributes (Kimmel, 2000). In the subsequent phase, attention centred on the differentiated socialization processes women and men undergo in various societies (Kane, 1996). More recently, sociological studies have recognized gender as an organizing principle in all social processes and institutions, from educational paths to diversity management. These theoretical perspectives, more interested in the relationship between gender and education, have highlighted the ways in which the intersection of gender and education might be structured so as to offer solutions and points of view on differences, gender disparity and diversity in schools (EURYDICE, 2009).

The relationship between gender and education has been addressed systematically since the late Sixties and early Eighties, when the feminist movement became a political actor casting a spotlight on gender inequality; it is at this stage that we began to think about what educational and school policies to adopt so as to overcome the gender barriers that can impede girls, and women more generally, from reaching the highest levels of educational achievement. Feminists have taken steps to identify solutions to the unveiling and removal of any role-based stereotypes that would have somehow disadvantaged one or the other gender in the school setting. The queer scholar Butler (1999) has notably argued that processes of everyday repetition entrench gender norms; she describes how the repetition of norms in daily life can become unconscious and result in the gendered attributes they reproduce coming to appear commonsensical, factual, and therefore natural as opposed to performatively produced.

This recognition of the importance of gender issues developed in Western societies in the second half of the twentieth century and the Seventies in particular. Previously, there was no branch in the discipline of sociology that studied gender in education, as the subject was instead

addressed as part of general themes. However, although the question of sexual difference has always interested scholars of Western classical thought, the debate on the natural order of differences between men and women did not arise until the Forties along with a deeper investigation into sexual differences (Acker, 1987). The first approach addressing both gender and sex differences was conservative in character, in the sense that it posited social and cultural differences between men and women as biological, natural and unchanging. Education was seen as a means of socializing and educating boys and girls in their “natural” roles as men (those who earn, work, and hold the position of family head), and women (who feed, do caretaking, and dedicate themselves to the family). The progressive approach instead holds that the social roles of men and women are largely shaped by historical, cultural, and social factors and, as such, change constantly with the changing of society itself. The extreme expression of this vision understands gender difference as a cultural phenomenon stemming from the ideas prevailing in a specific era or culture. Education is, therefore, considered a tool for encouraging greater equality between the sexes, as well as challenging dualistic and stereotyped assumptions.

In this chapter, we review theory about gender and socialization during early childhood (age 3-6). In particular, in § 1 we describe the different currents of thought and main changes in the gender perspective in the field of education, paying specific mention to gender socialization theory. Over the years, some theories have prevailed by explaining how the educational context operates as an engine for reproducing gender differences and inequalities. In § 2 we review how gender differences in early childhood educational contexts affect the use of school spaces. This differential use of space is a result of the fact that some institutional school practices such as spatial division reinforce, normalize, and encourage gender dualism. In § 3 we discuss how children themselves are interested in topics that are specifically associated with their gender identity. In particular, this section aims to discuss how children explore and rehearse roles during their games. Finally, the chapter offers some policy recommendations for future research and practice. Specifically, we refer to the EURYDICE report which illustrates gender inequalities in the school environment and gives a comprehensive overview of national policies. We also outline policies designed to tackle gender inequalities. This goal is a part of the Europe 2020 strategy for smart, sustainable and inclusive growth promoted by the European Commission.

2. WHAT KIND OF STUDIES ARE GENDER STUDIES? THE FEMINIST WAVE AND SOCIALIZATION THEORY

A variety of theories have developed under the umbrella of Gender Studies: liberal theories, constructionist and deconstructionist theories, and post-modernist theories. This distinction is only indicative, however; it

should not be taken as definitive. The field of research on the topic of “gender-education” in sociological terms is vast and there are numerous theoretical frameworks. For our reflections here we will adopt the theory of socialization, which is part of a liberal theoretical framework (Arnot, Dillabough, 1999) in which attention is focused on a type of society that is free, public and open to women. To achieve such a society, one of the key words is “empowerment”. One of the tasks of equal opportunity policies is therefore to remove those social obstacles that prevent women from achieving what they want and aspire to (Epstein, 1988).

The relationship between gender and education has been addressed since the Sixties and early Seventies when the feminist movement became a political subject committed to proposing a progressive position on issues of gender inequality in education. The movement raised the issue of school socialization differentiated by gender and thereby paved the way for the development of new practices and approaches in relation to boys’ and girls’ behavioral models and related forms of learning at school. At the beginning of the Seventies, in fact, feminist political discourse focused on education and the analysis of school socialization practices that were affected by the various stages of development of the concept of gender (Friedan, 1963). What was needed, such discourse argued, was the equal treatment of boys and girls and educational policies fostering a climate of neutrality (Bem, 1983). Consequently, it was necessary to think about what educational and school policies could be adopted to overcome gender barriers and break down the role-based stereotypes that might in some way disadvantage one or the other gender in the school setting. Feminists introduced discussions of the concept of gender as a term to describe something that is socially and culturally constructed (Davis, 1975; Scott, 1987) and it was in that historical moment that the concept of gender entered the common language, given that that sex was no longer considered sufficient to characterize masculinity and femininity.

On closer inspection, gender identity is a much more complex process resulting from the combination of identity development, cultural formation and socialization. It is on the basis of these premises that scholars began to think about intervening in the phases of gender constitution to try to reduce the differences between male and female schoolchildren and to emphasize the role of both school and family in the secondary socialization process (Eckes, Trautner, 2000). Feminists’ political discourse in relation to education and practices of analysing school socialization were influenced by the concept of gender. This phase coincided with the development of the theory of socialization and an attitude of (hypothetical) neutrality began to circulate in educational policies, particularly in schools (Bem, 1974; Whelehan, 1995; Friedan, 1963). In Italy, this phase coincided with one of the most important volumes on this topic, published in 1973 by Gianini Belotti, *Dalla parte delle bambine (Little girls: Social conditioning and its effects on the stereotyped role of women during infancy)*. Belotti’s book offers a clear overview of the education of girls and boys in schools and families in that period (Mitrano, 1979). This text showed that sexist stereotypes, a lack of attention to the construction of gender identity and cognitive errors about the naturalness or cultural basis of differences between the sexes were widespread

(Gianini Belotti, 1973). The feminist wave reintroduced volumes such as *The Second Sex* by Simone de Beauvoir (1961) and *The Feminine Mystique* by Betty Friedan (1963) back into the academic world, books which revealed the mechanisms through which Western society was able to make one sex inferior to the other. These scholars mainly adopted the liberal theoretical approach, specifically in the theory of socialization that developed between the early Seventies and early Eighties when gender-based stratification began to kindle the interest of academic circles (Collins, 1988).

Money and Ehrhardt's book (1972: 4) *Man and Woman, Boy and Girl* advanced an innovative thesis about gender, defining gender identity as «the private experience of gender role» and gender role as «the public expression of gender identity». Social aspects become just as fundamental as the biological ones in determining gender identity and gender roles.

This approach has undoubtedly had an impact on the intersection of gender and play as well. Although playing is an innate tendency for children, the ways in which games are expressed, their rules, and their objects are the product of culture. As is well known, play is one of the first forms of socialization through which children learn their roles and gender roles in particular. Most of the toys on the market are designed exclusively for males or females, in view of different roles and expectations. The key concepts in this approach are: equal opportunities, socialization, stereotypes and sexual discrimination. The main assumption of the theory of socialization is that girls are the object of a discriminatory educational process that imposes "traditional" gender expressions and roles on them (Lever, 1976). This theory opposes the functionalist paradigm according to which girls are socialized to become helpful and caring wives and mothers while boys are socialized to grow up to be career-oriented, dominant, and cold, with a calculating attitude (Lever, 1976; Gianini Belotti, 1973). In functionalist theory (Parsons, 1971), children are considered mere "objects" of adult socialization, educated to become competent and active members of society over time. From this perspective, boys and girls socialized by their parents internalize these values; boys and girls, having become adults, will feel the need to act in keeping with the values transmitted by their parents where they coincide with those of society as a whole (Parsons, Bales, 1955).

Educational institutions play a fundamental role in the elimination of gender obstacles. In Italy, the first public childcare centres were opened in the Seventies and, in terms of legislative developments, the referendum on the new family law (1975) was discussed after the 1970 divorce law had passed. The goal of some of these public policies was influenced by some reflections developed around those years in order to promote a neutral environment for equal treatment and initial opportunities (Friedan, 1963; Bem, 1974). As part of this project, school came to represent a privileged place to act and eliminate gender stereotypes and implement a series of positive measures aimed at bridging the gap between the two genders (Lever, 1976; Coser, 1989). However, school alone has never been sufficient to overcome gender stereotypes; rather, it is necessary to support all the socialization agencies involved in the educational

process, such as textbooks, media, and teachers' practices, not to mention the role of parents (Houston, 1985).

Since that period, other theories focusing on sexual difference (in the psychological and neurobiological spheres) and on gender difference (deriving from a social constructionist framework) have developed, often in parallel and in opposition to each other (Lindsey, 2015). According to the theory of differences, women's difference is fundamental and gender diversity is foregrounded and related to educational practices; this theory calls for fostering female traits and characteristics in a differentiated school trajectory that takes into account gender diversity (Noddings, 1992; Martin, 1992; Murphy, 1996). However, the exaltation of differences has met with critiques of essentialism as critics contested the idea that it is really possible to identify one monolithic gender identity (Arnot, Dillabough, 1999). This anti-essentialist position rejecting any single definition of the feminine developed between 1980 and 1995 by engaging with structural and deconstructivist approaches and post-modernist theories. Indeed, post-modernism has intensified and refined the reflection on difference and the concept of gender itself and given rise to numerous strands of feminist investigation which overlap in their approaches (Griffiths, 1995).

From the Nineties onward, Gender Studies also began to take into account young men, not as a category complementary to women but as a group with its specificities. The first impetus for change came from the Anglo-Saxon world but, recently, the debate on gender discrimination against men has taken hold both in the context of Italian research on education in schools (Martini, 2005) and in the public domain covered by the media. In particular, in England and Australia attention has shifted to males in a way that has been defined as «the boys turn» in studies on gender and education (Weaver-Hightower, 2003; Lingard, 2003). However, the lack of support for this body of research has helped to fuel a debate around the need to develop analyses of male students. The perspective focused exclusively on girls has been replaced by a way of studying gender identities that is based on comparison and on the study of relationships and differences in a perspective of coexistence, synthesis and union between the two genders (Acker, 1987). The theories that have developed to date in educational contexts represent a moment of transition in which sociological thought is formulating new theorizations. Such theoretical endeavours struggle to achieve concrete «empirical translation» in the educational sector, however (Leonelli, 2011.). Post-modern society is characterized by multiple and intersectional phenomena (Giddens, 1990) that add and stratify forms of diversity, such as: sexual orientations, disabilities, ethnic groups, etc. Other gender minorities have begun to make claims for recognition, breaking precarious forms of equilibrium based on a heteronormativity imposed by the secular tradition of the patriarchy (Recchia Luciani, Ponzio, 2018). In the 2010 EURYDICE report by the European Commission, Italy is defined as a country lacking in both guidelines and organizational policies on this subject. It was only through Law 107 of 2015 (the *Buona Scuola* law) that the principles of equal opportunity were implemented by promoting gender-equality education in schools of all levels. Subsequently, in the *Piano nazionale per*

l'educazione al rispetto and Linee guida nazionale per le scuole, Italy addressed the issue in more detail and even allocated funds for these policies.

3. GENDER DIFFERENCES AND SPACES IN PRIMARY SCHOOL

Space constitutes a main element in children's daily life from birth, so much so that caregivers pay particular attention to where and how to place them (Valentine, 2004). The main element distinguishing the spatial experience of children is undoubtedly their separation from the space of adults due to reasons often linked to protection, care and control. Space thus becomes a tool that gives rise to a possible domain of action; at the same time, however, such potential action is limited by well-defined physical boundaries (Valentine, 2004). Space thus expresses specific ways of structuring relationships between individuals and these ways in turn grant themselves meaning (Simmel, 1908). The relationship with space characterizes people's lives, and for children this relationship becomes an existential condition in that they are not always the ones who define the boundaries of their own spatial freedom (Jenks, 2005). While it is true that all space depends on the network of social relations that shape its borders, it is also true that social relations always play out within a specific space and it does not make much difference if this space is virtual, such as generated by today's technologies (Iachini et al., 2016).

Children's spaces, such as schools or other environments in which they engage in playful-recreational activities, are places where children play and express their freedom and creativity under the watchful and controlling eyes of adults; it is adults who define the educational purposes of such spaces, even though the ability to move freely through the environment is fundamental for children's growth and development (Rissotto, Tonucci, 2002). Such control is replicated in primary school spaces, as well. Not only does the organization of school spaces reflect socio-spatial relationships, but - for some authors such as Foucault (1978) - it encourages children to conform to certain rules of behaviour; they are supervised and subject to constant surveillance and evaluation. Indeed, educators often monitor even children's movements by teaching them to stand still, be quiet and listen carefully in class. The organization of school buildings and classrooms as well as teaching methods facilitates this dynamic of teachers supervising pupils, reinforced by devices of «panoptic surveillance» (Foucault, 1978). Therefore, schools or micro-spaces such as classrooms are useful sites of analysis because they are characterized by regulated codes of class, race and gender. The organization of school spaces reproduces and promotes the performance of masculinity and femininity, performances which are intelligible to others because they are based on shared cultural codes (Dixon, 1997; Holloway, Valentine, 2000).

An Italian study shows that spatial division in preschools reinforces and encourages gender dualism (Abbatecola, Stagi, 2017). In their study, conducted in a nursery school in Genoa, the two researchers observed how space in classrooms and particularly play space is powerfully divided on the basis of gender boundaries. The division of male vs. female space was one of the first elements they noticed during participatory observation: a play space for toy cars, for the boys, and a Barbie space for the girls. Moreover, the two sociologists note that their ethnographic work revealed what they have defined as «sexed universes»: it was immediately perceptible that girls and boys manifested not only a different way of conceiving play space, but also a different verbal and non-verbal communication style and various practices enacted in a «differentiated» manner. Although social space is never neutral (James et al., 1998), this fact is especially evident when looking at boys and girls whose identities are constructed within the spaces that have been designed for them (Holloway, Valentine, 2000). Paradoxically, in fact, what develops is a gendering of childhood play space that has repercussions on the formation of the child's identity. In relation to unstructured activity, Prezza and colleagues (2001) likewise show that boys tend to take up more space than girls in play. In other words, there is a generally shared assumption that males have a greater need to vent their excess energy through movement and are more prone to physical fighting or activities that highlight their athleticism. Other studies (Grellert et al. 1982; Martin, 2011), such as those conducted in the United States, also find that formal and informal spatial school practices often differ, for example in terms of the expectation that boys need to move more, be louder, and take up more space.

Preves (2005) reports that special teaching methods have been introduced with the aim of enabling boys to be more physically active during classroom hours. A separate carpeted area, on the other hand, is provided for girls to sit and talk. «They are segregating the sexes and leaving school to allow children to expand and move in a new approach to learning in the United States» (Preves, 2005: 45). Research conducted by American sociologist Martin (2011) shows that preschools set rules according to which children are not allowed to climb if they are wearing jewellery, and this often excludes girls. Educators should reflect more deeply on the actions of children in contexts such as the home or nursery school to better understand gender issues (Blaise, 2005). In early childhood educational contexts, it is necessary to create and promote an environment in which all children, girls and boys alike, are free to develop their potential and talents and explore non-stereotyped roles (Renold, 2006). This author further explains that this would involve creating a school-based space that allows all children to experience unstructured activities, workshops and games through which they are exposed to new, more inclusive environments and are given opportunities to escape the social demands of the adult world. Educators should pay attention to the often tacit and unconscious dynamics that emerge in groups of children, both in preschool settings and in other contexts (MacNaughton, 2000). Teachers must draw on a variety of perspectives to understand the intricacies of classroom life and what children learn about gender (Blaise, 2005). Abbatecola, Stagi (2017) have explained that a process of re-gendering is underway (that is,

a further gendering of everyday life that can be seen in games and children's environments) that specifically impacts disadvantaged social classes and their social networks (Munch et al., 1997).

Another fundamental question is that most teachers or educators in kindergartens and primary schools are women with first-level post-secondary education and little competence in Gender Studies (Crivellaro et al., 2013). Research conducted in the Emilia-Romagna region by the University of *Bologna's Centro Studi sul Genere e l'Educazione* showed that teachers often find themselves bewildered by and unprepared for parents' doubts and concerns (Crivellaro et al., 2013). According to this research, there is a widespread belief among educators that their role is neutral with respect to gender, as well as a certainty that they are treating everyone equally (Tarabusi, 2012). Questioning such convictions meets with powerful criticism because it involves few educational benefits and consciously "marks" gender difference among teachers and children, in performing school-based activities, and in peer group interactions in the classroom. This is why it is necessary to create a gender-sensitive physical and social environment in which children can absorb messages of social justice and equity (Cohen, Martin 1976; Hendrick 1990; MacNaughton, 1993). There is a marked gender imbalance in Italian primary schools at present, as such education is provided almost exclusively by female teachers.

4. CHILDREN AT PLAY: HOW GENDER, SEX AND PLAY ARE RELATED

It has become ever more important in recent years for society to consider issues related to gender and sexuality in childhood. Processes of gender socialization begin even before a child is born, as parents prepare for its arrival, often using ultrasound to identify the sex of the baby. This information makes a difference in how parents think about their unborn child. The current sociological interest in gender roles comes at the end of long period of patriarchal societies in which women have played subordinate roles in various social institutions, of which school is one. Even today, stereotypes related to these traditional understandings of role models continue to circulate and influence what takes place in contemporary classrooms by affecting the behaviour of teachers and families and, consequently, children's actions as well.

Children explore and rehearse roles during play – the roles of people they know or encounter through media outlets – and one of the purposes of such role exploration is to test adult responses. It could be argued that «all this is part of the formation of one's personal and social identity:

“Who am I? Who are you? Who are we?” - especially in the world of play - offers the child its first and most crucial opportunity to have the courage to think, speak and perhaps even be himself (Bruner, 1986: 69).

As Bruner has argued, identity is simultaneously social and cultural: from the beginning, a new-born is not an isolated and passive individual but instead grows up as part of a social network promoting the cultural development of skills and competences. Game culture therefore becomes crucial in the formation of a child's identity (Sutton-Smith, 1997). Through play, boys and girls express their sociality and their socio-cultural reference model and learn to respect moral codes. Children also explore and test out their gender identities during play.

The gendering of games and explicit labels are all suggestions that boys and girls have on hand and use to classify and grant meaning to world around them (Weisgram et al., 2014). These stereotypes influence pre-school boys and girls as they construct first their interests and then their attitudes; indeed, as such they represent the fundamental mechanisms of gender socialization (Abattecola, Stagi, 2017). We outlined above how play influences the social and cognitive development of boys and girls and how the possibility of increasing play areas can be conducive to the development of skills and competences (Blakemore, Centers, 2005).

TABLE 1. *Differences between the play behaviours of boys and girls:*

<i>Play styles</i>	<i>Physical play</i>	<i>Themes for pretend play</i>
<i>Boys:</i>	<i>Boys:</i>	<i>Boys:</i>
- play outdoors	- are more physical	- like heroic and war-like themes
- in large groups	- take up more space when they play	- imitate or dress up in superhero and villain outfits
- rush about	- like rough-and-tumble play	- use objects as weapons for killing or rescuing
<i>Girls:</i>	- are more physically aggressive with other boys	<i>Girls:</i>
- more often indoors	- show more attempts at dominance	- take on much more familial and domestic roles
- usually in smaller groups or pairs	- are generally more competitive	- like to dress up to be glamorous
- participate more in talking and discussion	<i>Girls:</i>	- take on other female roles such as princesses and fairies, e.g. 'girly' outfits, dresses, make-up and accessories
	- use smaller spaces	
	- take up less space	
	- are more likely to take turns	
	- dominate through	

Source: authors' processing of data presented by Kilvington, Wood (2016).

However, children use gender as identity support and «are attracted to things and behaviours associated with their sex» (Fine, 2010: 128). Martin (2011) suggests that children become «gender investigators» as they continually try to find clues and information about their belonging to «male or female tribes». Their interest in things that are particularly associated with their sex is reproduced in their own representations of themselves, in their boundaries of belonging to the group, and in different forms of play, depending on how they perceive male and female. By way of example, in Table 1 we lay out the differences between boys' and girls' play behaviours and stereotypical gender preferences (Zosuls et al., 2009).

The sociology of childhood considers the ritualized sharing of any playful theme as an expression of a «culture of children» (Corsaro, 1997) understood not as the reflection of adult culture but as a set of practices, values and interests in which children actively participate by negotiating

the meanings attached to them (Hengst et al., 2004). In other words, this vision affirms that children are already competent actors in their social worlds. In so doing, it overturns an adult-centred representation of childhood as incomplete and replaces it with a concept of play as forming and preparing for adult social roles.

Maccoby (2003) notes that children's tendency to play in gender-segregated groups is not a question of imitating adults but a reflection of their efforts to adhere to child culture. The games they end up playing in their groups, on the other hand, are determined mainly by the familial and cultural models within which such games are enacted. Such segregation is the result of gendered social practices that reinforce particular behaviours and preferences from childhood to adulthood. Significant adults inculcate and promote particular gender behaviours by modelling such practices. According to Maccoby, gender serves as an organizational principle for children, helping them to understand and interpret the behaviour of those around them. A further study by Alexander and Saenz (2012) found that 2-year-old girls preferred toys typically associated with girls over those associated with boys, but then 2-year-old boys showed only a slight preference for male children's toys over female ones. These findings support the idea that toy preferences, although based on gender, are not a perfect indication of gender identity. Some additional experimental analyses (Weisgram et al., 2014; Wong, Hines, 2015), show that children prefer toys which are gender-typed in both function and colour. For example, the experiments by Weisgram and colleagues (2014) found that boys prefer masculine toys to feminine ones and that girls reject masculine toy and colour combinations more than any other toy type and colour combination. Social experimental research has also shown that children learn gender stereotypes through gendered information. Examining whether 3 to 6 year-old children were read stories with a gendered protagonist in a gendered context or a non-gendered one, research by Seitz and colleagues (2020) indicates that children's notions of gender stereotypes became more flexible after they had been exposed to incongruent information in the stories recounted in school books.

A further current of studies highlights gender freedom and the right to self-determination starting from childhood. Diane Ehrensaft (2011; 2016) has contributed to this discussion by introducing the definition of «gender creative child», a term she uses to indicate children who identify and express their gender in ways that differ from societal and cultural expectations. She suggests that prepubertal children's crossing of gender identification boundaries be accepted and supported. This approach is fundamentally based on the idea of allowing children to choose their own gender and sexual orientation. Is it appropriate to guide a child's development by supporting a gender-variant position, however? Due to socio-cultural factors, transgender children often opt for a "false gender" self, that is,

the face a child puts on for the world, based on the expectations of the external environment and the child's interpretations and internalizations of either "appropriate" or "adaptive behaviors" (Ehrensaft, 2011: 140).

This choice can have an enormous psychological cost for the child:

Danger prevails when the false self takes over and suffocates the true self. In the most extreme case, an individual might want to stop living completely rather than let the false self continue to beat the true self into submission (Ehrensaft, 2011: 534).

In contrast, this gender self-determination approach would encourage parents and other agents of socialization to accept children's identities as they are, and allow them to grow up creating their own personalities. Ehrensaft has called for family and school to focus on providing well-being for gender variant children, creating a safe space for them to explore, learn, experience, and grow into their authentic selves. In summary, gender creative children position not the body at the centre of their worlds, but rather the development of their identities. It is thus important to allow the child's true gender self to be explored, accepted, and if at all possible, affirmed by parents and teachers.

The points discussed so far aid in reading the processes that take place during children's playful activities and daily lives at nursery school. Here, the gender identities shaped by the socialization process come face to face with stereotypes and social expectations in a sometimes-unpredictable game involving both the incorporation of models and «interpretative reproduction» (Corsaro, 1997). According to this latter theory, children absorb adult culture and reproduce it by creatively interpreting it in their peer groups and in interactions with adults. In so doing, they actively contribute to cultural production and change (Corsaro, 1997; Corsaro, Molinari, 2010). This analytical perspective thus allows us to adopt a more critical lens rather than casting children as passive parties in processes of primary and secondary socialization. In support of this critical perspective, sociologists of childhood underline the importance of the interpretative reproduction of social reality that children carry out, alone, with their peer groups and with adults (Thorne, 1987; James et al., 1998; James, James, 2004).

Children do not have «sponge models of identity» (MacNaughton, 2000); rather, children as rational actors exercise free will in the construction of their own identities. The novelty of this theory, therefore, lies in the fact that it recognizes agency in children beginning from their first years of life, thereby attributing the capacity to interpret, reproduce and valorize their active role in socialization and learning processes (Hughes, MacNaughton, 2001). As Blaise (2005: 18) states: «this perspective opens up the possibility that children actively resist a teacher's good intentions toward equity».

5. SOMETHING IS CHANGING

In rethinking contemporary modernity (Giddens, 1990, 1991; Beck, Grande, 2010), it is crucial that we consider the expression of gender fluidity in educational processes. A comparison of traditional and modern approaches can aid in the planning and implementation of educational

schemes and new social research. Several themes can be seen across this chapter, demonstrating the progress that the social sciences have made in advancing knowledge about gender and schooling. Fortunately, such progress shows that the implications and applications of social research on gender and schooling matter. What about gender and educational policies? After Northern European countries led the way decades ago, several associations were established in Europe and Italy to campaign against games which are considered sexist. For example, the *ComunicAttive* association, inspired by the *Campagne contre les jouets sexistes* (*Campaign against sexist toys*) created by a network of French associations, has created a brochure to encourage parents to reflect on the way games and toys negatively influence gender identity formation among children. The booklet, titled *Gioca Jouer. Guida pratica per salvarti dai giochi sessisti* (*Gioca Jouer: a practical guide to saving yourself from sexist games*), stems from a commitment to breaking with these patterns that present homemaking, motherhood and beauty as the sole model for girls, and heroism and virility for boys. In London, an extremely heated controversy has arisen over the “gender neutrality” of toys, presented without distinctions and without separate locations on the shop floor. Hamleys, the most famous toy store in the country, has eliminated separate departments for boys and girls; it now features signs that no longer direct the girls to the pink floor and boys to the blue one, but simply list the types of toys for sale, toy cars or dolls, without specifying for whom they are designed.

In Italy, the collective blog *NarrAzioni Differenti* presents the campaign *La discriminazione non è un gioco* (*Discrimination is not a game*) launched in 2012 by the Chile-based *Medusa Colectivo*. The campaign consists in attaching stickers to toys which are deemed sexist to help consumers understand what they are buying, that is, sexism, discrimination, and stereotypes. In the educational field, on the other hand, the European Commission published a 2010 report edited by the EURIDYCE agency outlining the measures various member countries have taken to foster gender equality. The initial idea was to examine how much gender inequality in education constituted a topic of discussion in European countries and how so. The study sought to provide a map of policies and strategies adopted in European countries to combat gender inequalities in contemporary education systems. The policies in question include a variety of measures, such as rebalancing differences between boys and girls and tackling gender-based harassment in schools. In particular, the report aims to call into question traditional gender roles and stereotypes. To this end, it investigates areas such as:

- The importance of gender stereotyping.
- The worrying lack of equality and comprehensive policies in many countries.
- Gender as a factor influencing performance.
- How to contrast gender stereotypes at school.
- What policies to adopt to tackle gender gaps, etc.

Despite the development of different policies and strategies to stimulate a climate of ethical change in schools and educational practices in relation to gender issues, gender inequality continues to represent a problem.

It is no longer restricted to girls and women, however; the concept of masculinity has also begun to garner attention. Along these lines, the European Commission has sought to define the concept of co-education associated with gender equality policies because, as suggested by Crosato and colleagues (2005), integrated coeducation is key in educating both females and males in a context that has overcome the gender roles society prescribes for each sex. Obviously, society must also contribute to offering equal opportunities overall; education cannot be considered the main tool. Indeed, education provides an important context of socialization, with informal interactions between students in schools representing an influential (and largely unstudied) element of their socialization in limited gender roles. Another fundamental issue is the undeniable differences between European countries as regards the degree of attention they have paid to these various political priorities. Such discrepancies are due in part to the fact that the different countries began to tackle the problems and policies related to gender equality. However, many countries still lack the overarching strategies and implementation plans that would constitute an effective gender-equality policy. Education is a powerful tool for changing attitudes and behaviours. Educational systems must play an important role in promoting equal opportunities for all and in fighting stereotypes; schools have a duty to provide all children with the opportunity to discover their identities, strengths and interests regardless of traditional gender-based expectations (European Commission, 2009).

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3

Female Hegemony among Italian Educational Professionals

Maddalena Colombo and Paolo Barabanti

1. GENDER INEQUALITY AND WOMEN IMBALANCE AMONG EDUCATIONAL PROFESSIONALS

One of the most recurrent issues in education in Italy, particularly in primary education and childcare services, is the gender imbalance among staff, and the resulting feminization of Italian education. Thanks to rooted gender stereotypes and habitus (Shinar, 1975), several generations of schoolchildren have been influenced from an early age in their school path and choice of profession by the assumption that women are naturally gifted or superior than men in the care and education of offspring and by this transforming «constraint into preference» (Correll, 2004). Girls and boys have interiorized these gender differences as biological and parents cultivated the conviction that women are more disposed than men to sacrifice, care, generosity, sensitivity and emotion. On the other hand, men are thought to be biologically equipped with other traits such as physical power, integrity of thought and action, entrepreneurship, and independence, all of which are considered less pertinent for care-oriented jobs (Block et al., 2018). This is called «genderism», which refers to how people think about masculinity and femininity, and it is widespread and rooted in one's cultural identity. As theories of the social construction of gender show (Connell, 1987; Lorber, 1995; Piccone Stella, Saraceno, 1996), gender identity develops very early on the basis of parental expectations, patterns of behaviour and lifestyles, and it is practiced across intimate relationships with them, so that «individuals, to some extent, tacitly agree with a pre-packaged destiny» (Gianini Bellotti, 1975: 25).

The educational sector was one of the first in which women were granted meaningful opportunities. Until the 19th century, there were plenty of men who attended and managed schools and there were few employment opportunities for women. With the extension of scholarships, women entering this professional field started satisfying the need for early education teachers and caregivers (Coffman, 1911.) Along with the increasing feminization of the teaching corps, women achieved

relative gender parity and more egalitarian access to every educational track. Thus, females have progressively shown that they are able to meet the same standards as males (Colombo, 2003). By the end of 20th century in Italy, females had begun to outperform males in terms of educational attainment (Giancola, Fornari, 2009) and since then surveys have registered an increase in aspiration and investment in long-term educational tracks amongst young women. This change has resulted in deep changes in competition in the labour market, as, for the first time in history, women are empowered enough to be a threat to men, especially in those economic and social positions previously held exclusively by men (Segal, 2006; Abbatecola, 2015).

However, despite women's achievements and the more balanced distribution of occupational and social roles, there are several professional fields in which gender segregation is still evident. This is what has happened in education: over the last decades, these jobs have becoming increasingly feminized (as well as in health and other caring jobs) leading to a sort of «vaporization of masculinity» (Guida, 2017). In Italy, for example, in SY 2016-2017 women make up 82.7% of the in-service employees in state schools. This trend extends to the new generations of teachers and educators who still consider these jobs unattractive. The OECD notes that (2017: 1): «In the OECD countries, the largest share of women is found among the new generation of teachers (below the age of 30), raising concerns about the intensification of gender imbalances over time—in particular at the lower education levels, where women make up the great majority of teachers».

In Italy, the feminization of the teaching profession is partly due to the long-lasting image of pre-primary school as “maternal”. This conception was so pervasive that in 1968, Law 44 (March 18th, 1968) was passed, changing the name of pre-primary schools from “infant schools” to “maternal schools”. This law stated all the roles in maternal school as exclusively feminine: *maestra* (female teacher), *educatrice* (female educator), *segretaria* (female secretary) and *bidella* (female janitor). Pre-primary education was only re-defined as “childhood school,” in 2007 (Ministry of Public Education, 2007). We believe that this change has been significant and offers a good start to the wider project of deconstructing the stereotypical association between women and early childhood education. This, however, is not sufficient to change behaviour and deeper meanings. Education is still considered a domain of and for women; in Italy, in the vast majority of families, domestic tasks (both at home and outside) are up to wives and – if there are little children – to mothers (ISTAT, 2016). Often mothers, rather than their male partners, serve as the point of contact with professors and the school system (Fleischmann, de Haas, 2016). Hence many fathers avoid dealing with teachers, supposing that women are “naturally” in agreement each other. Moreover, mothers exhibit a preference for female staff in the context of schools and childcare services; they tend to trust each other more and instead express feelings of discomfort when a man takes care of their children.

In the following pages, we showcase the results of an exploratory inquiry of consequences of the feminization of education. After describing the research design and hypothesis, we present some recent data on the

university choices of Italian girls and boys in educational careers, followed by data on the professional motivation of in-service teachers.

Subsequently, we present findings from an empirical study on student teachers, student educators and in-service teachers and educators in southern Italy. In conclusion we remark three main evidences drawn from it.

2. THE FEMINIZATION OF EDUCATIONAL STAFF: A CASE OF FEMALE HEGEMONY?

The feminization of educational staff has strong consequences for both the educational profession and pupils. The fact that nearly all of the teaching staff are female means that the entire school organization becomes gendered and segregated. Different impacts have already come to pass, with reference to the Italian context.

Impacts on professionals. Teaching and other jobs associated with childcare lose their economic value on the labour market, which changes the social prestige and the profitability of careers in education in both the private and the public sector and is likely to have long term repercussions on the professional self-esteem and agency of the worker. These feelings of anxiety and decreased self-esteem are common among Italian teachers: (Romano 2016; Mascherpa, 2016; Colombo, 2017).

Impacts on educational delivery. In a feminized school, the dialectic between genders diminishes or disappears and the prevalence of one gender is masked by a seemingly neutral pedagogy (Besozzi, 2003); the cultivation of relationships within the school environment is confirmed to be a female prerogative (Bombardieri, 2016).

Impacts on peer relations among both female and male students. If the school environment is lacking male role models, the entire system of interactions in the classroom is affected; both empathic relations between teachers and pupils and the coaching role of the teacher are thrown off balance for girls and boys (Colombo, 2009). The gender identity of a teacher or an educator is pivotal in reinforcing the student's motivation to be educated or taught (the mechanism of gender continuity): and a teaching staff comprised solely of women surely has much less impact on boys than a mixed one.

Impacts on organizational climate. A feminine organization does not support exchanges and hybridization with other gender cultures; moreover, it pushes educational staff to insist on their routines of education and care (routines which, being gendered, are thus more unconscious). A gendered organization is also discriminatory and exclusionary. In this case, men are discouraged from entering the field of education and they feel looked upon by women as invaders and thus unwelcome. There are also men who still think their masculinity can be threatened and «contaminated» if they undertake feminine jobs (Faludi, 1991; Abbatecola, 2012). Gendered organizations could be furthermore negative because, in the

case of feminine jobs, men have some competitive advantages. They achieve top positions more easily than women, both in school and university environments, where men have higher representation as principals and rectors. Hence a gendered organization can reinforce the negative effects for women (Williams, 1992).

In order to understand why feminization persists, the sociology of education has to investigate this persistence in terms of the direct and indirect exclusion of men. Many of the reasons men are excluded are tied to job motivation, which can be intrinsic (“expressive” in psycho-social terms) or extrinsic (“instrumental”). Intrinsic occupational values are those inextricably bound up with a particular form of work (i.e. self-realization, working with pupils, making society better, staying in contact with nature), while extrinsic ones are to some extent detachable from it (i.e. salary, security and status). Some authors distinguish also between fundamental and non-fundamental values (Rønnow-Rasmussen, 2015).

There are economic, social and cultural particularities that affect the career choices of males and females. Some authors point out that feminization is exacerbated by the weak social and economic profitability of a profession (Smithers, Robinson, 2000; Perra, Ruspini, 2014). Previous studies have shown that women seem to choose the teaching/educational profession to gain more free time to devote to family care; while men tend to go into education because they are influenced by positive past experiences with their teachers (Biklen, 1995; Guerrini, 2015). It is possible that women opt for this field in a more automatic and non-reflexive way whereas men need a reflexive and non-random motivation to choose it. This choice is particularly difficult for men given that men often have greater difficulties acclimatizing to educational contexts. In fact, men who want to become educators most likely do not mirror the traditional model of masculinity, but instead live their gender identities in alternative ways (Coulter, McNay, 1993).

However, males have an additional motivation to enter the profession as male educators are much requested by public and private schools and care services, especially to deal with teenagers and adolescents who need a “paternal” presence during their development. The ease by which a young man can find a job in education may compensate for the loss (real or symbolic) of prestige they suffer by entering the educational job market given the major remuneration they meet in the wider job market in Italy.

The role of the pedagogy consultant has a higher professional status than that of schoolteacher. In Italy, a pedagogy consultant must have a degree (this has been a legal requirement since 2017 - Law 2443 *Legge Iori* as do teachers at the secondary levels. Law 2443 made teaching more reputable in Italian society and consequently more appealing for men. In fact, as this job entails both management and designing skills, it fits better with men’s social and professional expectations. For this reason, the gender imbalance among pedagogic consultants is weaker than among teachers and educators (Guida, 2017).

We now analyse the access that women and men have to educational jobs (teacher, educator, pedagogic consultant), and how they fit into these roles and build their professional and gender identity by practicing

the job. Our hypothesis is that, in a latent manner, women limit access to the educational profession through a sort of discriminatory attitude, that is “female hegemony”. We use this concept as Antonio Gramsci did, to remark both a “cultural imposition” and an “avant-garde leadership”. Gramsci applied the concept of hegemony to both the middle class or bourgeoisies (hegemonic over the under-class or proletarians) and to the Communist International (hegemonic over the united mass of proletarians). As a “cultural imposition” (negative meaning), hegemony refers to the domination exerted by a set of values, models and interests of a group over the cultural of one other. On the other hand, as an “an avant-garde leadership” (positive meaning), hegemony refers to a cultural group exerts a dominating power in order to lead the masses to social evolution or the final “gain”.

Within Gender Studies, the concept of hegemony has typically been applied to males since men have traditionally dominated women throughout history (Carrigan et al., 1985; Connell, 1987) and imposed a particular shape on masculinity (Bellé, 2012). Recently, however, the concept has been revised (Connell, Messerschmidt, 2005). In the case of women who dominate the educational field on the basis of numeric and cultural superiority, the concept of female hegemony can help to argue that women tend to subordinate, reject and exclude their masculine counterparts, either consciously or unconsciously. Men’s reactions can also be interpreted through the frame of hegemony; when they feel excluded from access to these jobs and refuse to take on the role of caregivers, and thus seem to implicitly accept the stereotype that caregiving is a “women’s work”. In this case, we argue that women have the capability to create an implicit consensus toward accepted cultural norms and impose to men a “dominant ideology” (limited to this specific field).

Our research hypothesis is as follows: *i*) women and men perceive gender imbalance in educational professions (and its effects) in a different manner, being women more sensitive than men; *ii*) men and women do not differ in the ways they experience the teaching profession in terms of vocation, professional satisfaction and self-realization; *iii*) women hold stronger stereotypes than men as regards men working in education; *iv*) men feel greater distress and discrimination on the job (due to female hegemony or other factors).

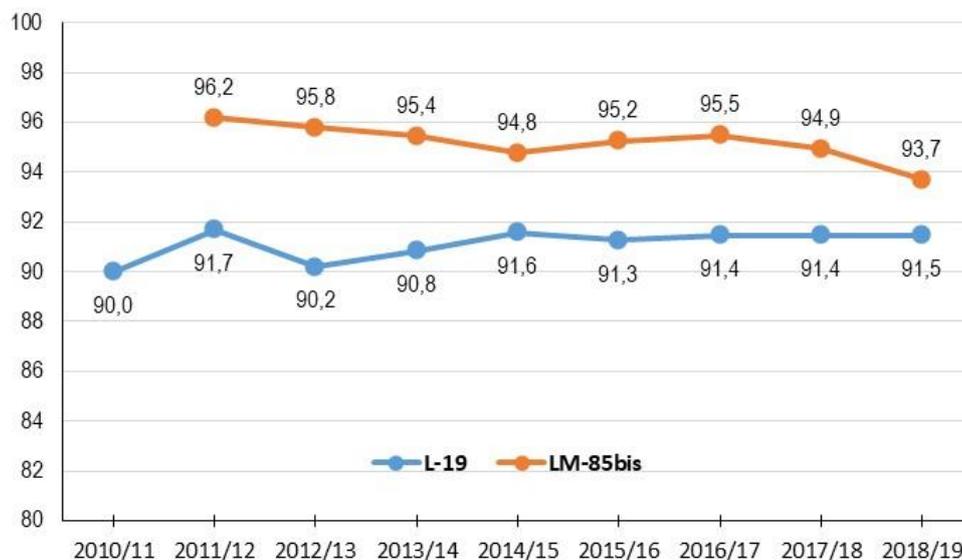
3. GENDER DIFFERENCES IN UNIVERSITY CHOICE AND TEACHERS’ PROFESSIONAL MOTIVATIONS

We investigate the gender imbalance in education by analysing the university choices of males and females. In Italy, there are *ad hoc* courses to become educators (the bachelor’s degree L-19 in *Educational Science*) and primary/infant schoolteachers (the single-cycle master’s degree LM-85bis in *Primary Teacher Education*). Male and female distribution within the two courses brings to light the pivotal gender segregation

(Figure 1). We here consider educational segregation as the concentration of a specific group of people sharing by a common feature (such as: sex, nationality or social background) in one educational branch (upper secondary school pathway or university course). When segregated, the school choice is based on inequality mechanisms, that is, forced orientation, hidden school selection or a perpetuation of social stereotypes (Goldsmith, 2009; Besozzi, 2017). It also reinforces occupational segregation (Charles, Grusky, 2004).

The majority of those who enrol in *Educational Science* are female (9 for every 10 matriculated), with an increasing trend from academic year (henceforth ‘AY’) 2010-2011 to AY 2018-2019 (+1.5%). This gender gap is even more marked when we look at registrations (first year enrolled) in *Primary Teacher Education*. However, in this latter case, the past 7 years have seen an increase in the share male students and consequently a decrease in the share of women registering for the course: -2.5 percentage points in seven years, from AY 2010-2011 to AY 2018-2019. Currently, males amount to 8.5% of students enrolled in L-19 and 6.3% of students enrolled in LM-85bis.

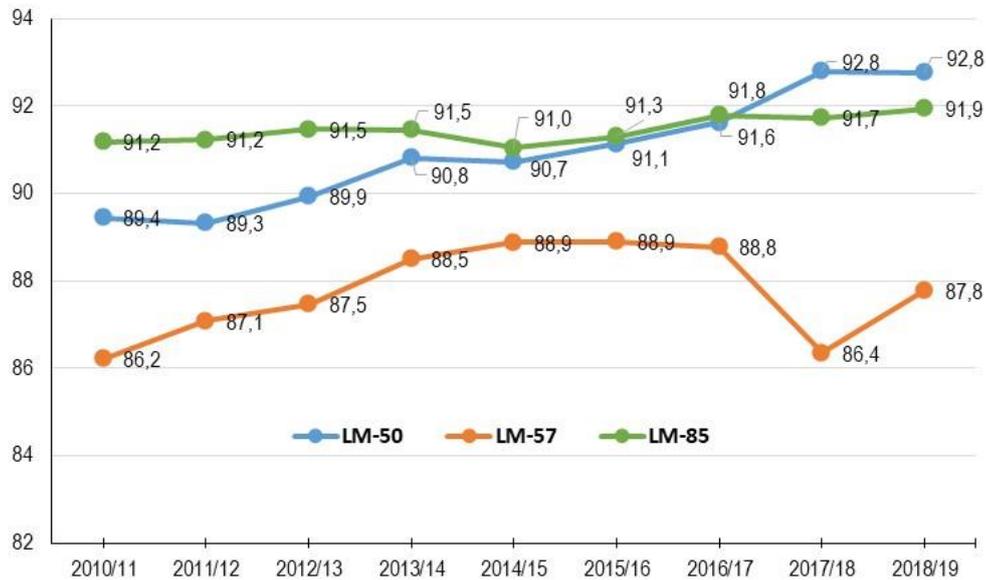
FIGURE 1. Percentage of women enrolled in Italian bachelor’s degree L-19 in Educational Science and single-cycle master’s degree LM-85bis in Primary Teacher Education. AY 2010-2011 to AY 2018-2019.



Source: our analysis on Secondary Education Data Portal – Ministry of Education

There is also a gender gap in all master’s degree courses for educational and training experts (LM-50 *Socio-educational Services Manager*, LM-57 *Adult Education and Life-Long Learning* and LM-85 *Pedagogic Management*), especially in the LM-50 which is focused on childcare (Figure 2). In the AY 2018-2019, 92.8% of enrolled students were females. LM-57 seems to be less feminised (87.8% of females), perhaps because this learning path – addressed to professional training with adult learners – seems more appealing to men.

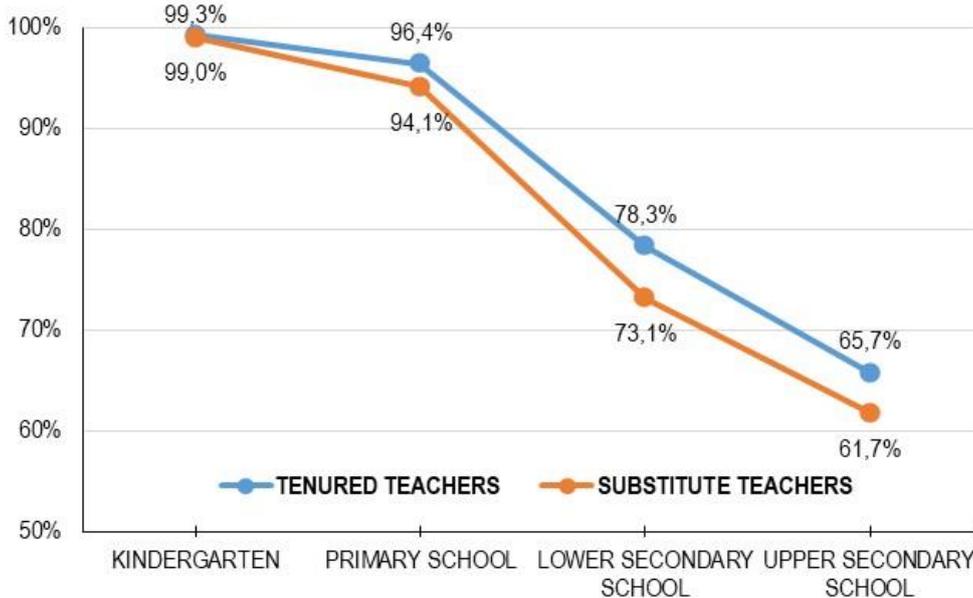
FIGURE 2. *Percentage of women enrolled in master's degrees LM-50 in Socio-educational Services Manager, LM-57 in Adult Education and Life-Long Learning and LM-85 in Pedagogic Management. AY 2010-2011 to AY 2018-2019*



Source: our analysis on Secondary Education Data Portal – Ministry of Education

Furthermore, the distribution of in-service teachers by sex in all types and grades of school is an indicator of strong gender segregation in tertiary education in Italy. Here the feminization of the teaching profession is a structural phenomenon. The proportion of women is similar throughout the country (Colombo, 2017) and has increased consistently since the 1950s (Argentin, 2018). At all levels of education, there are more female

FIGURE 3. *Percentage of female teachers in each school level. SY 2017-2018*



Source: our analysis on Secondary Education Data Portal – Ministry of Education

teachers than males, but the gender gap is smaller in secondary than in primary education (Fondazione Agnelli, 2009). Additionally, the

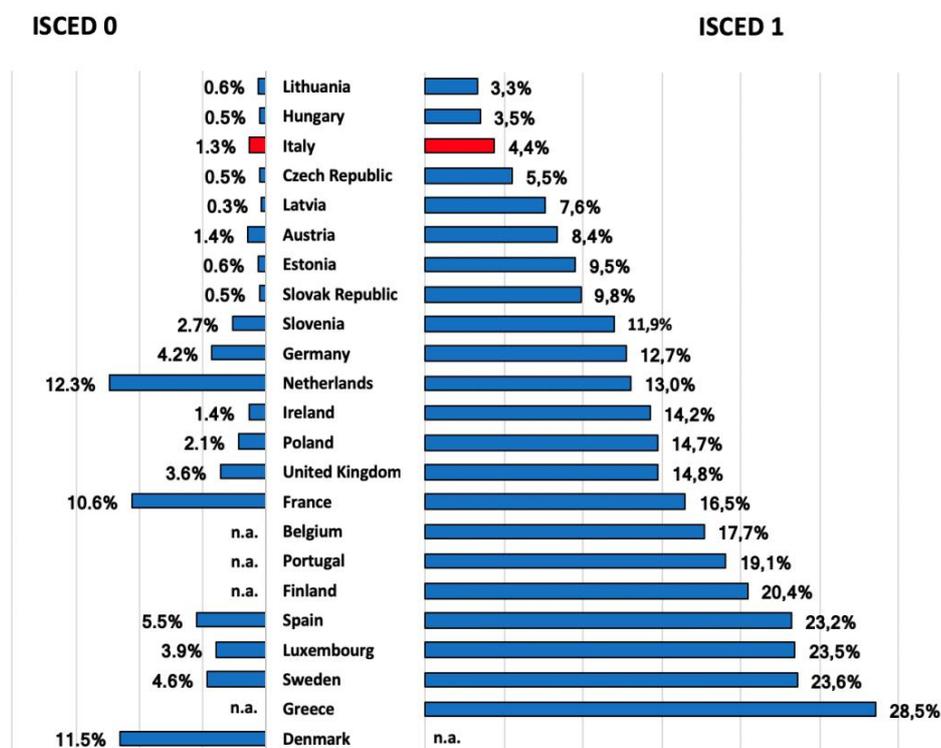
percentage of male teachers is higher at technical and vocational schools than in lyceums (men seem to prefer to teach professional subjects more than women). At university, where there are higher salaries and greater prestige, the ratio reverses (Guerrini, 2015).

In the school year (from now on: SY) 2017-2018 (Figure 3), around 82% of teachers were women, with a female monopoly in kindergarten (99.3%) and primary school (96.1%), and a bulk incidence in lower secondary (77.2%) and upper secondary schools (65%).

The feminization of teaching is not peculiar to Italy; it can be found across all Western countries (Sugg, 1978; Warren, 1989; Dei, 2012), OECD countries (OECD, 2017) and in European Union members (EU-RYDICE, 2015), who all display similar features to Italy (e.g. the increasing female ratio in the last decades and the decreasing gap as the school level rises). However, among all EU countries, the Italian case deserves special attention, above all with regards to pre-primary (ISCED 0) and primary education (ISCED 1) (Figure 4). In ISCED 0 (infant schools), the percentage of male teachers varies from 0.3% in Latvia to 12.3% in Netherlands; Italy is amongst those with the lowest percentage of male teachers (1.3%). In ISCED 1 (primary schools), the range is from 3.3% in Lithuania up to 28.5% in Greece; Italy is similar to Lithuania: 4.4%.

This data shows that in every country, men avoid choosing the teaching profession, which is likely a result of the factors mentioned above: the fact that teaching is viewed as principally about caregiving, the lack of social prestige, lack of career opportunities, and low salary.

FIGURE 4. Percentage of male teachers in 23 EU countries* in ISCED 0-1. Year 2017



Source: our analysis on OECD.Stat data. *For unmentioned EU countries, data was not available

It is important to understand whether men's professional motivations are similar or different to women's and whether they are influenced by gender. In 2009, Fondazione Agnelli (2019) reported on the newly-hired Italian teachers in the SY 2007-2008; the survey highlighted that around 80% of those who took part reported that the choice of becoming a teacher derived from a sense of vocation and from the pursuit for personal fulfilment rather than from the need to have time to fulfil other responsibilities (mainly in the family), from the desire to make a career, or from casualty¹.

Moreover, the third IARD survey on a probabilistic sample of Italian in-service teachers dedicated a part of the questionnaire to this topic. The emerging picture is similar: for the whole test sample, the reasons for becoming a teacher mainly derive from "the calling" rather than from instrumental motivations or from causal motives. It also showed that there is no solid difference between male and female teachers in relation to instrumental motivations, but women and younger teachers (of both gender) tend to highlight the vocation of this profession (Argentin, 2010); in addition, causal motives are more common among male teachers, especially among the ones who teach a scientific or a technical-applicative school subject.

Thanks to a specific question included in an INVALSI (National Institute for the Evaluation of the Education and Training Educational System) questionnaire (SY 2017-2018)² addressed to maths and literature teachers in Italy, we know more about the motives underlying their professional choice (8,924 teachers, from primary to upper secondary school, were surveyed, of whom 1,168 were men and 7,757 women). The question was: "It is not easy to describe in a few words the path to become a teacher. Which of these statements is the most suitable to summarize your decision to follow this career path? Please select only one answer".

The most frequent answers were: vocational reasons (38.7%); the pleasure of teaching (30.6%); and the desire to improve society (9.8%). Instead the "instrumental and casual items" were chosen less frequently: accidental motivations (6.7%), coincidence (4.7%), and economic reasons (6.8%). It is possible to group these responses into categories, according to the kind of motivation that they express: *i*) passion and vocation; *ii*) chance or coincidence, *iii*) the best choice among possible options; *iv*) reconciliation with other commitments; *v*) family tradition; *vi*) the sole job opportunity.

We focused our analysis on the first and second type of motivations (passion and vocation; chance and coincidence) as they are the most popular (Table 1). More women than men express a vocational motivation (+15.5 percentage points) and, inversely, more men became teachers for accidental reasons (+8.5 percentage points).

¹ Unfortunately, in the survey by Fondazione Agnelli data are not split among male and female respondents.

² The questionnaire is administered to literature and maths teachers in Italy, whose classes were selected for the national INVALSI sample; its aim was to collect information regarding teachers' attitudes toward standardized tests and other teaching tools.

TABLE 1. *Italian teachers surveyed by INVALSI. Aggregated items for the question Which of these statements is the most suitable to summarize your decision to follow this career path?, by gender and school levels. SY 2017-2018*

	Primary	Lower Secondary	Upper Secondary	Men	Women
Passion and vocation	86.2%	71.4%	75.5%	65.6%	81.1%
Chance and coincidence	8.7%	16.2%	11.7%	18.8%	10.3%
Best choice among options	2.1%	7.3%	6.7%	8.2%	4.4%
Reconciliation with commitments	0.7%	1.9%	3.4%	4.0%	1.6%
Family tradition	2.0%	1.7%	1.7%	1.9%	1.8%
Sole job opportunity	0.4%	1.5%	1.0%	1.5%	0.8%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%

Source: our analysis on INVALSI data

Primary school teachers are mainly motivated by passion and vocational reasons (86.2%) whereas this is far less the case for teachers at lower secondary schools (71.4%). Respondents who opted for motives of chance and coincidence are more frequent among teachers at lower (16.2%) and upper secondary school (11.7%). Lastly, we wondered whether these patterns might signal discontinuity with the past, and thus whether motivations vary by the age of female and male teachers (Table 2) and found that vocational motivation is more widespread among younger male cohorts and less among older ones; while for female teachers there are no significant differences.

TABLE 2 – *Aggregated items for the question Which of these statements is the most suitable to summarize your decision to follow this career path?, by age cohort and gender. Percentages SY 2017-2018*

	under 45		46-50		51-55		56-60		61 and over	
	M	F	M	F	M	F	M	F	M	F
Passion and vocation	74.0	82.0	69.6	79.9	66.3	81.7	60.5	80.4	54.1	81.2
Chance - coincidence	13.3	9.2	14.2	11.4	23.5	10.8	22.0	10.5	23.6	10.2
Best choice among options	6.6	4.7	6.8	4.5	4.6	3.5	12.5	4.6	11.0	4.4
Reconciliation with commitments	2.7	1.7	3.4	1.7	2.0	0.6	3.5	1.7	8.5	2.3
Family tradition	2.1	1.6	3.4	1.7	2.0	2.7	1.0	1.9	1.2	1.3
Sole job opportunity	1.3	0.8	2.7	0.9	1.5	0.8	0.5	0.9	1.6	0.6
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: our analysis on INVALSI data

Data from INVALSI questionnaire do not indicate what female and male teachers mean by “vocational choice” or “accidental choice” or “best choice”. As mentioned in § 2, qualitative research has highlighted that males who decide to have a career in a feminized workforce tend to be more aware and engaged than females or – on the basis of a similar motivations – to show a higher degree of reflexivity than females because they go beyond gender boundaries with their choice (Cross, Bagihole, 2002; Biemmi, Leonelli, 2018). However, there are some male teachers

who emphasized that their choice was driven by an accidental reason, by a lack of other job opportunities, or because they considered it the best channel to pursue their goals (Gherardi, Poggio, 2003).

4. GENDERED VISIONS: WOMEN AND MEN IN PRIMARY SCHOOLS AND CHILDCARE SERVICES

An explorative enquiry was carried out in Autumn 2019 to reconstruct the gendered visions of women and men engaged or employed in primary/infant schools and childcare services. We conducted semi-structured interviews with a sample of 24 interviewees (12 men and 12 women), including student teachers and student educators enrolled in the Faculty of Education, teachers in primary schools and consultants in educational services. The respondents were asked to describe the gender imbalance in the current landscape of education and to imagine a new situation of education, in which men and women would be more balanced. The recruitment was carried out on a non-probabilistic base (snowball selection) in Southern Italy (Apulia). Both the male and female sub-samples respectively were made up of three students in LT-19 *Educational Science*, five in-service teachers, two in-service educators, one in-service pedagogical consultant, and one student in LM-85 *Pedagogic Management*. On average, female respondents were 30 years old and male respondents 32 years old.

The interview tool contained 16 questions divided into five sections: professional choice and motivations, care jobs and gender identity, degree of personal satisfaction at work, career opportunities, opinion on the present gender imbalance and visions of the future³. We sum up research findings in three blocks: *i*) the ways women and men experience their profession; *ii*) their opinions about the gender imbalance; *iii*) female hegemony in education.

i) The ways women and men live their profession. As regards *professional motivation*, many interviewees (22 out of 24) mention a “passion for education”. Those who preparing for the teaching profession (or who are already in-service) motivated also by an “inter-generational continuity” (i.e. their parents or other relatives were teachers as well). Even those who are training for or already performing the job are influenced by the memory of a positive model among their teachers during secondary school or university. Thus, vocational choices and the reproduction of positive models are key this choice of profession for both men and women.

Both samples agree that caregiving is the main content of the educational job. Men and women feel themselves to be particularly devoted to children and ready to take care of them.

³ The field research was limited to a single area located in the southern Italy (Foggia and its province); notwithstanding the fact that the training and coursework paths are similar throughout Italy, the particular location might have affected results in terms of negative impact (on the interviewees), of more widespread unemployment.

Another common point is the high level of professional satisfaction and the high expectations of self-realization and improvement during career. Only two young men voiced dissatisfaction, one of whom cited low wages as factor:

I cannot say I am fully happy with my job, and this is not because of the teens (they are not guilty of that) but because of the organization in which I work. They do not totally accept me I often feel like a fish out of water, I cannot be as influential as I would like, and I think my job is not well remunerated ... this also matters! (Int. #13, man, in-service educator).

Both samples tend to neglect the gender issue in education. Some women think that education is a vocational choice, regardless of gender:

Maybe if I were a boy, and I had looked at the world from a male perspective, I would have chosen to become educator as well (Int. #20, woman, in-service pedagogic consultant).

Other women argue that childcare is up to women because they have the “maternal instinct”; they are presumed to be more appropriate than men and better than to them in all care activities.

The masculine sample confirms that men are slightly aware that their choice of job goes against contemporary stereotypes. Some do not mind if the rest of society judge their occupation negatively:

I got into the habit of being among girls and I don't think that being a man can become a burden for me (Int. #9, man, in-service educator).

Some other men claim their right to step out of line:

I feel called and prepared to this profession. Who has the right to impede me? Where are the equal rights of the Italian Constitution? (Int. #7, male, student educator).

Although many criticized my decision, I feel good, I feel I am a special person because I have challenged prejudices and gender stereotypes... (Int. #11, male, in-service primary teacher).

Hence men appear to be more open-minded than women in dealing with gender stereotypes in education. None of the men we interviewed mentioned the biological differences or the maternal instinct. They all responded that men working in education are “special”, “proud”, “outstanding” and “sensitive” people.

Moreover, the majority of women agree with this profile of the men engaged in educational jobs, and they share with men the perception that they are denigrated (or simply misunderstood) by those outside the sector. For example, girls enrolled in the Faculty of Education are often accused of attending an easy course of study, called with disdain the “university of afternoon snacks”. As a result, both women and men feel that their profession is in line with their personality and intimate aspirations.

Apart from the intrinsic motivation, some men report experiences of distress and a sense of being oppressed within the feminine environment of a school or a childcare service, because they are the minority and perceive to be discriminated against by women.

I suffered discrimination by women; they said to me: “You will not be good as a father at taking care of your children!” I replied: “How can I be discriminated now. I am still young, and so far, I have not had the chance to show my capabilities!” (Int. #7, male, educator student).

I was sure that in a service for young children I would never find a job! (Int. #13, male, in-service educator)

There is some gender parity at a formal and professional level, but at a deeper level, when we deal with feelings and conscience, we are a minority, so we are discriminated against. Men dominate jobs that are based on resistance and muscle power, but they cannot take care of others; in this case, they are seen as inferior to women (Int. #21, male, in-service primary teacher).

Being a man makes me feel discriminated against when I think that I cannot exchange things with other men as colleagues (Int. #22, in-service primary teacher).

One of the most negative consequence of being a minority is denounced by women and confirmed by some men: male educators and teachers are often belittled or disregarded by parents, especially by mothers.

I have seen in some cases that parents were suspicious towards male educators or teachers; but in my case, it has never happened (Int. #5, female, pre-service primary school teacher).

I feel surprised when (men) are undervalued by parents.... I guess it happens because some mothers look at these men in the classroom and implicitly see her husband or partner in them, and it is not a good thing (Int. #15, female, in-service educator).

My difficulty was when parents realized that the educator was a man, and often it happened that they wanted a woman. They did not ask about my competence or my education, nothing. They only wanted a woman and not a man (Int. #18, male, in-service primary school teacher).

ii) Opinions about the gender imbalance. Both women and men replied to the question: *How do you feel about the fact that in your school (or kindergarten) women are by far the majority?* There were a variety of different responses to this question. On the one hand, women mostly deny feeling distressed by the gender imbalance (8 out of 12). Only four female interviewees report that women—in the absence of competition from men—emphasize competition amongst women. On the other hand, 5 of the 12 male interviewees do not agree that gender balance in education has negative consequences and report that they feel content with the situation and appreciated by their female colleagues:

It is a real pleasure to work among women. I can be in harmony with them. Women are available, creative, gentle and friendly...On the contrary, when I worked with men, I felt that they were less empathic and engaged than women, and too self-centred (Int. #23, male, in-service primary school teacher).

However, there are also men (6 out of 12) who consider the same female attitudes as sources of distress and misunderstanding and feel that it is difficult to relate to women in primary schools.

I often came across female colleagues who misunderstood my words or requests for information. Some of them even supposed that I was flirting with them! (Int. #18, male, in-service primary school teacher).

One male educator thinks that the gender imbalance itself brings about misunderstanding and ambiguity in the professional relations. Due to their minority status, men are sometimes too protected and pampered by women, and only women have the power to decide if they want to cooperate with men, not the contrary.

There are women who recognize my professional competence, but there are also those who perceive a masculine presence in the school setting as an impediment for them, as if it were an interference (Int. #17, male, in-service primary school teacher).

Women sometimes look at men with surprise, and they make me feel strange, but I think that it depends also on me, on my capacity to receive their gaze with a good spirit. Very often, even if they joke with me, I choose to accept it as a bit of fun...And very often I am able to use their joking to my advantage (Int. #19, male, in-service educator).

iii) In order to explore the female hegemony, we asked women: *What do you think about men who work in education?* and men: *How do you think women see men who work in education?* Among women, only three (out of 12) explicitly declared that men are not devoted to (and prepared for) childcare; the majority of women recognizes that men working in education are mainly sensitive and reliable and appreciates their non-conformism. Thus, the majority of both women and men consider the masculine presence in education as an added value (and this is far from confirming the female hegemony hypothesis). Besides, when they envision a possible future, in which men are equivalent in number to women in education, they have a clear positive attitude and wish it would really happen. If the former results are in contradiction with the hypothesis of female hegemony, however, we noted some signs of a gendered closure on the women's side, which might refer to an ongoing process of hegemonization, mostly unintentional, which needs to be further explored. For example, when some women talk about how men address their female colleagues, they say that some men behave with the well-known attitude of 'masculine superiority,' both tacit and explicit; and this is uncomfortable for women who want to counteract these attitudes with defensive responses.

Unfortunately, sometimes (not always) men adopt their typical attitude of superiority. I mean, when they suggest or say that they are very good at working and imply that women are not (Int. #20, female, in-service pedagogical consultant).

On the male side, there are those who claim that women deal with male colleagues in an ambivalent manner, because they accept or wish for the masculine presence while refusing to compete with men on an equal basis:

In my institute, I always noticed among the women a strong antagonism toward the psychologist, no matter if it were a man or woman; they compete with this consultant because they want to play the same role and substitute the therapist (Int. #12, male, in-service pedagogical consultant).

As a male educator in my school, they assign me the worst cases (e.g. pupils with severe disabilities), but I would also prefer working with less severe cases and teaching more for the entire class. However, since I am male they attribute to me the strongest case (Int. #13, male, in-service educator).

In conclusion, even if subtle and mainly unacknowledged, this ambivalence exists and it manifests itself clearly, as for a young female student teacher who says:

Women are still mistrustful towards men. Maybe they have interiorized the typical idea that caregiving is the domain of women and that men are not good at it. But we all (women included) need to overcome this kind of terrible prejudice and mental barrier (Int. #5, female, student teacher).

CONCLUDING REMARKS

This work has analysed if (and how) there is a gender imbalance among educational professionals in Italy, as we assist to an almost exclusive presence of women to the detriment of men. We have also explored how the Antonio Gramsci's concept of hegemony applies to the female predominance in educational contexts. Considering the outcomes emerged from the data here presented, three topics can be pointed out.

Firstly, there are many similarities between the ways males and females think about, choose and perform their jobs in the educational field. They both believe professional motivations are mainly due to passion and vocation (especially at primary school), even if on average men tend to choose this job more frequently than women for accidental reasons or reasons of convenience. Younger men tend to choose an educational career based on vocation, and we assumed this as a meaningful cultural change. Further studies on the changing masculinity could develop this issue more in depth.

Secondly, although we noticed a common trend in denying gender-related issues and minimizing the gender imbalance in education, young women affirmed more frequently than men the stereotype according to which females are more naturally inclined to the caring professions (Bolton, Muzio, 2008). However, overall, both men and women are more in favour than against the male presence in education.

Finally, the findings indicate that males remark some negative aspects of belonging to a minority. It can occur that they feel devalued or ignored by parents and also seen with distrust (Priegert Coulter, McNay, 1993); from within the institution, some female colleagues misunderstand the professional relationship with men, sometimes because of envy or fear of competition. In conclusion, the results of this study suggest that, even though none of the male respondents made direct reference to "female hegemony", at least half of them commented on personal incidents of discrimination; in addition, men refer to a sort of ambivalence and ambiguity in the way that women tend to interact with them. On the part of

women, a few of them consider men, because of a sort of mental barrier that limits them. This information allows us to partly confirm the hypothesis of female hegemony; but the limited sample (in numbers and territorial distribution) considered by this study pushes us to go further in the exploration of it.

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4 *Gender Differences in Higher Education Choices. Italian Girls in the Corner?*

Marco Romito, Tiziano Gerosa, Martina Visentin and Giulia Maria Cavaletto

INTRODUCTION

In recent decades, many scholars have argued that youth transitions have become more complex, heterogeneous, and fragmented in most developed countries (France, 2016). The body of research they generated has shown, however, that factors pertaining to young people's identities and ascribed membership still play an important part in structuring their horizons of actions and transition choices (Struffolino, Borgna 2020). Gender is a key aspect of differentiation and inequality, with an enormous impact on young people's trajectories in their education and occupations (Benadusi et al., 2009). We here focus on the transition from school to higher education, which crucially influences an individual's working opportunities and social standing in adult life (Bobbitt-Zeher, 2007). We review the literature on this subject and examine the Italian case, using data from the Italian Institute of Statistics (Istituto Nazionale di Statistica - ISTAT) to show how gender inequalities have been reconfigured today as an issue of unequal access to specific fields of study. We discuss policies to address the gender gap in higher education, focusing on the role that schools and guidance services can have in reducing this divide.

Since the end of World War II, western countries have witnessed a massive expansion in their education systems, particularly involving upper secondary and tertiary education (Marginson, 2016). In most countries in the global North, nearly one in two young people have access to tertiary education, and an even larger proportion of students successfully complete their secondary education (Trow, 2006). This massive growth in academic participation has especially concerned women, who still faced severe limitations in the field of education at the beginning of the 20th century. Female students generally have better examination grades than males and, in most countries, women do better academically than men, but that does not mean that gender equality has been achieved (Buchmann et al., 2008; OECD, 2019).

Concerns have emerged regarding the role of gender in access to specific fields of education (Hendley, Charles, 2015). This is very important

as it helps to explain gender inequality in the labor market and in income levels (Bobbitt-Zeher, 2007). Research has fully demonstrated that strong gender differences exist, shaped along a humanistic–scientific divide, with females under-represented in STEM-related areas (Gerber, Cheung, 2008; Jacobs, 1996). Such findings show a remarkable stability across different countries revealing the persistent structural forces underlying gender segregation (Van De Werfhorst, 2017). The debate on this issue has focused mainly on the problem of female under-representation in some areas of study (and consequently in the related job markets), but there have also been calls for reflection and intervention to deal with the stereotypes influencing males' choices (Stoet, Geary, 2018).

Examining the processes that give rise to gender-related differences in higher education trajectories is clearly important, not only to advance our sociological understanding, but also - and more meaningfully - to identify measures and action to enhance equity in education, in the labor market, and in society as a whole. This understanding provides the necessary backdrop to the gender-sensitive lifelong guidance practices that we discuss in this chapter.

In the following sections, we first outline the main theoretical framework used in sociological research to explain gender-driven differences in choices of university course. Then, we use data from ISTAT to identify and measure the effect of gender on students' choice of university course in Italy. We conclude with a critical reflection on the topic of guidance policies to enhance gender equity in students' decisions regarding their higher education in Italy.

2. GENDER SEGREGATION IN HIGHER EDUCATION

According to OECD (2019) data, many countries around the globe have witnessed a meaningful increase in female participation in tertiary education. The analysis of long-term trends shows a significant increase in the numbers of female students in several fields of study once dominated by men (Triventi, 2010). This has not necessarily coincided with a reduction in gender inequalities, however. When we look at disciplines such as the hard sciences, engineering or computer science, and compare the share graduates across men and women, the gender gap has shown no sign of shrinking (Barone, 2011). Even when younger cohorts of students are considered, there have been fewer signs of change in females' probabilities to enrol in scientific or technical fields of study (De Vita, Giancola, 2017). Emphasizing the need to move beyond treating STEM as a homogeneous field and looking at differences between STEM disciplines may shed light on more complex ways in which inequalities persist in a context of expanding educational opportunities. It has been pointed out that the humanistic-scientific divide does not tell the whole story about gender segregation: there is also evidence of gender unbalance within the

humanities or sciences, which reveals an opposition between care and technical fields that needs to be addressed (Barone, 2011).

The sociological literature points to two major theoretical sensibilities applied to the study of gender differences in higher education. One assumes that people's choices are cognitive and rational processes completed by individuals dealing with specific representations of their opportunity-cost structure (Udehn, 2001). The other sees choices as the outcome of embodied cultural dispositions constructed by dominant representations and gender ideologies and through social interaction within everyday life contexts (Bourdieu, 1994; Davis, Greenstein, 2009). A rigorous testing of these theories goes beyond the scope of this chapter, but it may be useful to give a brief account of them because they can help us interpret the data presented in the next section. They can also support some of our considerations on the potential role of institutions in reducing gender differences in individuals' study choices.

Setting aside the outdated approaches based on the assumption of innate differences that predisposed men and women to embark on different careers, many scholars have so far drawn on theories of rational choice and preference (Breen, 2001). According to rational choice theory, individuals orient their educational trajectories toward options that increase their chances of success (Breen, Goldthorpe, 1997). As girls outperform boys in literary or humanist disciplines, they choose fields of studies for their higher education in which they can exploit this comparative advantage (Jonsson, 1999; Vaarmets, 2018). Moreover, according to preference theory, women opt for fields of study with lower career and income prospects because they are aiming for occupations that afford a good family-work balance (Hakim, 2006).

Rational choice and preference theories have both been widely tested, and the hypotheses drawn from these theories seem untenable (Barone, Assirelli, 2020). First of all, male and female students perform very similarly in math and sciences in many western countries (Vaarmets, 2018), and this would suggest that differences in choice of higher education cannot be explained by gender divides previous school performance (Morgan et al., 2013). Second, studies have shown that needing to strike a good work-family balance carried little weight on young girls' educational and occupational preferences and aspirations which have narrowed in recent years (Bobbitt-Zeher, 2007; Hakim, 2006; Konrad et al., 2000).

A different theoretical approach to explaining gender differences in educational choices focuses on the cultural dynamics in which educational preferences emerge, and the perpetuation of gender stereotypes in society at large (Bourdieu, 2001; Davis, Greenstein, 2009). Girls would develop a preference for subjects and fields of study characterized by a closer proximity to their traditional reproductive role in society, focused on the domestic realm and care occupations (Charles, Bradley, 2009; Di-Prete, Buchmann, 2013) This interpretation has been supported by studies showing that girls opt for fields of study that lead to care occupations due to an "expressive" motivation (Barone, Assirelli, 2020; Morgan et al., 2013). This seem to support the idea that gender segregation in higher education is based both on a sense of affinity for certain subjects, through which students construct socially legitimate female or male selves at

school, and on social expectations associated with normative conceptions of femininity and masculinity (Connell, 2005).

Scholars have also emphasized, however, that embodied dispositions and internalized gendered preferences need to be constantly secured and reiterated through some form of external pressure or social control mechanism (Eccles, Jacobs, 1986; Jacobs, 2005). It is worth mentioning that research has also looked at the part played by institutions, teachers and school counsellors in enforcing gender norms (Barone et al., 2019; Cheryan, Plaut, 2010; Gunderson et al., 2012). Our data suggest that institutions (teachers, counsellors or career orientation experts) have space for intervention and can be mobilized to deconstruct gender norms - or at least mitigate their effect on career choices. We will argue that lifelong guidance services, whose importance is currently emphasized by EU and national policies, can play a key – although neglected – role in reducing gender segregation.

3. GENDER-BASED INEQUALITIES IN ITALIAN TERTIARY EDUCATION. BEYOND RATIONAL EXPLANATIONS FOR STUDENTS' CHOICES

In this section, we use data collected by ISTAT to investigate the nationwide persistence of gender inequalities in access to tertiary education and the choice of field of study. We look at the educational trajectories of students leaving Italian upper secondary school, in the light of their previous school experience and personal preferences. The survey was conducted in 2015 on a nationally representative sample of 26,235 individuals who had obtained their high-school diploma four years before (2011). Participants were invited to complete a questionnaire collecting information about their socio-demographic characteristics, past educational experience, and post-secondary transitions. The descriptive statistics of the sample are given in Table 1.

We first investigate gender inequalities in access to tertiary education, looking at the overall differences in enrolment rates for males and females, and at the mediating role of different types of secondary school program, academic performance, and personal preferences (Table 2). A baseline logistic regression model was estimated on the overall sample (Model 1), with students' enrolment at university within four years after graduation predicted by gender and a set of family-level covariates, including citizenship (Italian vs foreign), parents' educational level (considering the better-educated of the two, based on the dominance criterion), and social class (according to the EGP 3-class typology: working class, intermediate class, salariat). The results of our analysis show that, after controlling for citizenship and family resources, females are 15% more likely to enrol at university than males.

TABLE 1. *Descriptive statistics of the sample*

Variable	Mean (SD)	Frequency (%)
<i>Socio-demographic characteristics</i>		
Gender: female		14,520 (55.4)
Citizenship: Italian		25,547 (97.4)
Family education level		
up to middle school diploma		8,438 (32.2)
high school diploma		12,346 (47.1)
university degree or higher		3,782 (14.4)
not stated		1,669 (6.4)
Social class (EGP)		
working class		15,131 (57.7)
intermediate class		7,784 (29.7)
salarial		1,821 (6.9)
not stated		1,499 (5.7)
<i>Secondary school experience</i>		
Type of school		
scientific high school (lyceum)		3,786 (14.4)
other high school (lyceum)		2,148 (8.9)
teacher-training school		3,582 (13.7)
art school		2,310 (8.8)
technical school		5,641 (21.5)
vocational school		8,631 (32.9)
not stated		137 (0.5)
Private/State-run school management: State-run		24,965 (95.2)
Final high-school grade	75.6 (11.5)	
Switching courses during high school		3,578 (13.4)
Repeated at least one school year		5,692 (21.7)
Conditional advancements		12,855 (49.0)
<i>Tertiary education</i>		
Personal preferences after diploma		
to enroll at university		13,430 (51.2)
to enter the labor market/professional training		10,599 (40.4)
no idea		2,206 (8.4)
Reasons for choosing course of study		
interest in the discipline		7,402 (28.2)
better job opportunities		5,616 (21.4)
other reasons		601 (2.3)
no further studies		12,616 (48.1)
Course of study		
Architecture		659 (2.5)
Economics and Statistics		1,751 (6.7)
Law		1,072 (4.1)
Engineering and Sciences		2,343 (8.9)
Teaching		631 (2.4)
Literature and Languages		2,310 (8.8)
Medicine		1,729 (6.6)
Political and Social Sciences		1,106 (4.2)
Psychology		856 (3.3)
other courses of study		1,162 (4.4)
no further studies		12,616 (48.1)

To explore the variables and mechanisms behind this gap, we proceed with an estimation of a set of additional logistic regressions, introducing other three sets of covariates. The former group (Model 2) includes past educational choices (type of school and whether it was private or State-run), the second group (Models 3) focuses on past school performance (final grade, changing course of studies as a proxy for a fragmented educational path, and having to repeat at least one school year) and the third group (Model 4) deals with personal preferences for after completing

secondary school (to attend a professional training course, to enter the labour market, no idea, to enrol at university).

TABLE 2. *Logistic regression model on University enrollment: predicted probabilities*

VARIABLES	University enrollment			
	Model 1	Model 2	Model 3	Model 4
Gender (ref. Male)				
female	0.155*** (0.006)	0.068*** (0.006)	0.037*** (0.006)	0.004 (0.005)
Citizenship (ref. Italian)				
foreign	-0.069*** (0.021)	0.059*** (0.017)	0.069*** (0.016)	0.020 (0.013)
Family education level (ref. up to middle-school diploma)				
high-school diploma	0.213*** (0.007)	0.108*** (0.006)	0.091*** (0.006)	0.052*** (0.005)
university degree or higher	0.435*** (0.009)	0.225*** (0.010)	0.195*** (0.010)	0.101*** (0.008)
Social class (ref. working class)				
intermediate class	0.052*** (0.007)	0.015** (0.006)	0.009 (0.006)	0.005 (0.005)
salariat	0.091*** (0.013)	0.041*** (0.012)	0.029*** (0.011)	0.013 (0.009)
Type of school (ref. scientific high school)				
other high school		-0.021** (0.009)	-0.034*** (0.010)	-0.034** (0.014)
teacher-training school		-0.176*** (0.010)	-0.170*** (0.010)	-0.107*** (0.011)
art school		-0.498*** (0.012)	-0.486*** (0.011)	-0.331*** (0.012)
technical school		-0.409*** (0.009)	-0.391*** (0.009)	-0.166*** (0.011)
vocational school		-0.659*** (0.008)	-0.625*** (0.008)	-0.304*** (0.012)
Private/State-run school management (ref. private)				
State-run		0.091*** (0.013)	0.057*** (0.012)	0.032*** (0.010)
Final high-school grade			0.008*** (0.000)	0.004*** (0.000)
Changing course of studies (ref. no)				
yes			0.051*** (0.008)	0.025*** (0.006)
Repeated at least one school year (ref. no)				
yes			-0.063*** (0.007)	-0.030*** (0.006)
Conditional advancement (ref. no)				
yes			-0.008 (0.006)	-0.008* (0.005)
Personal preferences (ref. to enroll at university)				
enter labor market/professional training				-0.563*** (0.008)
no idea				-0.255*** (0.010)
Observations	23,533	23,533	23,533	23,533

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Model 2 shows that respondents' chosen type of secondary school was significantly associated with their likelihood of going on to university: students attending art, technical and vocational schools were 50-66% less likely to go to university than those attending scientific high schools (our reference category). Adding such covariates to the model significantly

contributes to reducing the gender gap in university enrolments, with girls lowering their advantage by about 8%.

The introduction of the second set of covariates in the model (Model 3) contributes to a further reduction in female advantage in enrolment rates, with girls retaining a less than 4% greater access to university after controlling for previous educational choices and past school experience. The gender gap initially identified is further reduced, and no longer statistically significant, after controlling for students' personal preferences after obtaining their diploma (Model 4).

Overall, these results show that girls' initial advantage in university enrolment rates is wholly explained by their better school performance, and by the fact that girls tend to be more strongly represented at more academically oriented secondary schools. This finding seems to support the conviction that male and female students choose whether to go on to university based on a rational reasoning regarding their chances of success.

The picture changes, however, when we consider what subjects students choose to study at university. Looking at gender specific enrolment rates across disciplines⁴, we clearly found two opposite patterns in the choice of university courses. Indeed, females choose for STEM disciplines in the fields of engineering and sciences much less often than males, reporting a gross average difference about 17%. Conversely, and in line with previous research on gender segregation (Barone, 2011), females express clear preferences for humanities and social science disciplines specifically focused on education and caring, with advantages around 10% for literature and languages and 6% for psychology and teaching courses of study.

We then conducted an additional set of analyses on the subsample of respondents who decided to go to at university, modelling gender differences in the likelihood of enrolling to study STEM (engineering and sciences), as opposed to humanities and caring-oriented social sciences (literature and languages, psychology and teaching). The first column in Table 3 shows that being a girl reduces the probability of choosing a STEM course by 18%, irrespective of student's socio-demographic characteristics (Model 1). Adding the first set of covariates in the model (concerning the type of upper secondary school students choose after middle school) contributes to a consistent reduction of about 5% in the divide (Model 2). The gender segregation persists after controlling for past school performance (Model 3), and for personal reasons for choosing a given course of study (interest in the discipline or better job opportunities rather than other reasons) (Model 4). The final divide remains, with girls 14% less likely to choose a STEM course than boys.

Similar results, but tending in the opposite direction, emerge for students choosing to study social sciences and humanities, with girls retaining a 16% higher probability of doing so than boys, regardless of their previous school experience and personal motives.

⁴ Gender differences in enrolment rates by discipline (females compared to males): architecture = -1.1%; economics and statistics = -5.4%; law = 1.7%; engineering = -16.8%; teaching = 5.5%; literature and languages = 10.2%; medicine = 1.9%; political and social Sciences = 3.8%; psychology = 6.4%; sciences = -3.1%.

TABLE 3. *Logistic regression models on STEM or humanities enrollment: predicted probabilities*

VARIABLES	STEM				Social sciences and humanities			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Gender (ref. Male)								
female	-0.180*** (0.006)	-0.132*** (0.007)	-0.141*** (0.007)	-0.141*** (0.007)	0.235*** (0.008)	0.153*** (0.009)	0.161*** (0.009)	0.162*** (0.009)
Citizenship (ref. Italian)								
foreign	0.004 (0.024)	0.005 (0.024)	0.012 (0.024)	0.012 (0.024)	-0.106*** (0.030)	-0.078*** (0.029)	-0.080*** (0.029)	-0.078*** (0.029)
Family education level (ref. up to middle-school diploma)								
high-school degree	0.013 (0.008)	0.006 (0.008)	0.005 (0.008)	0.005 (0.008)	0.009 (0.010)	0.013 (0.009)	0.014 (0.009)	0.014 (0.009)
university degree or higher	0.011 (0.010)	0.003 (0.010)	-0.000 (0.010)	-0.000 (0.010)	-0.015 (0.012)	-0.011 (0.012)	-0.009 (0.012)	-0.008 (0.012)
Social class (ref. working class)								
intermediate class	0.010 (0.007)	0.007 (0.007)	0.005 (0.007)	0.005 (0.007)	-0.037*** (0.009)	-0.035*** (0.008)	-0.034*** (0.008)	-0.034*** (0.008)
salariat	0.008 (0.012)	0.006 (0.011)	0.002 (0.011)	0.002 (0.011)	-0.054*** (0.014)	-0.052*** (0.014)	-0.051*** (0.014)	-0.051*** (0.014)
Type of school (ref. scientific high school)								
other high school		-0.158*** (0.010)	-0.158*** (0.010)	-0.158*** (0.010)		0.198*** (0.013)	0.202*** (0.013)	0.202*** (0.013)
teacher-training school		-0.166*** (0.010)	-0.158*** (0.010)	-0.157*** (0.010)		0.251*** (0.012)	0.243*** (0.012)	0.243*** (0.012)
art school		-0.114*** (0.014)	-0.106*** (0.014)	-0.105*** (0.014)		0.177*** (0.017)	0.169*** (0.017)	0.166*** (0.017)
technical school		-0.024** (0.011)	-0.020* (0.011)	-0.019* (0.011)		0.002 (0.011)	-0.000 (0.011)	-0.004 (0.011)
vocational school		-0.121*** (0.011)	-0.113*** (0.012)	-0.112*** (0.012)		0.110*** (0.013)	0.103*** (0.013)	0.099*** (0.014)
Private/State-run school management (ref. private)								
State-run		0.064*** (0.016)	0.045*** (0.016)	0.045*** (0.016)		-0.062*** (0.016)	-0.051*** (0.017)	-0.050*** (0.016)
Final high-school grade								
			0.003*** (0.000)	0.003*** (0.000)			-0.001*** (0.000)	-0.001*** (0.000)
Changing course of studies (ref. no)								
yes			-0.024* (0.013)	-0.024* (0.013)			0.012 (0.013)	0.012 (0.013)
Repeated at least one school year (ref. no)								
yes			-0.018 (0.011)	-0.017 (0.011)			0.019 (0.013)	0.018 (0.013)
Conditional advancement (ref. no)								
yes			-0.006 (0.008)	-0.006 (0.008)			0.032*** (0.009)	0.031*** (0.009)
Reasons for choice of course of study (ref. interest in the discipline)								
better job opportunities				0.028* (0.015)				0.001 (0.015)
other reasons				0.030** (0.015)				0.060*** (0.015)
Observations	12,704	12,704	12,704		12,704	12,704	12,704	12,704

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

To sum up, two interesting outcomes emerged from the second stage of analysis. On the one hand, our findings suggest that secondary-school education programs have a meaningful influence on students' choices regarding their tertiary education. Female students mostly join secondary-

school programs in the fields of caring-oriented social sciences and humanities, and this seems to guide them, to some extent, towards university courses consistent with their previous studies. Although only a relatively small piece of gender segregation can be attributable to previous school choices, it should be underlined that, in our study, the mediating role played by high schools may have been underestimated by a lack of information on specific courses attended by participants.

Indeed, technical and vocational schools offer both STEM-oriented and service-oriented courses. Courses such as mechanics, electronics or information technology are mainly chosen by males, while other specializations areas such as tourism or fashion are characterized by a clear female prevalence. That is, relevant gender differences may have ended up being ruled out from our analyses because of this issue, reducing the predictive power of previous school choices on gender segregation in higher education.

Having said that, our results suggest that gender segregation in higher education is still at least partly related to the structure of the Italian secondary-school system, and, consequently, to the processes involved in students' choice of secondary school (Romito, 2016). On the other hand, given that a significant 14% gender divide in access to STEM courses persists even after controlling for previous study paths and school performance, our findings indicate that there are other gender-related mechanisms at work in school-to-university transitions. Our data do not allow us to explore these mechanisms in depth, but they may be related to persisting social pressures capable of reinforcing traditional gender identities and trajectories to some degree (DiPrete, Buchmann, 2013; Jacobs, 2005).

In the next paragraph we focus on guidance policies as one possible institutional response to gender segregation in higher education fields of study. Guidance policies and services are increasingly seen as spaces where setting up initiatives aimed at counteracting structural inequalities (Barone et al., 2019; Hooley et al., 2018). More strictly guidance policies can support fairer educational transition countering the weight of ascribed membership (such as gender) on students' decision-making.

4. LIFELONG GUIDANCE IN ITALY AND ELSEWHERE IN EUROPE

Evidence emerged in the previous section confirm the persistence of gender inequalities in the probability of enrolling in STEM and social sciences and humanities courses. Moreover, we found that these divides are at least partially mediated by high school choices. Echoing Sultana's words (2017), we believe that guidance policies could have an important role in reducing gender inequalities. This could serve both public goals, by establishing a better balance between the supply and demand of skills, and private goals, by helping to ensure that education, training and

employment are more fulfilling experiences for male and female citizens alike. In this section, we question some of the policies recommended in recent years to deal with the issue. Instead of describing all the documents and policies that have addressed the gender gap, we focus here only on the institutional efforts to support guidance policies in Europe and Italy.

The EU has been pushing for LifeLong Guidance (LLG) actions to promote a wider presence of women in schools, including the STEM sector since mid-2000s (Caprile et al. 2015). At EU level, the LLG is a shared political responsibility in all areas of education, employment, and youth policy. The European Lifelong Guidance Policy Network (ELGPN) was established in 2007 with the aim of assisting Member States and the European Commission in developing European cooperation on LLG in both education and employment.

The ELGPN has also had a significant impact on Italy's lifelong guidance and learning policies. It contributed to the delineation of the conceptual framework behind the Italian National Guidelines on Lifelong Guidance (MIUR, 2014), which aim to strengthen the coordination and cooperation between the various orientation practitioners involved in implementing guidance policies and services (ELGPN, 2015).

The *Guidelines* are well designed, and their approach is distinctly innovative, but some problematic elements remain. It is worth mentioning a few critical issues.

i) The *Guidelines* say nothing about how to find the necessary financial resources to start in-service training schemes for all teachers, and to pay for the tutor(s)' work commitment. The *Guidelines* are rich in ideas, but risk remaining no more than a planning document because it is unclear how the proposed actions can be given strength and continuity without the necessary funds. So, we may end up with a policy deprived of its innovative impetus.

ii) No attention is paid to the issue of promoting gender equity – in fact, the word “gender” never appears. It is only very recently that it has become clear that the whole guidance system should be approached from a gender perspective, and this has yet to become a commonly adopted stance (Biemmi, Leonelli, 2017). The *Guidelines* could have been very effective on this issue and could have helped to generate a system through which to address and combat gender inequalities, but it is of little use as a tool for supporting gender equality.

It is not surprising that if we look at guidance practices carried out by schools and universities within the Italian context there is little attention to the gender dimensions. More research is needed in this regard. However, it is fair to acknowledge a general lack of guidance interventions aimed highlighting and contrasting the role of gender stereotypes in the choices of higher education study fields. Among the more than five thousand upper secondary schools' sites available within the Italian territory, some good practices could be found. However, their emergence is related to the sensibility of individual school managers or teachers, to contingent opportunities and the contextual availability of the expertise network that is needed to enact meaningful and high-quality gender-sensible guidance projects. In terms of national policies and guidelines there is no attempt

to provide a systemic response to the issues at stake and a lacking provision of indications, resources, tools, and expertise to enact this type of interventions. Recent research supports our claims (Biasi et al., 2019) and a similar argument can be made concerning the role played by university institutions. If we look at one among the major instruments through which universities monitor and provide policy indications in the field of gender equity, the gender budget, we found the recognition of the persistence of study-field gender segregation but no indications about the role played by university guidance services and about intervention to counterbalance this trend.

5. CONCLUDING REMARKS

Gender segregation in higher education fields of today study constitute a relevant area of sociological investigation as well as space of policy intervention. We have reviewed the literature on this subject and analysed the Italian case, using data from ISTAT (Italian Institute of Statistics) to show how gender inequalities have been reconfigured today as an issue of unequal access to specific fields of study.

We found that gender counts in the probability to enrol to university after completing secondary education with female entering higher education significantly more than men. However, we have also found that gender differences disappear when students' type of secondary school programs and school performance are considered.

The picture change when we consider what subjects students choose to study at university. Our study has shown that there is significant gender difference across disciplines. In lines with previous research (Barone, 2011; De Vita, Giancola, 2017), we have found that gender differences are particularly strong for STEM disciplines such as engineering and sciences. Interestingly, previous school performance does not play any significant role in this respect, but we have found a significant although moderate effect played by the type of high school programs in which students obtained their secondary school certificate.

On the one hand, our findings suggest that previous transitions (from middle to high school) play a key role in producing gender differences in higher education choices. Female students mostly join secondary-school programs in the fields of humanities or caring-oriented social sciences, and this seems to guide them, to some extent, towards university courses consistent with their previous studies. This question the structure of the Italian high school system – which is rigidly tracked – and the gender-based mechanisms involved when students and families makes their high school decisions.

On the other hand, we suggest that other factors are at stake in reinforcing gender traditional gender trajectories which can be related to the realm of cultural and social control mechanisms (Jacobs, 2005; DiPrete, Buchmann, 2013). Recent studies have highlighted that gender

differences in university choices are meaningfully dependent on «expressive preferences» (Barone, Assirelli, 2020) suggesting that embodied dispositions and internalized gendered preferences are somehow reiterated and secured during the transition to university. Further research is needed to explore the processes involved in stabilizing traditional gender norms in university decision making. In this respect, we would claim that ethnographic and qualitative research methods can be decisive in showing the intersubjective dimension of higher education choices and the role played by families, schools, teachers, and peer networks.

In order to address gender inequalities in higher education, guidance policies and services are increasingly seen as relevant. We have analysed the main policies available at European and national level in the field of lifelong guidance to discuss if and how issues related to gender inequalities in educational trajectories are addressed. After decades where guidance practices were mostly framed by a neoliberal ideology and their aim narrowed to boost employability and economic growth, recent debates emphasize the need for guidance policies to promote social justice (Sultana, 2017; Bimrose et al., 2019; Hooley et al., 2018; Hooley et al., 2019). In this light, guidance services are seen as spaces where to counteract structural inequalities and as instrument to support fairer learning and working transitions. Our discussion has highlighted that that EU have played a central role in supporting a productive cooperation among EU members to develop guidance policies. However, two issues are worth pointing out. First. The open method of coordination adopted by the EU in this field leaves EU members the freedom to translate policy indications in various ways. This has led to the risk of fragmenting lifelong guidance policies across the EU. Second. Beside very broad references to favouring equity of access to guidance services, the EU framing of lifelong guidance policies has been so far characterized by a strong reference to concepts such as employability and learning flexibility. The Italian guidelines for lifelong guidance issued in 2014 represent a national translation of the European policy discourse in this field which underestimate the role that guidance practices can play to favour equity in education and working transitions.

If the issue of gender segregation in higher education fields of study has to be taken seriously, there is the need to acknowledge the complex mechanisms through which traditional gender norms are secured and reiterated when boys and girls face key transitions. Our findings align with previous research showing that middle-to-high school transition and school-to-university transition constitute key spaces where institutions could set up gender-sensitive intervention. In this respect, we believe that a lifelong guidance approach aimed at expanding boys' and girls' horizons of action, at promoting fairer transition, at deconstructing gender norms can be pivotal in coordinating the often fragmented initiatives enacted so far within and outside the education field.

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5
***Gender Differences in Tertiary
Educational Attainment and the
Intergenerational Transmission
of Cultural Capital in Italy***

Luca Salmieri and Orazio Giancola

INTRODUCTION

The rapid rise in women's educational attainment is one of the most striking trends in statistics on education. Women's educational attainment has been increasing steadily in many industrialized countries since the Second World War and is now greater than that of men. Nowadays, women constitute a substantial majority of graduates in secondary and tertiary education in most EU countries. Considering recent trends in international data, it seems likely that female dominance in tertiary education may become even stronger in the decades to come (Roser, Ortiz-Ospina, 2016).

Women's extraordinary educational advancements appears to be the realization of what was once considered utopian, namely equality of access and treatment among girls and boys in all tracks and fields of education. To understand the factors enabling this shift we must briefly outline the historical evolution of the attributes of public education systems. Indeed, such systems have been designed and developed over the course of the XX and XXI centuries, an era in which states increasingly intervened in a universalist manner through the expansion of citizenship, civil rights and access to welfare and education. However universalist they were, yet, school systems throughout Europe have long been designed on the rationale of dividing pupils by social classes and gender, obliging families to send their children to separate educational institutions according to specific social and educational stratifications and gendered ethics.

In general, the most prestigious and elite of these institutions – the *Gymnasium* in Germany and *Lycée* in France, for example – were not open to girls until the end of the 19th century. Likewise, British public schools were mostly restricted to male students from the upper or middle classes (Goodman, Martin, 2004). The post-1944 British Education Act granted all children up to the age of fifteen the right to free

secondary education. Still, the modern secondary education program for girls was heavily domestically oriented and centred on the humanities, with only scant doses of science and technology. The English *Board of Education* persisted in denying coeducation for longer on the belief that mixed classrooms would have had a detrimental effect on boys (Spencer, 2005). Girls' secondary education in the UK was maintained predominantly as a single-sex institution until comprehensive schools became the rule during the Seventies. It was not until 1965 that the Labour government slowly began conducting a tour of local school authorities to collect suggestions and proposals for systemic reform with the aim of making plans to abolish the old, snobbish and divisive system. The tripartite system introduced in 1947 and based on dividing students among grammar, secondary modern and secondary technical schools was thus replaced by a standalone comprehensive school (Salmieri, 2018).

In France, effective education for girls did not emerge until the end of the XIX century (Mavrinrac, 1997; Rogers, 2005). During the inter-war period, feminists, Catholics, and educators debated the virtues or dangers of coeducation, taking a stand in opposition to Pius XI and his hostility towards the "coeducation of the sexes" as asserted in his encyclical *Divini illius magistri* of 1929 (Offen, 2000). In 1924, the so-called *Bérard Law* extended the secondary public program for French girls aged 5 to 6 and introduced an optional program allowing girls to prepare for the *baccalauréat* (Offen, 1983). By 1930 the educational program specifically targeting girls had virtually disappeared even while separate girls' institutions flourished. In this period, the concept of separate but equal schooling was satisfactory for many French educators and especially school administrators, these latter invested in defending the traditional learning landscape. After the Second World War when democratization was proclaimed if much more reluctant rationale behind French institutional reform, the newly established common secondary school for pupils aged 6 to 15, with a single college after primary school, was made coeducational. The decision determining this shift towards coeducation had no feminist connotations; rather, it was argued that the growth of collateral secondary education for girls would «serve families in their immediate neighbourhood or in the best conditions of pedagogical approaches». In 1963, the new secondary schools were coeducational from the outset and the decrees implementing the 11 July 1975 *Haby Law* were extended to also cover coeducation in secondary schools. As a result, more girls than boys earned the *baccalauréat* in 1971. Feminist voices were decisive in asserting women's potential impact in civil society depended on their having an education that equalled, if not surpassed, that of men (Rogers, 2016).

In Germany, a transformation carried out from 1910 to 1938 reorganized the tracks of secondary education into a tripartite structure. After a compulsory 4-year public primary school (*grundschule*) legislated in 1919, pupils were sent to one of three types of secondary education: the *volksschule* did not grant much in the way of career opportunities, while the *gymnasium* and *oberschule* gave greater access to the upper echelons of academia. After 1935, the need for full

employment and increasing demand for university graduates led German women to enrol in university (Jarusch, 1984). Even so, there continued to be ideological discrimination against women wishing to attend *Abitur* preparation and university programs. Once the Nazis took power, the *gymnasium* was closed to females and the *oberschule* was the only remaining means for young women to prepare for the *Abitur*.

Directly after 1860s unification, Italian girls were still excluded from knowledge-based and liberal professions because women's national citizenship was only theoretical, not substantive. In practice they were prevented from practicing or occupying regulated professions and middle-class women were trapped at home. The new-born secular Italian state had no concern for the formal, long-term education of women. There were various "educational institutes for girls", but almost all of them were religious in both scope and governance and rarely shifted from the holy triad of "prayer, catechism, and domestic tasks" seen as the proper purview of women. A few local municipalities in North-Central Italy made attempts to promote girls' colleges in the form of 3-year schools called *scuole femminili superiori* (Soldani, 2010; Dei, 1987). Coeducation had never been established as a principle; it was practised in exceptional cases or tolerated as transitory but had no explicit legal standing in Italy. The Fascist regime made educational reforms focused on secondary education to the detriment of girls' rights: the *Gentile Reform* (1923) of the entire Italian school system erected both formal and informal barriers to education for the lower classes and those living furthest from big cities. Not only did it considerably increase schooling costs, including tuition fees, it also introduced a legal veto on girl's enrolment in various types of school, with the sole exception of complementary schooling based on an endless series of courses designed merely to ensure minimum literacy. Generally speaking, the only girls who continued studying past primary school in this period were from higher social classes than boys. As Giovanni Gentile had previously insisted in 1918, women «do not and never will possess either that bold originality of thought or that resolute spiritual vigor which form the superior intellectual and moral forces of humanity and must be the cornerstones of any school shaping the superior spirit of the country» (Gentile, 1918: 8). It was not until after the Second World War that Italian women were able to gain more access to secondary schools and universities, alongside small reforms in both secondary and tertiary education.

Having shown that equal access to all levels and types of education was the result of many decades of slow and hard-fought transformations, in the following sections we intend to highlight how female educational attainment in Italy has taken place while maintaining the influence of family and social origins almost completely unaltered, especially in terms of social inequalities measured via cultural capital. At the same time, however, we intend to stress out that the Italian growth and overtaking of female educational attainments has been more intense than the structural barriers posed by social inequalities at the origins. Furthermore, we aim to emphasize that the advancement of Italian women in secondary and tertiary education probably occurred

in a context in which the demand for education influenced and shaped the provision of education, guiding the reforms of openness and democratization rather than being at the opposite a mere set of consequences of changes in the educational system.

1. DATA AND METHODOLOGY

For the purposes of our analysis, aimed at estimating the variation over time of the distribution of educational achievement of Italian men and women by identifying the weight of the ascriptive variables, we used data collected by the European Social Survey (ESS). The European Social Survey has carried out an extensive research survey since 2001, replicated in Europe every two years, designed to detect stability and changes in European societies, the transformations of living conditions, as well as the evolution of values and opinions of European citizens in a cross-national and diachronic perspective. Coherently to the needs of our study, we selected variables of ascriptive type i.e. gender of the respondents, their mothers and fathers' educational achievements and their cohort of birth. We run those independent variables on one variable of acquisitive type which is the highest level of education achieved by respondents.

Given the level of disaggregation of the analyses, we then performed a "merging operation", combining data from 2016 and 2018 waves to increase the population under investigation and thus maximize the sample statistical reliance. Data have been statistically weighed according to ESS protocols and using the proper "weight variables" included in the original datasets. Ascriptive and acquisitive variables have been duly recoded to make sure of reaching internal harmonization and balancing in distributions. Then, the educational achievements of the respondents' mothers and fathers as well as respondents themselves were then grouped into three: "Less than secondary education", "Upper secondary education", "Tertiary education". Age cohorts have been recoded into six groups i.e. respondents born "before 1940", "from 1941 to 1950", "1951 to 1960", "1961 to 1970", "1971 to 1980", and "1981 to 1988". We adopted this recodification approach to conduct a diachronic and descriptive analyses aimed at tracing historical trends over time in the educational achievements of respondents' fathers and mothers as well as respondents themselves (Figures 1 and 4). Age groups were then re-merged to be used effectively in the regression models we carried out: we thus used respondents born "before 1950" as the reference category and respondents born "between 1951 and 1960", "1961-1970", "1971-1980" "1981-1988" as the opposite category.

Multiple binomial logistic regression models were then performed. A preliminary model estimates the probability of attaining a tertiary educational degree according to gender, age group and the educational level of the respondents' mothers and fathers (Table 1). Subsequently,

the same model was replicated for the male and female population to analyse similarities and differences in the explanatory patterns (Table 2). A third regression model splits the independent variable “age” into two macro age groups, i.e. respondents born before 1961 and respondents born during the period from 1961 to 1988. The goal of this analysis is to compare explanatory structures across the two age groups and to highlight continuity and change in the extent to which independent variables are likely to affect respondents’ ability to earn a degree in tertiary education.

Finally, to further interpret the mechanisms at play in the outcomes of previous models, an association index was created by combining the educational levels of respondents’ mothers and fathers. This index essentially renders visible the distribution of cases among parents who are homogamous or heterogamous in terms of cultural capital: homogamous when both father and mother earned a tertiary degree, secondary school degree or educational attainment lower than secondary school; heterogamous when their educational attainments differ. We then used the index to analyse the trend in the share of respondents who attained a university degree in relation to their parents’ upper, medium or lower educational homogamy (Figures 7 and 8).

2. GENDER GAPS IN THE ITALIAN EVOLUTION OF EDUCATIONAL ATTAINMENT

While the first quarter of the nineteenth century represented a moment of intense educational ferment for middle-class girls, the third period of widespread change occurred after the Second World War when the demand for secondary education spread all over Europe, albeit to different degrees. Women were beginning to establish a growing presence in secondary education. This development was largely eclipsed by the global democratization of education involving the middle and even lower classes. In France, for instance, most secondary girls’ schools disappeared in favour of coeducation (Lelièvre, Lelièvre, 1991). More radical changes occurred at the secondary level: school systems were subjected to massive restructuring to meet families’ demands for education no longer divided so deeply on the basis of social class (Baudelot, Establet, 1992).

In Italy, more than 220,000 students enrolled in university courses for the 1951-52 academic year. In 1967, with universities even more crowded than before, the first instances of revolt erupted with students occupying the classrooms and halls of the Catholic University of Milan. The demonstrations, fuelled by practical considerations, broke out in opposition to a tuition increase passed that year. By 1968, a new political and cultural movement had been born. It expanded to involve many state universities in Italian cities and secondary schools as well. Of the protesters’ demands, one key point was a fierce critique of the old student representational bodies. Most importantly, students

demanded more democratic relations in cultural institutions, easier access to knowledge and a series of larger cultural and societal shifts outside the scope of the educational system (Meyer et al., 1992; Colarusso, Giancola, 2020). Under the pressure of the student movement, Italian Law 11 December 1969 legalised universal access to universities by eliminating the limits imposed by the old Gentile system. Before 1969, students' access to university had been conditioned by the type of secondary school they attended: only applicants with a *liceo classico* degree could access all the departments, while students from the *liceo scientifico* could enrol in many courses but not literature or philosophy (these were considered the most elitist fields of studies, in keeping with the Italian classical tradition deeply rooted in Benedetto Croce's idealistic philosophy). Several secondary schools tracks enabled students to enrol only in specific academic courses, the former being preparatory to the latter: for instance, someone with a diploma in accounting could study only economics at university while technical diplomas granted access only to academic courses in industrial engineering, and so on. The *Codignola Law* of 11 December 1969 put an end to the previous early tracking system and made enrolment in any university course possible with any kind of diploma earned at the completion of five years of secondary school education.

Another important reform had been reshaping the school system since 1962. In previous years, students had two tracks for accessing further education after primary school: one was aimed at inserting the graduate into the industrial or commercial job market as soon as possible (with female students expecting to be secretaries at best), while the other provided the kind of comprehensive education enabling students to continue on to secondary schools. In 1962, law 1859 merged the two systems into a single three-year course. The resulting unified and compulsory *scuola media* gave access to all higher courses, from *liceo classico* to professional and technical schools. Schools for vocational training were abolished.

The Seventies, with their spread of feminist values marked an extraordinary turning point in women's emancipation, especially for the youngest generations. A deep cultural revolution pushed more and more Italian girls to invest in education as a way of gaining competitive advantage in the labour market – where they would otherwise be segregated into low-paying, low-skilled jobs – and to achieve autonomy, economic independence, and social self-reliance. An astonishing and rapid surge in the demand for tertiary education took place during the Seventies when Italian universities changed from «elite to mass institutions», as the American scholar Martin Trow (1974) predicted. According to Trow's formulation, the elitist model in which only 15% of the youth population studied at university was mainly aimed at moulding the minds and characters of the leading class; the contrasting massified model, he argued, would turn tertiary education into a tool for training students for a wide range of technical and economic roles in the period's expanding industrial societies. Trow predicted that the supply of higher education would drive demand for it: the growing need for professionalization stemming from the complexity and specialization of the modern economy would be a priority for

any modern country wishing to advance its industrial and scientific power. In the Italian case, however, student demand for tertiary education has been the effective driving force behind its provision. This was especially true of the increasing demand for university decentralization in the Eighties, when a growing number of students from peripheral regions put pressure on metropolitan universities and persuaded national governments to invest in establishing new campuses to meet mounting needs. In relation to this point, it should be noted that leaving family homes at an early age to relocate to a different region so as to continue their studies at university became a well-established pattern of female emancipation for many girls from Italy's rural south (Piccone Stella, 1979).

Around the end of the Seventies, the enrolment rate in Italian tertiary education, calculated as the ratio between the number of registered students and the total of nineteen-year-olds completing secondary education, had reached approximately 25%. This expansion consolidated during the Eighties as well – albeit with some setbacks – and had a positive effect on the educational attainment of the Italian population, increasing it considerably. Further reforms were passed, including one giving universities organizational, financial, and didactic autonomy from the Ministry of Education. In the 1991-92 academic year, registration at Italian universities reached a peak of approximately 1,500,000.

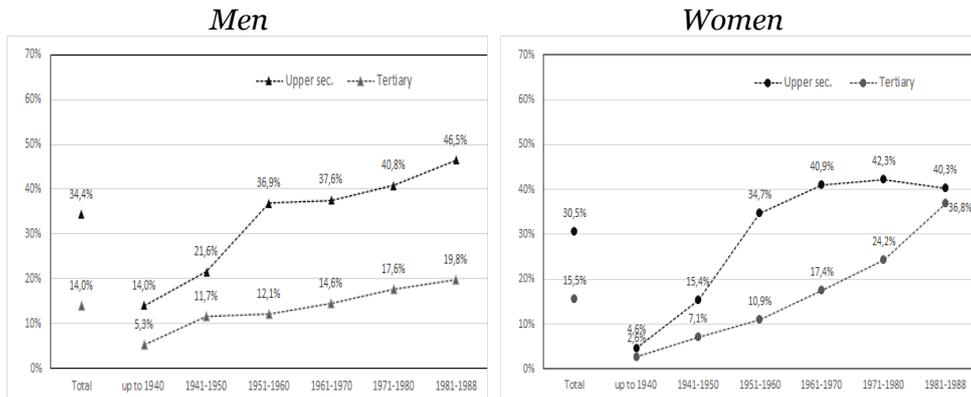
Towards the end of the Nineties, previous reforms gave impetus to the transformation of the university by reshaping degree programmes and introducing the “short degree” formula (3 years, i.e. bachelor's degree) which was preparatory to the successive degree (2 years, i.e. master's). This reform aimed to guarantee each individual university the freedom to develop degree programs calibrated to students' educational choices, including in relation to specific, local, labour market needs. Expanding enrolment in tertiary education and the corresponding proliferation of programmes and courses, the implementation of the “Bologna process” and through it the establishment of a «European higher education space» (Van der Wende, 2000) paved the way for further reforms and interventions, some of them overlapping. Meanwhile, the share of nineteen-year-old students completing upper secondary school steadily increased from 38% in 1980 to more than 70% in 1998, fuelling a parallel increase in tertiary education enrolment rates (Benadusi, Giancola, 2015). Trends in the rate of both secondary school graduation and registration at tertiary educational institutions went hand in hand until the end of the 1990s. At that point, however, the former continued to rise while the latter grew by just 5 percentage points. The process of expanding the university for the masses had nearly reached saturation.

From the 2000s to today, Italian universities have undergone a process of radical change, first with the *Moratti* reform and then with the *Gelmini* reform. Since that time, the number of university students has begun to decline, apparently mainly because of the increase in registration fees, living costs and disillusionment about labour market employability. From 2005 to 2015, university fees rose by 60% and

enrolment dropped mainly among students from technical and professional secondary schools (Contini, Salza, 2020).

Several Italian sociological studies have found that, from the Seventies to the new century, the increase in secondary and tertiary enrolment also included rising university enrolment on the part of students from the lower social classes (Recchi, 2007; Ballarino et al., 2009; Ballarino, Panichella, 2016; Cattaneo et al., 2017). However, this expansion in tertiary educational expectations was part and parcel of the so-called inflation of educational credentials and does not conceal the fact that class inequalities are once again evident when considering rates of completion (Ballarino et al., 2009; Bernardi, Ballarino, 2014; Barone et al. 2018. Ultimately, the tangible and profound revolution in absolute educational mobility outlined here concerns gender rather than class-based equalities. It is the female population as a whole that has made great strides in terms of absolute improvement in educational attainment.

FIGURE 1. Educational attainment of Italian men and women according to birth cohort



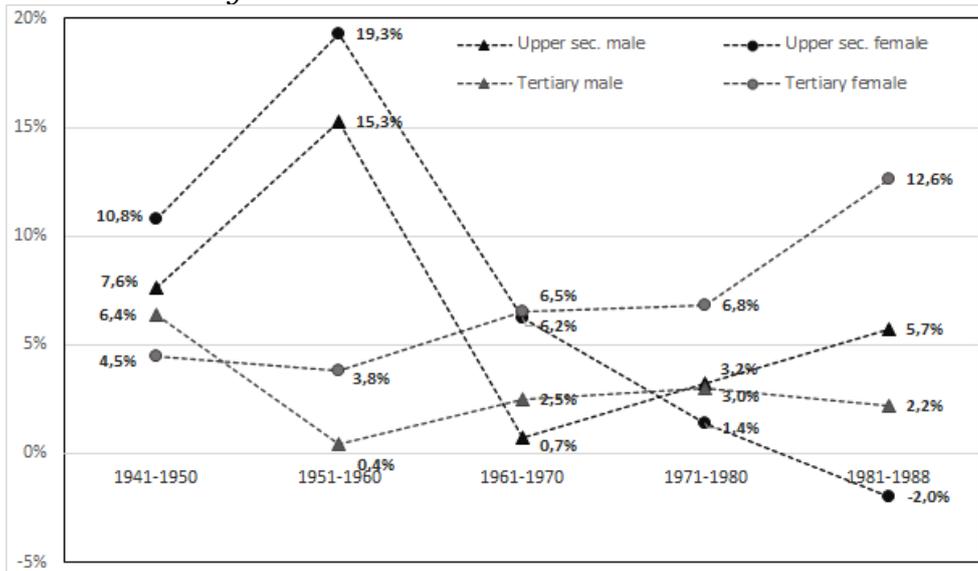
Sources: processing of ESS data

The Italian population born before 1940 was deeply divided into two separate fields of cultural attainment: 14% of men earned an upper secondary degree and 5.3% a tertiary degree, while only 4.6% and 2.6% of women, respectively, attained the same educational levels. Among the generations born after 1940, however, there was a gradual but robust growth in male and female attainment thanks to reforms and expansions in the right to study. Reforms and policies were aimed at facilitating access to education for the middle and lower classes, as the main goal was to strengthen the educational base for the country's pursuit of industrialization. Nevertheless and surprisingly, it was the female population that took the most advantage of new educational opportunities arising from the larger process of education democratization. Among the population born from 1940 to 1950, the share of men attaining upper secondary and tertiary education rose to 21.6% and 11.7%, respectively, and the share of women to 15.4% and 7.1%. This can be seen as a very remarkable increase in female mobility if contextualised in relation to the historical period.

If we examine changes in the distribution of educational achievement among birth cohorts according to gender, we note that while the

male trend shows a steady and parallel linear increase in both upper secondary and tertiary degrees, the female trend is differentiated between the former and the latter: the share of women attaining upper secondary degrees increased marginally while the share of women attaining tertiary degrees increased exponentially, causing a slight decrease in female upper secondary degrees from the 1971-1980s to the next generation. Therefore, among individuals born during the Eighties (1981-1988), more than one in every three women earned a tertiary degree while only one in every five men did.

FIGURE 2. Variation in the educational attainment of Italian men and women according to birth cohort



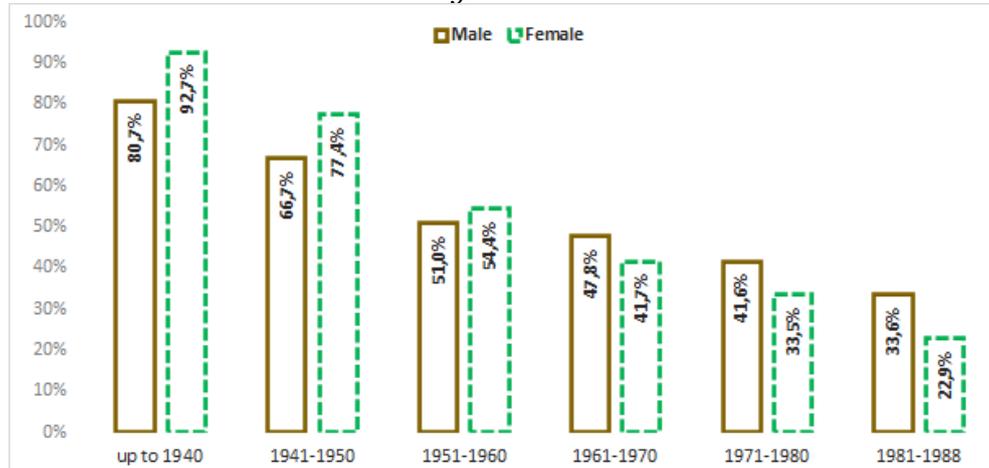
Sources: processing of ESS data

If we consider Italians born before 1940 as a starting point for comparison, both men and women born in the Forties underwent a normal increase in educational attainment (+10.8% and 7.6% of upper secondary graduated women and men and +4.5% and +6.4% of tertiary graduated women and men). Afterward, however, male and female tendencies display different directions and degrees of intensity: the growth of the share of women attaining tertiary education is constant and exponential, from +3.8% for those born in the Fifties to +6.5% for those born in the Sixties +6.8% for those born in the Seventies, up to the marked educational boom of +12.6% for those born in the Eighties. The share of men earning a university degree also increases from one generational cohort to the next, but less intensely: it is only +0.4% for those born in the Fifties, +2.5% for those born in the Sixties, and +3.2% and +2.2% for those born in the Seventies and Eighties respectively.

To better understand the increasing of the female investment in education during the second half of the last century, we can consider the shares of those who stopped studying after primary or lower secondary education. Of individuals born before 1940, a massive share of women, 92.7%, had completed only primary or lower secondary schooling. Among women born during the Seventies this share had dropped by

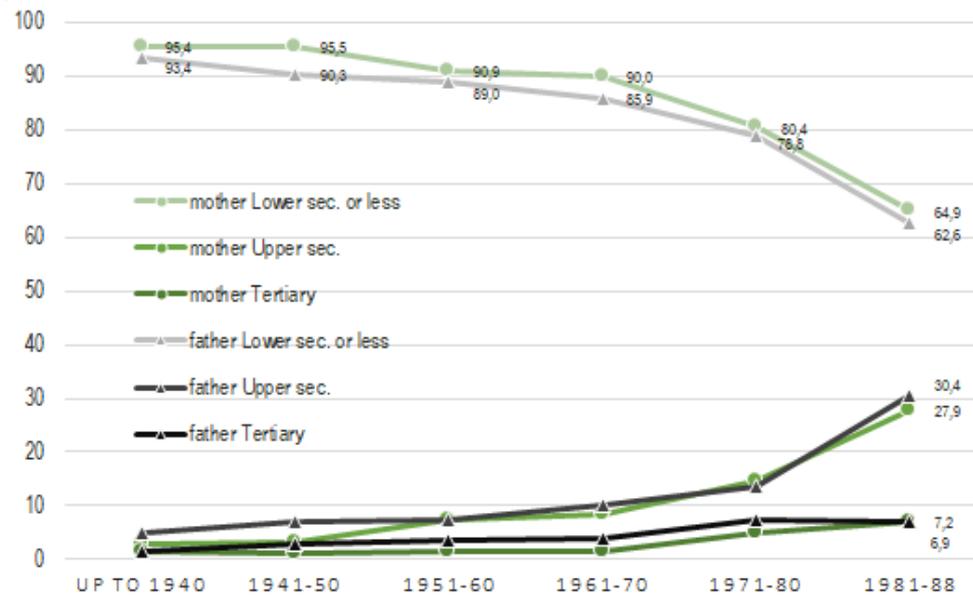
more than half (41.7%) and among women born during the Eighties had almost halved again (22.9%).

FIGURE 3. Share of Italian men and women attaining lower secondary or lesser educational levels according to birth cohort



Sources: processing of ESS data

FIGURE 4. Educational levels of fathers and mothers of Italians born before 1988



Sources: processing of ESS data

Finally, there have been variations over time in the educational levels of the parents of Italians born in the six cohorts we examined. The decreasing trend is very similar for fathers and mothers with lower educational attainment: from 93.4% of fathers and 95.4% of mothers in the population born before 1940 to 62.6 and 64.9%, respectively, in the population born between 1981 and 1988.

Although we found a very similar distribution of education levels for mothers and fathers in the population under consideration, significant gender differences stand out in the educational levels achieved by their

children. Our hypothesis is that cultural homogeneity in marriages is at play. In love, birds of a feather flock together; that is to say, partners forming a conjugal union and procreating usually have equal levels of education. Considering the population born after 1951, the probability of completing tertiary-level education is highest among the youngest birth cohort (1981-1980) and the segment of individuals whose fathers have tertiary degrees. However, the likelihood of obtaining a university degree is even greater, more than twice as high, when the individual's mother has a tertiary degree as well. The main change took place between the 1951-1960 cohort and the following ones: the population born from 1961 to 1970 had easier access to university following the 1969 reform. After this point, the likelihood of attaining a tertiary educational degree increased from one birth cohort to the next in a steady but marginal way. Furthermore, women's high investment and drive in pursuing tertiary education becomes crystal clear if we note that they are 1.2 times more likely than men to earn a university degree. However, graduating from university is also heavily influenced by family origins. As Table 1 shows, having a graduate father increases one's chances of obtaining a degree by about 6.1 percentage points and, more significantly, having a graduate mother boosts the probability by 9.2%.

TABLE 1. *Likelihood of graduation on the part of the Italian population according to birth cohort, father's education, mother's education, and gender*

	B	S.E.	Sign.	Exp(B)
Age group=1951-1960	,465	,125	,000	1,592
Age group =1961-1970	,881	,112	,000	2,413
Age group =1971-1980	,910	,114	,000	2,484
Age group =1981-1988	,939	,126	,000	2,556
Edu_father= Upper secondary	,815	,099	,000	2,259
Edu_father=Tertiary	1,820	,150	,000	6,174
Edu_mother=Upper secondary	1,114	,105	,000	3,047
Edu_mother=Tertiary	2,219	,179	,000	9,202
Gender=Female	,218	,070	,002	1,243
Constant	-3,002	,099	,000	,050

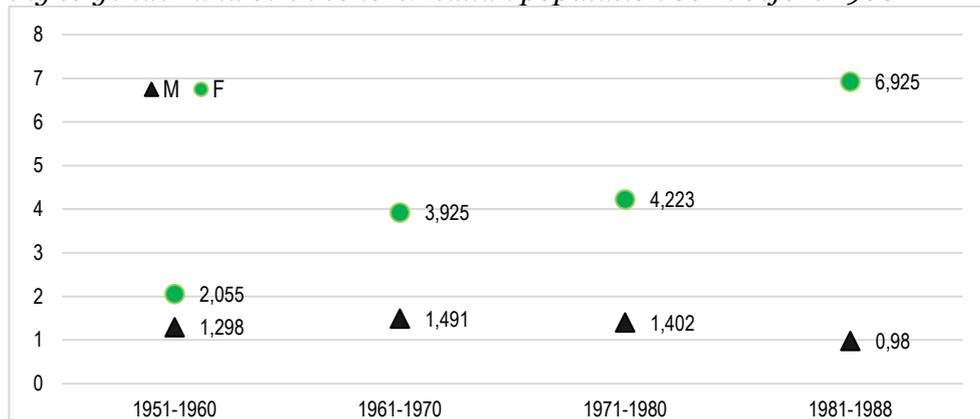
Sources: processing of ESS data

These findings suggest three crucial points for our analyses: *i)* family cultural capital is a gamechanger in shaping individuals' opportunities to successfully complete tertiary education: parents with the highest educational attainment are able to transfer various kinds of social and educational skills that may facilitate children's progress through primary, secondary and tertiary education and to motivate them to earn at least the same degrees as their parents; *ii)* female cultural capital has a stronger predictive force, as we detected a sort of virtuous circle linking mothers' higher education to that of their daughters over decades of historical development *iii)* finally, the higher likelihood of earning a tertiary degree is nevertheless greater among females than males.

If we look at the likelihood of attaining a degree in tertiary education according to gender over time (Table 2), there is once again an astonishingly surge on the female side: while men's likelihood of attaining

the highest degrees increases steadily from one birth cohort to the next – except for the boom during the Fifties and Sixties’ birth cohorts – women’s likelihood almost doubles from one birth cohort to the next. The likelihood for women is 2,055 points among the oldest age group (birth cohort 1951-1960); it jumps up to 3,925 points among the 1961-1970 birth cohort, to 4,223 points among the next birth cohort and as high as 6,295 among the latest birth cohort.

FIGURE 5. Odds ratio of achieving a tertiary educational degree according to gender and birth cohort. Italian population born before 1988



Sources: processing of ESS data

TABLE 2. Likelihood of graduation on the part of the Italian population according to birth cohort, father’s education, mother’s education, and gender

	B	S.E.	Sign.	Exp(B)	
Men	Age group=1951-1960	,261	,170	,125	1,298
	Age group =1961-1970	,399	,155	,010	1,491
	Age group =1971-1980	,338	,161	,035	1,402
	Age group =1981-1988	-,020	,181	,910	,980
	Edu_father= Upper secondary	,802	,142	,000	2,231
	Edu_father=Tertiary	2,103	,208	,000	8,192
	Edu_mother=Upper secondary	1,160	,148	,000	3,190
	Edu_mother=Tertiary	2,250	,271	,000	9,492
	Constant	-2,558	,119	,000	,077
Women	Age group=1951-1960	,720	,189	,000	2,055
	Age group =1961-1970	1,367	,167	,000	3,925
	Age group =1971-1980	1,441	,169	,000	4,223
	Age group =1981-1988	1,935	,185	,000	6,925
	Edu_father= Upper secondary	,901	,144	,000	2,461
	Edu_father=Tertiary	1,543	,223	,000	4,678
	Edu_mother=Upper secondary	1,138	,154	,000	3,119
	Edu_mother=Tertiary	2,375	,249	,000	10,746
	Constant	-3,264	,142	,000	,038

Sources: processing of ESS data

As a son, having a father with a tertiary education means 8,192 points more likelihood of earning a university degree, while having a mother with a tertiary education entails an even higher probability: 9,492 points. Once again, the cultural capital inherited via a mother’s educational skills plays a crucial role for both sons and daughters, but especially for the latter. As a daughter, having a father with a tertiary education implies a 4,678-point increase in the likelihood of obtaining

a university degree, but having a mother with a tertiary education entails the highest chances: 10,746 points.

In order to understand the growing effect of cultural capital inherited from parents, we compared two wider age groups: populations born before and after 1960 (Table 3).

TABLE 3. *Likelihood of graduation on the part of the Italian population according to birth cohort, father's education, mother's education, and gender. Split models for overall population, population born before, and population born after 1960.*

	B	S.E.	Sign.	Exp(B)	
Overall population	Edu_father= Upper secondary	,879	,099	,000	2,409
	Edu_father=Tertiary	1,807	,148	,000	6,094
	Edu_mother=Upper secondary	1,265	,102	,000	3,543
	Edu_mother=Tertiary	2,314	,177	,000	10,118
	Gender=Female	,176	,070	,000	1,192
	Constant	-2,375	,057	,000	,093
<hr/>					
	B	S.E.	Sign.	Exp(B)	
1960 and before	Edu_father= Upper secondary	1,451	,199	,000	4,269
	Edu_father=Tertiary	1,903	,271	,000	6,703
	Edu_mother=Upper secondary	1,595	,227	,000	4,930
	Edu_mother=Tertiary	1,681	,332	,000	5,371
	Gender=Female	-,508	,131	,000	,601
	Constant	-2,576	,094	,000	,076
<hr/>					
	B	S.E.	Sign.	Exp(B)	
1961 - 1988	Edu_father= Upper secondary	,619	,114	,000	1,857
	Edu_father=Tertiary	1,801	,185	,000	6,055
	Edu_mother=Upper secondary	1,057	,116	,000	2,879
	Edu_mother=Tertiary	2,444	,218	,000	11,517
	Gender=Female	,521	,085	,000	1,684
	Constant	,619	,114	,000	1,857

Sources: processing of ESS data

The female population born in the most recent period – from 1961 to 1988 – has an almost three times better chance of obtaining a university degree compared to the female population born before 1960, while for the male population the increase is only 2 percentage points (Figure 6).

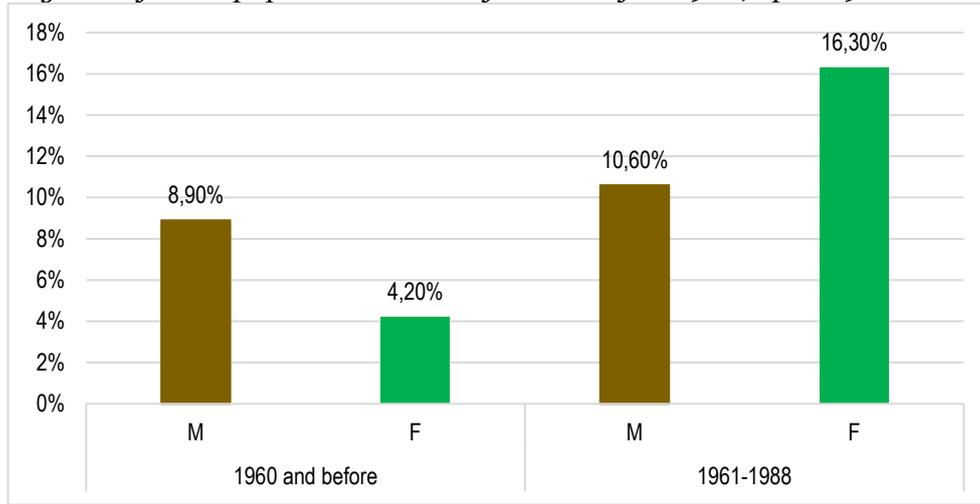
Furthermore, regardless of gender, having a mother with a university degree grants almost double the likelihood of attaining a university degree if the person in question was born from 1961 to 1988 instead of earlier.

Nonetheless, the cultural mobility of the female population seems to have been stronger than the effect of cultural origins: if we consider exclusively daughters and sons whose mothers attained lower secondary educational levels at best, we find out that only 4.2% of daughters born before 1960 succeeded in achieving tertiary education, but the share rises to 16.3% for those ones born during the 1961-1988 period. Men display a similar pattern, except that the male increase is far less significant: from 8.9 to 10.6%.

Finally, we analysed the effect of both parents' educational attainments on children's educational achievements, specifically assessing the share of children who completed tertiary education. We considered

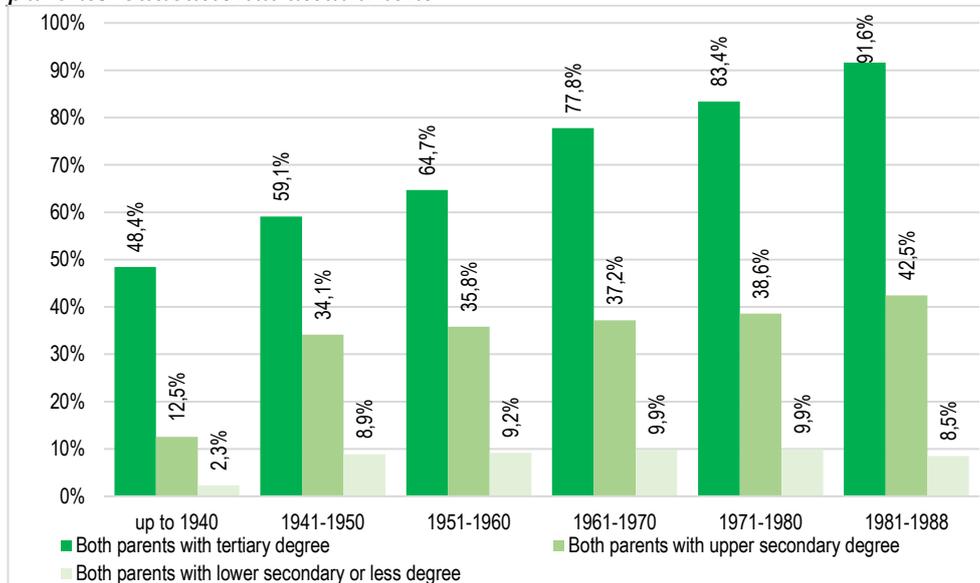
parents' educational attainments by including only cases in which both parents attained the same educational level: tertiary degree, upper secondary degree, or lower secondary (or lesser) degree. This sub-group accounts for 87% of the sample, meaning that marriage social homogeneity in terms of educational level has been a marked attribute of the majority of the Italian population over the second half of the XX century.

FIGURE 6. Odds ratio of achieving a tertiary education degree according to gender for the population born before and after 1960, up to 1988



Sources: processing of ESS data

FIGURE 7. Male population achieving tertiary degree, by birth cohort and parents' educational attainment

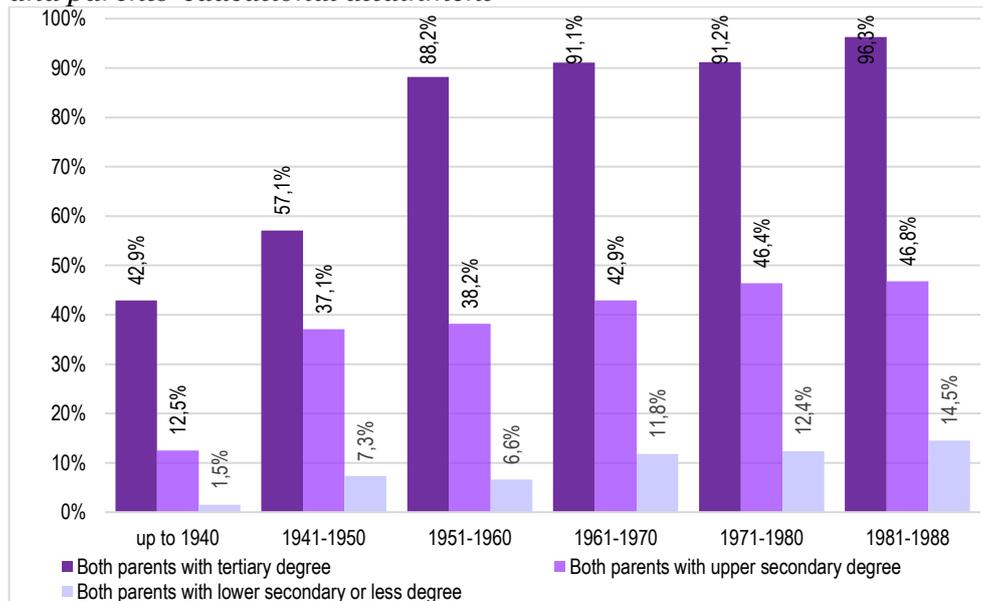


Sources: processing of ESS data

Comparing the data illustrated in Figures 7 and 8, it can be seen that only 1.5% of the oldest birth cohort daughters whose parents had low educational levels were able to attain a tertiary education, while the youngest birth cohort daughters whose parents also had low educational levels were able to obtain a tertiary education in 14.5% of the

cases. This remarkable increase has no equal among male birth cohorts. As a matter of fact, the sons of low-educated parents attained tertiary degrees in 2.5% of cases in the oldest birth cohort (twice the share of daughters), but in only 8.5% of cases in the youngest birth cohort (6 percentage point less than daughters). This gender gap in favour of girls means that girls' investment in higher education has gradually become more relevant and successful than that of boys, even among families in the lower educational ranks.

FIGURE 8. *Female population achieving tertiary degree, by birth cohort and parents' educational attainment*



Sources: processing of ESS data

CONCLUSIONS

In this chapter we have briefly outlined the main historical steps in the dismantling of gender barriers to accessing different levels of education in the main European countries and Italy more specifically. We have also highlighted the way Italian women came to outnumber men in the total share of university enrollees and, more importantly, the total share of graduates. The trends we have mapped here mark the unfolding of a silent revolution in trajectories of cultural mobility, driving women of the younger generation to invest more in education than do men. In our opinion, this key fact signals women's vigorous advancement in the fields of scientific knowledge and advanced education; on the other hand, it also reveals the difficulties and discrimination women still face in the labour market, where it is instead men who continue to be unfairly advantaged.

However, the outcomes of our analysis focus mainly on the issue of transmitting cultural capital and reproducing inequalities of origin

from a gender perspective. Indeed, we have shown that: *i*) over time, female investment in higher education has become a reference model for middle and lower-class families as well, influencing the provision of tertiary education in a broader context of educational expansion: the female population took advantage of new opportunities generated as part of a larger process of democratization; *ii*) beginning with those born in the Eighties, women overtake men to such an extent that various Italian faculties and university degree programmes have ended up being feminized, while others, traditionally the domains of prestigious training for men, are beginning to display an increasingly balanced gender mix. This phenomenon is much more evident for girls from families with high and medium educational levels; *iii*) likewise, as it becomes ever more common for fathers and mothers alike to hold university degrees, a new mechanism of cultural capital transmission through the matrilineal line becomes quite widespread, so much so that the probability of sons and daughters graduating depends more and more on their mothers' educational qualifications rather than those of their fathers; *iv*) finally, for the last few generations, the further we move down the hierarchical scale of parents' educational attainment, the more likely it is that sons not daughters will fail to enrol in university. This facet of the overall story speaks to concerns about the male disinvestment in higher education that distinguishes the Italian case.

Although it is not the focus of our analysis, these research results can be supplemented by a significant observation. Considering the dramatic increase in girls' educational attainment as soon as they were granted better access to secondary and higher education, we face a paradox that deserves more attention than ever on the part of the social sciences: the widening gap between women's educational and degree attainment rates and their rates of employment. Although this gap varies from one country to the next, it constitutes a cornerstone of inequality in all western labour markets. Gender inequalities in the labour market persist despite women's better performance in tertiary education, on average. Rising female employment rates have narrowed the gender gap in the labour market but they have not dissolved other basic gender disparities. Inequalities stemming from type of contract, career opportunities and duration of periods of unemployment are still clearly evident in all European countries. Women from the youngest generations work under fixed-term contracts and in part-time jobs more often than their male peers. Girls are much less likely than boys to secure a job matching their field of educational specialisation or to pursue a career granting them access to high-level positions in the professional hierarchy. Women tend to aspire to high-skilled professions more than men, but they still have more difficulty than men in realizing their aspirations. Among graduates, employment rates in all European countries display this gender gap, with women continuing to be at a disadvantage in employment rates and with overeducation impacting more female workers than male ones.

We should then shift our attention from the thesis that education offers a rational and automatic return in terms of labour market

advantage, careers and earnings and look instead at the discrepancies between female expectations and labour market dynamics.

In summary, gender inequalities have been dismantled only in education and not in the labour market (or the political realm). Labour markets, by definition, are systems producing and reproducing inequalities by their very nature. They are not modifiable. They cannot be regulated, or only partially so. Especially in private companies and small and medium enterprises, principles and norms of equality cannot transform the rationale and mechanisms by which a semi-skilled man is preferred over a highly qualified woman. Here, regulations can address and stop evident forms of discrimination, but they are ineffective against more subtle processes of discrimination. While rules, regulatory norms and substantial policies in post-compulsory education systems apply to everyone and generally tend to treat men and women equally or even support female empowerment, the expectations of job applicants often clash with those of recruiters and employers and must be channelled into a limited array of options, defined and controlled by companies, firms and enterprises.

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6
***Gender, Social Origins, and
Educational Choices: How it really
works***

Orazio Giancola and Simona Colarusso

1. AIMS AND LITERATURE REVIEW

This study analyses how parents' socio-economic and cultural status influence students' choice of secondary schooling track, according to gender differences and their interaction with social class effects (Cabrera et al. 2015). The way parents affect their children's education is a crucial aspect of the social construction of individual educational trajectories. Education is a process that proceeds in stages, and early educational career decisions have a profound effect on the choices available at later stages (Dustmann, 2004). Some analyses have focused on ascriptive factors such as gender, migratory background or the socio-economic and cultural position of the students' family (Lucas, Beresford, 2010). Other studies have focused on the role played by the structure of educational systems itself ("school tracking" as a macro variable of *institutional differentiation*, see Benadusi, Giancola, 2014). In these studies, researchers focus in particular on analysing educational choices in relation to the mix of social statuses within the school tracks, the overall social composition of individual schools and, finally, the combination of these two dimensions (Giancola, Salmieri, 2020). A further line of inquiry has investigated the connection between parents' preferences and their children's educational choices, especially preferences regarding the reputation and quality of schools. The fact that students' educational success is so closely linked to the quality of education they receive has fuelled a rich tradition of studies and research aimed at investigating the mechanisms through which educational choices are constructed (Rosenbaum, 1976).

Whatever the interpretative framework adopted, the decision of which educational path children should pursue has far-reaching consequences that extend into their adult life, and particularly so in countries with a strong tracking system such as Italy (Giancola, 2009; De Vita, Giancola, 2017). The literature shows that a child's future social and economic situation thus depends in large part on an appropriate school track choice

(Schnabel et al., 2002). Classic findings (Coleman, 1987; 1988) demonstrate that parental background, as a compound measure of parents' education, work and investment in their children, has been and still is one of the most important factors determining children's educational attainment (Heineck, Riphahn, 2007 in Germany and Ermisch, Francesconi, 2001 in UK). At the same time, however, educational decisions might be considered an investment with uncertain outcomes and, as such, would be subject to individuals' risk preferences.

The interpretative model outlined by Bourdieu (1972) indicates some of the family characteristics transmitted by parents to children, such as distinctive cultural elements. Such transmission, he argues, plays an important role in the construction of school pathways and educational choices.

The choice of what school to attend (referred to as "school choice") is linked to "distinctive" elements such as social recognition, reputation, and the socio-economic composition of the school population (both students and their parents). More specifically, family cultural capital seems to have a two-fold effect. Bourdieu suggests that first, direct effect influences the student's school career and the second, indirect effect conditions the individual's construction of his or her professional aspirations in a stable trend regardless of personal skills (Dupriez et al., 2012). These trends are clearly visible in the Italian case as well. The distribution of choices between general (*licei*) or technical/vocational school tracks tends to reproduce social stratification, with the higher social classes "choosing" general high schools and mainly the lower classes vocational "choosing" vocational ones (Azzolini, Vergolini, 2014).

However, such evidence can also be explained through the model proposed by Boudon (Stocké, 2007). According to this model, students' propensity for a certain school or school track is the result of a cost-benefit calculation weighing the future pay-off of the education received. This interpretation seems to be confirmed by the theory of "relative risk aversion" (RRA), according to which students opt for vocational training out of a desire to ensure they achieve at least the same employment positions as their parents and avoid any slide into downward educational and social mobility (Breen, Goldthorpe, 1997; Becker, 2003; Breen, Yaish, 2003).

From a procedural point of view, we do not opt for an *a priori* theoretical choice in developing this chapter. Rather, we outline the research results step by step, using the interpretative approaches or "theoretical segments" which seem more useful for interpreting the empirical evidence in question.

2. DATA, METHODS AND HYPOTHESES

The OECD-PISA 2018 survey aims to provide a standardized metric for comparing several areas of competence over time and space. Until a few years ago, school success meant success in terms of students' school

careers, that is, the probability of their obtaining a certain certificate or degree or avoiding a premature exit from the educational system (Giancola, Viteritti, 2014). Thanks to the emergence and diffusion of comparative international studies, we can now broaden our attention to how students perform in terms not of formal careers but of “learning”, that is, the knowledge and skills they actually acquire. Furthermore, the informative wealth of the datasets produced by the OECD-PISA makes it possible to consider a much larger number of independent variables that are useful for interpreting the differences in result. In this research, in fact, we take into consideration not measured skills but ascriptive elements: gender, family background – synthesized here by the ESCS index¹ – migration background, regulations – the subdivision of the educational system into differentiated school tracks (Benadusi, Giancola, 2014), and information from the questionnaire addressed to the parents of students participating in the survey. For our specific cognitive purposes, we use a rich question (Table 6) relating to the motivations that conditioned the parents’ choice of the school their children attend.

In the first phase, our goal is to analyse and make evident the network of relationships that links social origin, gender and educational choices. To achieve this objective, we turn to several descriptive analyses based on multivariate models for categorical variables (multinomial logistic regression), including a model that takes into account the interaction effects between independent variables (Brock, Durlauf, 2003).

Subsequently, we investigate the relationship between the motivations expressed by students’ parents, and choice of school. Starting from a descriptive analysis of parents’ answers, we perform a synthesis of the data through a principal component analysis (Di Franco, Marradi, 2013) to then analyse the direction and strength of the relationship between parental motivations and their sons and daughters’ mix of gender and social class type. Our hypothesis is that families are accustomed to investing in a diversified way in their children’s education whether the students are girls or boys.

3. THE CHOICE OF SCHOOL TRACK: HOW SOCIAL CLASS AND GENDER PLAY TOGETHER

The sociological literature on educational choices clearly shows that, in the face of institutional differentiation in the upper secondary education system, students’ social origins play a fundamental role in determining school choice. Basically, highly stratified educational systems are those in which differences based on social origin are then reflected in disparate performance (thus constituting “institutionalized” differences), educational expectations, and employment expectations in adulthood.

¹ As a synthetic measure of social origins, the OECD PISA survey produces the ESCS index (Index of Economic, Social and Cultural Status) that synthetically defines the socio-economic and cultural status of the students’ families.

Students' choices between general or vocational tracks tend to be distributed in a way that replicates social stratification, with general tracks usually preferred by the higher social classes and vocational ones chosen more often by the lower classes (Azzolini, Vergolini, 2014). The smaller share of children from the lower classes choosing a general track reflects a process in which students' individual choices are adapted to fit the educational and employment models found in their families of origin. In practice, a school path considered less immediately utilisable on the labour market is considered a riskier choice and children display an aversion to risk by preferring instead the more professional tracks.

This interpretation is confirmed by the theory of relative risk aversion (Breen, Goldthorpe, 1997; Breen, Yaish, 2003) according to which students' choice of vocational training is guided by a desire to ensure they avoid downward social mobility by achieving at least the same levels of employment as their parents. There is considerable evidence showing a greater female propensity for study (at the tertiary level in particular), due to both intrinsic motivation and rational calculation in that girls know they will face greater disadvantage in labour market competition without such educational investment. In a stratified school system (such as the Italian one), therefore, students' social origins will tend to push children of the socio-economic and culturally advantaged classes towards the most prestigious school tracks. In addition, since the most prestigious school tracks are a prelude to university studies and given that girls tend to continue their studies more frequently than boys, they will tend to enrol in school tracks that better prepare them for higher-level studies.

Tables 1 and 2 clearly indicate a significant and strong association between students' socio-economic and cultural background of origin (which for simplicity we will call "social class", measured by the ESCS Index) and school track choice at the upper secondary level.

TABLE 1. *Track choice by socio-economic and cultural background (in %)*

STF Study Prog.	ESCS_CAT				Total
	Low	Medium-Low	Medium-High	High	
Istituti Professionali	29.4	16.5	11.8	4.3	15.5
Istituti Tecnici	39.8	35.8	28.6	20.8	31.2
Licei	30.8	47.7	59.6	74.9	53.2
Total	100.0	100.0	100.0	100.0	100.0

Source: processing of OECD-PISA data

TABLE 2. *Track choice according to gender (in %)*

STF Study Prog.	STF Gender (F=1; M=2)		Total
	A	B	
Istituti Professionali	15.4	15.4	15.4
Istituti Tecnici	18.9	43.5	31.5
Licei	65.7	41.1	53.1
Total	100.0	100.0	100.0

Source: processing of OECD-PISA data

The data show that family socio-economic and cultural background is linked to the propensity to enrol in the most historically prestigious educational institutions (*licei*). If we consider the opposite two poles of the ESCS categories, we can see that children from the upper classes tend to attend the *liceo* school track while students with lower social origins

mainly attended professional and technical school tracks (indicated here as *istituti Professionali* and *istituti Tecnici*). Obviously, this relationship is tendential. However, it should be noted that the trend is strong and evident, and that other sources show it is also stable over time (Giancola, Salmieri, 2019; 2020). Equally strong and significant is the greater tendency of girls, as compared to boys, to attend the *liceo* school track for the reasons outlined above.

A highly noteworthy point is the relationship between social origins and choice of school track for male and female students. For both male and female students, the relationship between social origin and track choice is equally strong. The distance, in percentage points, between the highest and lowest class of those who enrolled in the *liceo* track is practically the same between males and females (46% for women and 48% for men). That is, it is the size effect that changes, in that girls with low social origins who attend *liceo* account for 43.6% while the share of boys doing the same drops to 18.1% (in the interests of completeness, it should be noted that boys from lower social classes attend mainly technical schools). These initial findings already provide us with clues regarding boys' and girls' differential investment in education. As we will see in section 4, however, this result is closely connected to the differential investment that parents make for girls as compared to that made for boys.

TABLE 3. *Track choice by Socio-Economic and Cultural Background, controlled for gender (in %)*

		ESCS_CAT				Total
		Low	Medium-Low	Medium-High	High	
Female	Istituti Professionali	31.4	15.7	10.7	3.3	15.5
	Istituti Tecnici	25.0	22.5	15.6	11.5	18.8
	Licei	43.6	61.8	73.7	85.2	65.7
	Total	100.0	100.0	100.0	100.0	100.0
Male	Istituti Professionali	27.5	17.3	12.9	5.1	15.5
	Istituti Tecnici	54.4	49.4	41.8	28.6	43.2
	Licei	18.1	33.3	45.2	66.3	41.3
	Total	100.0	100.0	100.0	100.0	100.0
Total	Istituti Professionali	29.4	16.5	11.8	4.3	15.5
	Istituti Tecnici	39.8	35.8	28.6	20.8	31.2
	Licei	30.8	47.7	59.6	74.9	53.2
	Total	100.0	100.0	100.0	100.0	100.0

Source: processing of OECD-PISA data

To further quantify this relationship, we opted to use a multinomial logistic regression model. In this model, the dependent variable is school track choice, assuming gender (female vs male), migratory background (second and first generation vs native students), and social class (expressed in terms of ESCS index, recoded into four categories) as the independent variables. The model clearly shows girls' higher probability (in terms of odds ratio, see Exp(B) in Table 4) of attending the general *liceo* track rather than technical or professional schools. On the other hand, migratory background seems to intensely penalize students from the first generation and, to a slightly lesser extent, also disadvantages students with a second generation background as compared to native ones. This latter finding has already been thoroughly documented in the empirical

literature (Giancola, Salmieri, 2018). As expected, social origin (captured via the ESCS index) has a very substantial impact in terms of increasing the student’s chances of attending *liceo* rather than a vocational school. Nevertheless, the most interesting point is that Exp (B) coefficients do not gradually increase. With respect to the probability of attending *liceo*, there is a wide gap between students with medium-high ESCS level as compared to students with a high ESCS level. On the basis of this finding, it can be asserted that not only does social origin have a strong effect but also that this effect does not grow linearly; instead, it gives rise to a strong differential outcome (with an equally strong relative advantage) at its highest level.

TABLE 4. *Determinants of school track choice (multinomial logistic regression)*

	B	Standard error	Sign.	Exp(B)	95% confidence interval for Exp (B)	
					Lower bound	Upper bound
Istituti Tecnici	Intercept	,745	,009	,000		
	Female	-,762	,010	,000	,467	,475
	ESCS High	1,057	,017	,000	2,877	2,976
	ESCS Medium-High	,463	,013	,000	1,589	1,629
	ESCS Medium-Low	,420	,011	,000	1,522	1,556
	IMMIG=Second-Generation	-,250	,017	,000	,779	,805
	IMMIG=First-Generation	-,538	,019	,000	,584	,606
Licei	Intercept	-,187	,010	,000		
	Female	,695	,009	,000	2,004	2,041
	ESCS High	2,785	,017	,000	16,198	16,738
	ESCS Medium-High	1,517	,012	,000	4,560	4,671
	ESCS Medium-Low	,995	,011	,000	2,704	2,766
	IMMIG=Second-Generation	-,741	,018	,000	,477	,494
	IMMIG=First-Generation	-1,010	,019	,000	,364	,378

Although this analysis is already rich, it can be further refined to observe in more detail the effect of interaction between gender and social origin. Indeed, the model presented above illustrates the net effects of the individual variables but not their interaction. In a regression equation, an interaction effect is represented as the product of two or more independent variables (Brock, Durlauf, 2003; Hilbe, 2009). For example, here is a typical regression equation *without* interaction:

$$\hat{y} = b_0 + b_1X_1 + b_2X_2$$

where \hat{y} is the predicted value of a dependent variable, X_1 and X_2 are independent variables, and b_0 , b_1 , and b_2 are regression coefficients. Here is the same regression equation *with* an interaction:

$$\hat{y} = b_0 + b_1X_1 + b_2X_2 + b_3X_1X_2$$

Here, b_3 is a regression coefficient and X_1X_2 is the interaction. The interaction between X_1 and X_2 is called a «two-way interaction» because two independent variables are interacting.

In the model we present here below, therefore, instead of taking gender and social origin as single regressors (albeit transformed into dummy variables), we use the typological crossings of gender and social origin as independent variables² to illustrate the differential mechanisms underlying different school track choices.

TABLE 5. *Determinants of school track choice (multinomial logistic regression with interaction effect)*

	B	Standard error	Sign.	Exp(B)	95% confidence interval for Exp (B)		
					Lower bound	Upper bound	
Istituti Tecnici	Intercept	,422	,008	,000			
	Second-Generation	-,239	,017	,000	,788	,762	,814
	First-Generation	-,576	,018	,000	,562	,542	,583
	Male with High ESCS	1,290	,020	,000	3,634	3,492	3,782
	Male with Medium-High ESCS	,819	,015	,000	2,269	2,203	2,338
	Male with Medium-Low ESCS	,718	,014	,000	2,051	1,996	2,107
	Female with High ESCS	,865	,028	,000	2,375	2,246	2,511
	Female with Medium-High ESCS	-,032	,018	,076	,969	,936	1,003
	Female with Medium-Low ESCS	,021	,015	,163	1,022	,991	1,053
	Licei	Intercept	,232	,008	,000		
IMMIG=Second-Generation		-,744	,018	,000	,475	,459	,492
IMMIG=First-Generation		-,994	,019	,000	,370	,356	,385
Male with High ESCS		2,354	,020	,000	10,527	10,128	10,943
Male with Medium-High ESCS		1,113	,015	,000	3,043	2,953	3,136
Male with Medium-Low ESCS		,573	,015	,000	1,774	1,723	1,825
Female with High ESCS		3,105	,026	,000	22,316	21,209	23,481
Female with Medium-High ESCS		1,775	,015	,000	5,898	5,722	6,080
Female with Medium-Low ESCS		1,280	,014	,000	3,597	3,500	3,697

Source: processing of OECD-PISA data

This formulation of the multinomial logistic regression model shows very clearly the strong relative advantage of girls and boys from high social classes in attending a *liceo* school; given the same background, however, the odds for girls are more than double those for boys. Again, both boys and girls display non-linear growth but with a strong advantage for those coming from higher social classes. The emerging social dynamic is the same for boys and girls, but what discriminates the latter from the former

² The dummy variables are constructed as follows: women with “high”, “medium-high”, “medium-low social” origin *vs* women with “low” social origin; men with “high”, “medium-high”, “medium-low” social origin *vs* men with “low” social origin.

is the intensity of the effect induced and produced by social origins. The probability of attending a technical rather than a professional school is higher among boys with high social origins. In this case, however, boys are more likely than girls to choose vocational tracks (perhaps because they aspire less to university post-school study and are more oriented towards a school track that allows them to both attend university and enter the world of work directly after graduation). Once again, the results show the relative disadvantage of students with a migrant background in terms of their likelihood of enrolling in a *liceo*, thus illustrating a further element of inequity in the Italian education system.

4. SCHOOL CHOICE: THE HYPOTHESIS OF DIFFERENTIATED PARENTAL INVESTMENT

As mentioned above, the parent questionnaire of PISA 2018 includes an articulated demand question the possible replies to which are organized along a Likert scale. This question is designed to investigate the reasons behind respondents' choices of school for their children. The question poses a set of items related to the general statement "importance for choosing a school", with a wide variety of reasons that justify (*ex post*, therefore entailing a considerable distortion effect) the choice that has been made. In Table 6 we have listed the items comprising the Likert battery, in order of importance as attributed by parents.

TABLE 6. *Factors that parent declare to be important in choosing a school*

Importance for choosing a school	Not important	Somewhat important	Important	Very important
There is a safe school environment	1.6	10.0	36.0	52.3
The school has an active and pleasant school climate	3.0	17.3	44.9	34.8
The school has a good reputation	3.4	17.0	41.8	37.8
The school has a focus on foreign language instruction	6.3	16.7	37.6	39.5
The school offers particular courses or school subjects	8.3	19.5	48.9	23.4
The academic achievements of students in the school are high	9.5	23.4	45.0	22.1
The school offers exchange programmes with schools in other countries	20.3	23.5	35.1	21.1
The school has an international student body	42.0	24.5	23.6	9.9
Expenses are low (e.g. tuition, books, room and board)	42.5	26.0	22.7	8.8
The school is at a short distance to home	37.7	31.3	21.4	9.6
The school has a particular approach to "pedagogy/didactics"	45.7	23.5	24.0	6.9
Other family members attended the school	67.0	10.8	14.5	7.7
The school adheres to a particular "religious philosophy"	63.8	14.5	16.6	5.0

Source: processing of OECD-PISA data

The aspects that appear to be of greatest motivational importance are related to «a safe school environment» and good school climate but also a reputational criterion typical of the quasi-market school. These are followed by aspects concerning the curricular subjects offered by the school and the level of student learning (literally “academic achievements of students”). Criteria based on philosophical, pedagogical or religious aspects are placed at the end of the ranking. Even lower in the ranking is the item relating to school expenses. This last consideration ranks so low because enrolment costs are very low the Italian school system, whereas indirect costs (books and school materials, transport and travel, etc., elements which are not taken into account in the questionnaire) are particularly high.

To effectively synthesize the items and make a comparison between the motivations expressed by parents with respect to choosing a school for their sons and daughters, we conducted a PCA (optimized with a Varimax orthogonal rotation³). The result is satisfactory (see Table 7 and Figure 1) in that three components emerge, with a cumulative explained variance equal to 50.5% of the initial variance (the first component has a variance of 29.1%, the second approximately 12%, the third 9.3 %).

TABLE 7. *Principal Component Analysis (variance explained by the components)*

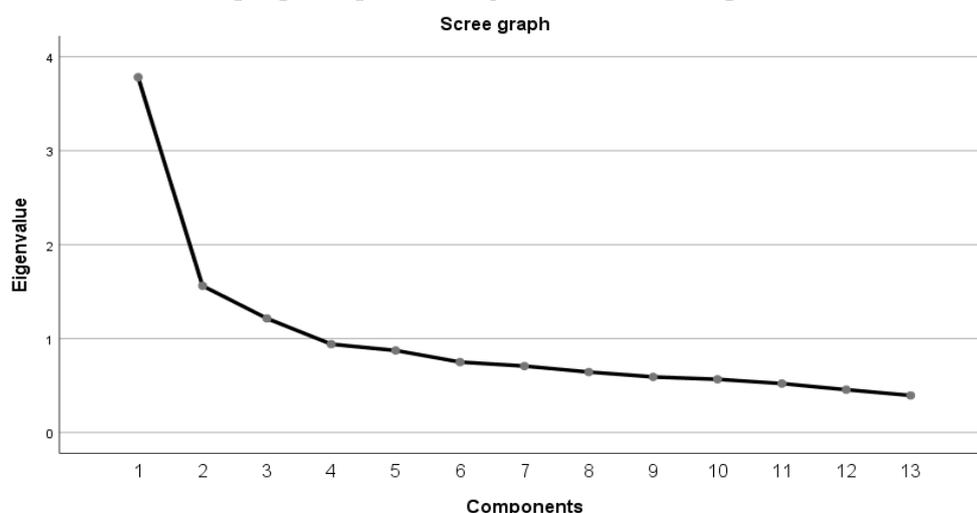
Component	Total	Initial eigenvalues	
		% of variance	% cumulative
1	3,781	29.088	29.088
2	1,562	12.014	41.102
3	1,214	9.340	50.441
4	,940	7.230	57.671
5	,873	6.715	64.386
6	,750	5.766	70.152
7	,707	5.441	75.593
8	,644	4.951	80.544
9	,592	4.552	85.096
10	,566	4.357	89.453
11	,521	4.008	93.461
12	,455	3.504	96.965
13	,395	3.035	100.000

Source: processing of OECD-PISA data

On the semantic level, the extracted components effectively synthesize three different dimensions. The first two components are more clearly interpretable, in part due to a trivial matter of the statistical calculation of the maximization of variance; the third component appears slightly more composite but still of significant interest in relation to the research hypotheses.

³ Varimax rotation is a statistical technique used an attempt to clarify the relationship among factors. Generally, the process involves adjusting the coordinates of data that result from a principal components analysis. The varimax rotation simplifies the loadings of items by removing the middle ground and more specifically identifying the factor upon which data load (Allen, 2017)

FIGURE 1. Scree graph (eigenvalues for extracted components)



Source: processing of OECD-PISA data

By analysing the relationship between the original items and the extracted components (Table 8), it is possible to progress to a semantic interpretation of the components.

TABLE 8. Rotated component matrix

	Components		
	1	2	3
There is a safe school environment	0,767	0,145	0,027
The school has an active and pleasant school climate	0,758	0,106	0,1
The school has a good reputation	0,718	-0,032	0,147
The academic achievements of students in the school are high	0,631	0,25	0,143
The school offers particular courses or school subjects	0,476	0,307	0,109
The school has a focus on foreign language instruction	0,436	0,634	0,017
The school offers exchange programmes with schools in other countries	0,215	0,81	0,014
The school is at a short distance to home	0,161	-0,149	0,57
Expenses are low (e.g. tuition, books, room and board)	0,156	0,097	0,652
The school has a particular approach to “pedagogy/didactics”	0,139	0,356	0,492
The school adheres to a particular “religious philosophy”	0,068	0,142	0,646
The school has an international student body.	0,018	0,736	0,299
Other family members attended the school.	-0,027	0,117	0,629

Source: processing of OECD-PISA data. Rotation method: Varimax with Kaiser normalization.

The first component is clearly linked to the latent dimension of how much attention parents grant to the "Quality and reputation" of schools. The second component summarizes the dimension of teaching, with a view to internationalizing both the curriculum and the teaching staff (as well as study opportunities abroad). This component therefore belongs to the latent dimension of “internationalization”. The third and final component sums up multiple aspects: the school’s proximity to the family home, the family’s relationship with the school in terms of past alumni (the school

having been attended by other members of the student’s family). Alongside these aspects, there is also parents’ appreciation for an educational focus on specific pedagogies or the religious dimension of teaching. As a whole, this component therefore refers to the dimension of familiarity and closeness (both cultural and physical).

To understand what kind of link exists between the typological combination of gender and social origin and parental motivations behind school choice, we conducted an analysis of the variance (a comparison of the mean values for the categories in relation to each of the three extracted components is reported in Table 9a).

The analysis of the first component shows that the parents of children from the upper classes (both males and females with a high ESCS) pay more attention to “quality and reputation”. Comparing boys and girls, however, we find that the trend of the averages for the classes of this type is monotonic increasing for girls. Both upper-middle and upper-class parents are more attentive to educational context and learning opportunities for girls than they are for boys. This result is even more evident when we consider the component of school internationalization. Parents pay greater attention to this dimension when choosing schools for daughters than in the previous case (the difference between the averages is fully significant).

When the component related to “familiarity and closeness” is considered, the data show an inversion of the trend. In this case, families with a higher social background seem to be decidedly less interested in these dimensions. Quite the opposite, these dimensions seem to be more relevant for school choice among parents and children from lower classes. This result is more pronounced for boys than it is for girls.

TABLE 9a. ANOVA on components by type category (gender and social class)

	Quality and reputation	Internationalization	Familiarity and closeness (cultural and physical)
Male with Low ESCS	-0,11446	-0,13854	0,387806
Male with Medium-Low ESCS	-0,01316	-0,05258	0,149136
Male with Medium-High ESCS	-0,01477	-0,01317	-0,0956
Male with High ESCS	0,121154	-0,03673	-0,19663
Female with Low ESCS	-0,23563	-0,01244	0,153106
Female with Medium-Low ESCS	-0,02408	0,069136	-0,03194
Female with Medium-High ESCS	0,017745	0,064281	-0,08323
Female with High ESCS	0,229597	0,084128	-0,19733
Total	0,002375	-0,00139	-0,00328

Source: processing of OECD-PISA data.

To conclude, we replicated the comparison between the mean values of the variable relative to institutional differentiation, and school track (Table 9b). This comparison clearly shows that parents pay much more attention to “quality and reputation” and “internationalization” for students attending the “general” track (*licei*). On the contrary, parents of students attending technical and professional schools pay closer attention to “familiarity and closeness”. Obviously, we must not forget that the

choice of school track depends a great deal on ascriptive factors, including and above all the mix of gender and social class (as shown by the logit coefficients and odds ratios in Table 5).

TABLE 9b. ANOVA on components by school track

	Quality and reputation	Internationalization	Familiarity and closeness (cultural and physical)
Istituti Professionali	-0,33811	-0,01609	0,307521
Istituti Tecnici	-0,07029	-0,03564	0,051842
Licei	0,116351	0,022699	-0,0994

Source: processing of OECD-PISA data.

These data seem to support the hypothesis that parents make a differential degree of investment, not only by social class but also by gender. These two dimensions (family background and gender) do not operate autonomously; rather, they appear to be linked both in school track choice and in the selection of a specific educational institute.

5. SOME CONCLUSIVE REMARKS

The objective of this research was to analyse and highlight the network of relationships linking social origin, gender and educational choices. To achieve this goal, descriptive examinations were carried out (see section 3), based on multivariate models for categorical variables (multinomial logistic regression, see Table 4), also referring to a model that holds account of the effects of interaction between independent variables (see Table 5). Furthermore, the relationship between the motivations expressed by parents regarding the choice of the school was taken into consideration, through the PISA 2018 parents' questionnaire, in which there is a question aimed at investigating the reasons behind this choice (see section 4). In the analysis, a distinction was made between sons and daughters in order to observe significant differences. Finally, the data was summarized through an analysis of the main components (see Table 7), which led to outlining a differential investment based on the social class of origin and students' gender.

Class origins play a key role in determining how students and families choose a school. A significant association was observed between students' socio-economic and cultural background (measured via the ESCS index) and school choices at the upper secondary level. Students from higher classes tend to choose and attend "general" schools (*licei*), while students from lower social classes attend mainly professional and technical schools. These results clearly indicate that the higher the level of family background, the higher the likeliness children will enrol in more prestigious fields of study.

By focusing on the relationship between social origins and school-choice controlled for gender, we observed that girls with both higher and lower social origins attend *licei* more frequently than boys. This result is

to be considered an initial empirical confirmation of the hypothesis that parents' educational investment in their children differs according to the students' gender. To confirm and further quantify this relationship, a multinomial logistic regression model was used. This model clearly showed that girls are more likely to attend *licei* than technical or vocational schools. In addition, another important finding emerged from the model: as compared to native students, migration background seems to penalize foreign students from the first generation most intensely and students from the second generation to a slightly lesser extent, thus revealing another, deep-seated form of inequality in the Italian education system.

Additionally, using a more complex model highlighting interaction effects between gender and social class, we noticed that, within same social class, girls' chances of attending the most prestigious track are clearly greater than those of boys. The model also shows that, for both male and female students, the effect of social class does not grow linearly; rather, it is much stronger for the sons and daughters of high social status parents than for their peers with medium-high status parents (these latter do enjoy a relative advantage, but it is not as strong as for the former). The social dynamic is similar regardless of gender. The real difference in terms of gender lies in the intensity of the effect induced and produced by social origin.

Finally, after synthesising the data via PCA, three macro dimensions stand out in terms of the reasons parents give for choosing schools for their children (see Tables 7 and 8). The most remarkable dimension is that of the "Quality and reputation" of the schools being chosen; the second dimension concerns "Internationalization" and the last one "Familiarity and closeness", conceived as cultural and physical proximity. Through an analysis of variance, we found that families from the higher and middle classes appear to be more attentive to educational contexts and learning opportunities, but – in the same status category – families show greater interest in and concern for these aspects when choosing schools for girls than for boys. These results support the hypothesis that differential investment is at play, differing not only by social class but also by gender. Family background and gender do not operate as two separate dimensions of inequality; rather, they are intermingled in the moment when parents both choose a kind of school for their children and when they select the specific institution.

Finally, it must be underlined that the effect of institutional differentiation (school tracking) is combined with families' preferences on the basis of school reputation, perceived quality and educational focus. Indeed, in a quasi-market regime schools are looking to seize as large as possible a share of new enrolments as well as the most excellent performers.

According to the theory of cumulative inequalities – expressed through the «systematic bias hypothesis» (Giancola, 2009) – the institutional division of schooling into tracks (due explicitly to the design of the Italian educational system) works together with social distinction (an implicit and invisible set of process) to generate a scenario rife with structural inequalities that educational policies are still struggling to address.

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7

Computer Skills and Employment. A Comparative Gender Study

Sara Binassi and Claudia Girotti

INTRODUCTION

The so-called fourth industrial revolution stems from a greater and growing connection between virtual systems (computer systems, the Internet of things and of services, artificial intelligence, etc.) and real systems (production, logistics and distribution facilities, products and services). It is closely related to Industry 4.0, which has pervaded the manufacturing sector in recent years. Business Plan 4.0, managed by the Italian Ministry of Economic Development, has put in place a series of tax breaks and incentives both on capital goods and on human capital for the digital development of companies. Thanks to this plan, digitalisation is gradually involving the other sectors of the economy, primarily services, in order to allow small - and medium-sized enterprises to equip themselves with the necessary tools to support the digital transformation (Ministry of Economic Development, 2017). These are very important initiatives, especially given Italy's delay in terms of digitisation compared to other countries of the European Union (ISTAT, 2019).

A policy paper produced by UNESCO for the EQUALS Skills Coalition underscores how digital skills – optional in past years – have now become fundamental to avoid remaining isolated from local, national and global communities. «Against this backdrop, education systems are trying to ensure equitable, inclusive and high-quality digital skills education and training. These efforts carry special urgency because digital skills open pathways to further learning and skills development» (UNESCO, 2019: 10). However, globally there is a growing gender gap in digital skills. Women are increasingly being left behind, both in terms of access to digital technologies and degree of learning, but above all also because of prejudices and socio-cultural norms that lead to digital exclusion (OECD, 2018).

The demand for skills is constantly evolving, and the incomplete knowledge of this issue both on the part of businesses and educational institutions is at the root of a disconnect between the demand and supply of these skills (Osservatorio delle Competenze Digitali, 2019). This

problem is aggravated by well-known gender inequalities: according to the ranking of the *Global Gender Gap Report 2020* (WEF, 2020), Italy is 76th out of 153 countries in the world for its ability to bridge gender differences. ISTAT (2020) data also reveal a considerable employment gap: while the situation has improved over the last decade, women continue to experience a higher unemployment rate than men and consistently lower wages. Even in terms of digitisation, influenced by stereotypes and clichés, women are at risk of being excluded from the digital transformation, only men having the opportunity to acquire the skills necessary to deal with and manage it (European Commission, 2018).

There is clearly a paucity of women in the technical and scientific fields. In fact, female STEM graduates (Science, Technology, Engineering and Maths) are still few: AlmaLaurea (2019c) data on the 2018 Graduates' Profile show that among Italian STEM graduates there are more men, reaching 59.0%, whilst women predominate among non-STEM graduates, accounting for almost two out of three. This has also been confirmed by the European Institute for Gender Equality, which has estimated that STEM disciplines are those with the greatest gender gap across the education system (EIGE, 2018).

The purpose of this chapter is to identify gender differences in computer literacy of graduates in Italian universities, including differences in employment, remuneration and the main characteristics of their jobs. Data refer to the two AlmaLaurea surveys of 2018 on the Profile and Employment status of graduates. The former provides a comprehensive and detailed snapshot of the main characteristics of graduates, including university performance, study conditions at the university and the experiences and skills acquired during their studies (AlmaLaurea, 2019a). The latter, on the other hand, examines the educational and work experience of graduates at one, three and five years after graduation, as well as the characteristics of the work carried out – including wage – and the consistency between studies and the work carried out and the profession itself (AlmaLaurea, 2019b). AlmaLaurea, founded in 1994, is an Interuniversity Consortium including, in 2020, 76 Italian Universities, corresponding to about 90% of students who graduate each year.

1. COMPUTER SKILLS OF GRADUATES

The AlmaLaurea questionnaire on the Graduates' Profile includes information which is used to fill in the CV of the graduates in AlmaLaurea databank. In recent years, CVs have been further enriched with a specific section dedicated to digital skills. However, for the graduate cohort analysed in this chapter, this information is not available. Therefore, the focus is on IT skills and not on broader digital skills. Nevertheless, this type of data allows to collect information relating to the computer skills acquired during university studies and to assess knowledge of eleven different IT tools: *i)* operating systems; *ii)* programming languages; *iii)* word

processors; *iv*) spreadsheets; *v*) databases; *vi*) CAD, CAM, CAE - assisted design; *vii*) Internet browsing and communications; *viii*) website development; *ix*) data networks; *x*) multimedia (sound, image, video processing); *xi*) presentation tools.

These are self-assessments made by students at graduation relating to their level of knowledge of each IT tool, based on the following scale: “none”, “limited”, “fair”, “good”, “excellent”. Therefore, caution must be exercised when interpreting data, due to the subjectivity with which the individual assesses his/her skills. However, since self-assessments can be overestimated, that they are closely linked to objective aspects, such as employment status, remuneration and the type and feature of job carried out.

Data refer to over 280,000 first- and second-level graduates in 2018 involved in the Graduates' Profile Survey. Some IT tools such as browsing the Internet have been mastered by almost all the graduates, so much so that 88.6% of 2018 graduates declare to have at least a “good” knowledge of this skill (where “good” stands as the aggregate of “good” and “excellent” responses; Figure 1). Other tools such as word processors and operating systems are also very widespread, mastered respectively at a good or even excellent level by 72.8% and 68.1% of graduates. Finally, tools such as programming languages, databases, CAD, CAM, CAE - assisted design, data networks and website development are known only to a minority of graduates, due to the relative specificity of the content intrinsic to the acquisition of related skills. Therefore, these tools are mastered to an at least a “good” extent by less than 15% of graduates.

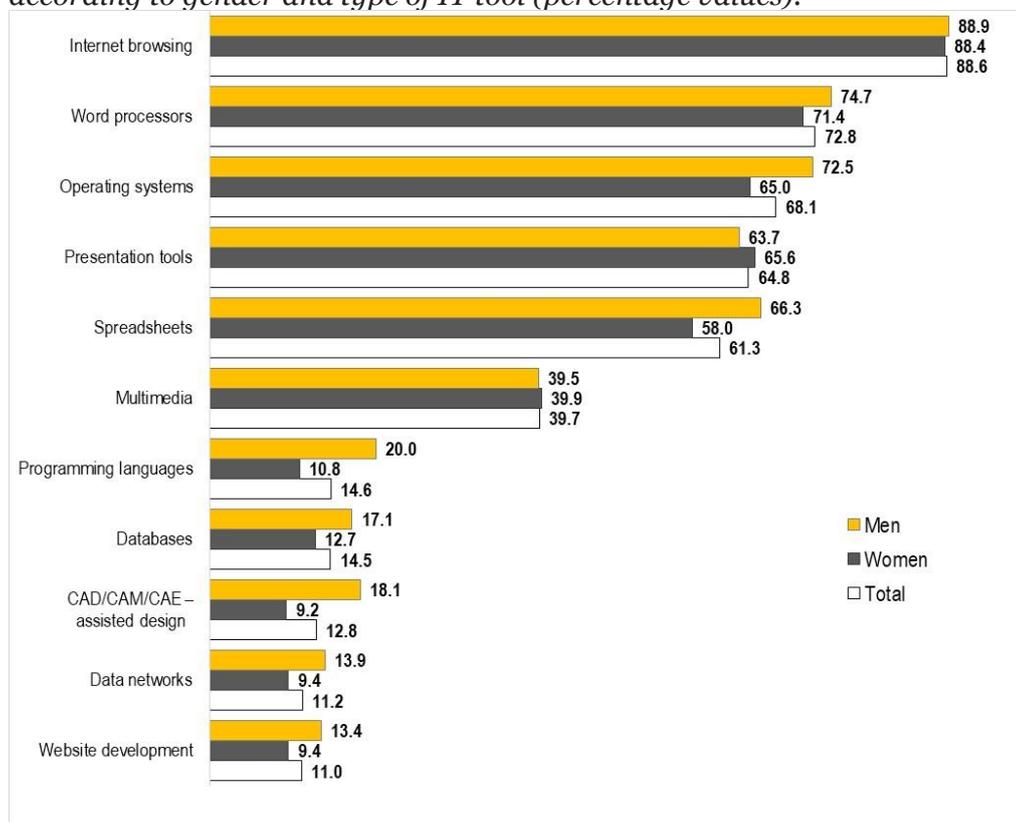
Broken down by gender there are interesting differences: except for presentation tools and multimedia, known to a slightly greater extent by women (respectively +1.9 and +0.4 percentage points compared to men), men have a higher knowledge of all the other surveyed tools, above all of programming languages (+9.2 percentage points compared to women), CAD, CAM, CAE - assisted design (+8.9 points), spreadsheets (+8.3 points) and operating systems (+7.5 points). Obviously, this situation reflects a significant compositional effect: women are in fact generally more present in fields of study where knowledge of computer tools is typically less widespread.

These trends are also generally confirmed at field of study and gender levels, albeit with some exceptions. More specifically, among all the tools for which women declare a greater knowledge than men, presentation tools are the ones for whom the female advantage has been confirmed in all fields of study. The gap is particularly evident in humanities, education and foreign languages. Contrary to what has been observed overall, however, in fields such as architecture, math, physics, natural sciences, medicine and psychology it is men who have a greater knowledge of multimedia tools. Finally, considering the tools for which men declare a greater knowledge compared to women, this situation was found to be true in almost every field of study. Programming languages were the exception in education, law and humanities, where women declared greater proficiency.

Some studies (Hargittai, Shafer, 2006; McLachlan et al., 2010) have shown the existence of a different attitude between men and women in

their approaches to technological skills. There is a different perception both in terms of level of interest in new technologies and in terms of the difference between the level of skill that they believe they possess and reality. These studies have shown that women more than men tend to perceive the use of computer and digital skills as unattractive, but above all women tend to underestimate their own digital skills more often than their male counterparts. Mitra and colleagues (2000: 81) highlights that «the process of acceptance of computer technology is related to gender where the women are far more cautious about exhibiting a positive attitude than men. However, when the functionality of a technology has been demonstrated within the context of a specific process, in this case the “learning process”, women tend to embrace the technology and are often more positively pre-disposed».

FIGURE. 1. Graduates in 2018 having at least a “good” knowledge of IT tool, according to gender and type of IT tool (percentage values).



Source: elaboration by authors from AlmaLaurea data on Graduates’ Profile Survey

2. FEATURES OF GRADUATES WITH A GOOD KNOWLEDGE OF COMPUTER TOOLS

Considering all the IT tools surveyed, the characteristics of graduates who declared to have at least a “good” knowledge of five or more IT tools (on

the eleven surveyed) are analysed below, compared with those who declare to know at most two tools, regardless of which ones.

The share of 2018 graduates who declared at least a “good” knowledge of five or more IT tools is 50.8%. On the other hand, 20.8% of graduates know at most two tools, with differences by the type of degree programme: among the ones who completed two-year masters the percentage rises to 60.4%, while it falls among first-level graduates (47.1%) and the ones who completed single-cycle masters (46.7%). Shares of graduates who know at least five IT tools in architecture (74.8%), math, physics, natural sciences (65.1%) and engineering (63.2%) are high. In contrast, the percentages of graduates with at least a “good” knowledge of five or more IT tools in the humanities (39.6%), physical education (39.3%) and law (39.2%) fields of study are decidedly low.

We now highlight the main features and the employment status of the graduates who declared to have at least a “good” knowledge of several computer tools. The main employment outcomes are analysed below, separately for graduates with at least a “good” knowledge of five or more IT tools and those with a good knowledge of at most two tools. In this case, first-level graduates who after graduation chose not to continue their studies with another degree programme and second-level graduates in 2017 were interviewed in 2018, one year after graduation.

Data elaboration show that men are more likely to be among those who have at least a “good” knowledge of five or more IT tools (43.0%) compared to the share of men who have limited knowledge of IT tools (34.6%). Moreover, among graduates with a good knowledge of a large number of computer tools, the employment rate is 72.5%, compared to 64.3% for those who declare to know at most two tools (Figure 2). Gender analysis found that for men the greater knowledge of IT tools translates into an employment advantage equal to 11.1 percentage points (employment rate: 77.3% versus 66.2% for those who declare to know at most two tools). Instead, for women the increase in the employment rate is smaller, equal to 5.6 points (employment rate: 68.9% compared to 63.3%).

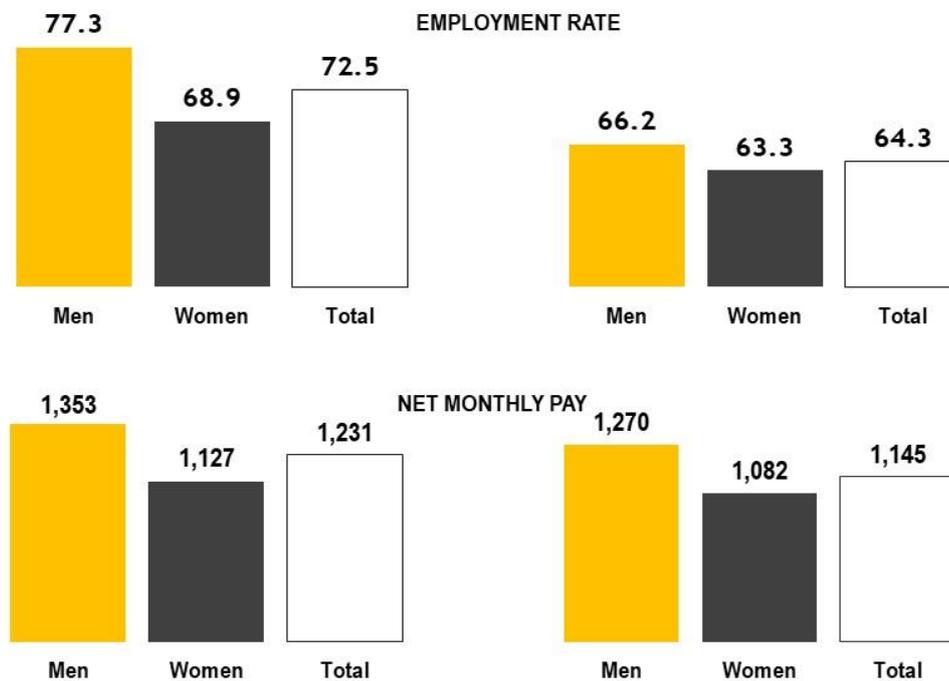
In terms of wages, the advantage of having good computer skills is confirmed: overall, one year after graduation, the net monthly pay is equal to an average of €1,231 compared to €1,145 for those who declare to know at most two computer tools. Among those who declare to know at least five IT tools, men receive €1,353 net monthly (+6.5% compared to those who declare to know at most two tools), while women receive €1,127 (+4.2% compared to those who declare to know at most two tools).

Therefore, gender gaps are greater among those who have good computer skills: the advantage of men over women in terms of employment is 8.4 percentage points among those who know at least five computer programs and 2.9 points among those who know at most two programs. However, the advantage of men over women in terms of wages is 20.1% and 17.4%, respectively.

The outcomes are consistent with what AlmaLaurea has traditionally found out with respect to the employment and wage advantages related to computer skills and gender. In particular, all else being equal, a good knowledge of at least five computer tools and being a man increases the probability of being employed one year after graduation (+21.4%

compared to those who know at most two computer tools and +19.2% compared to women). A similar advantage is observed with respect to wages (AlmaLaurea, 2020). Nonetheless, it should be remembered that employment outcomes are strongly affected by multiple factors aside from gender, including the field of study. Graduates with at least a “good” knowledge of five or more IT tools belong mainly to the field of architecture, math, physics, natural sciences, and engineering which are usually likely to generate better performance in the labour market. In contrast, graduates with a more limited knowledge of IT tools come mainly from fields of study with lesser employment chances.

FIGURE 2. *Employment rate and net monthly wage of 2017 graduates interviewed one year after graduation, by gender and number of known IT tools (percentage values and average values in euros)*

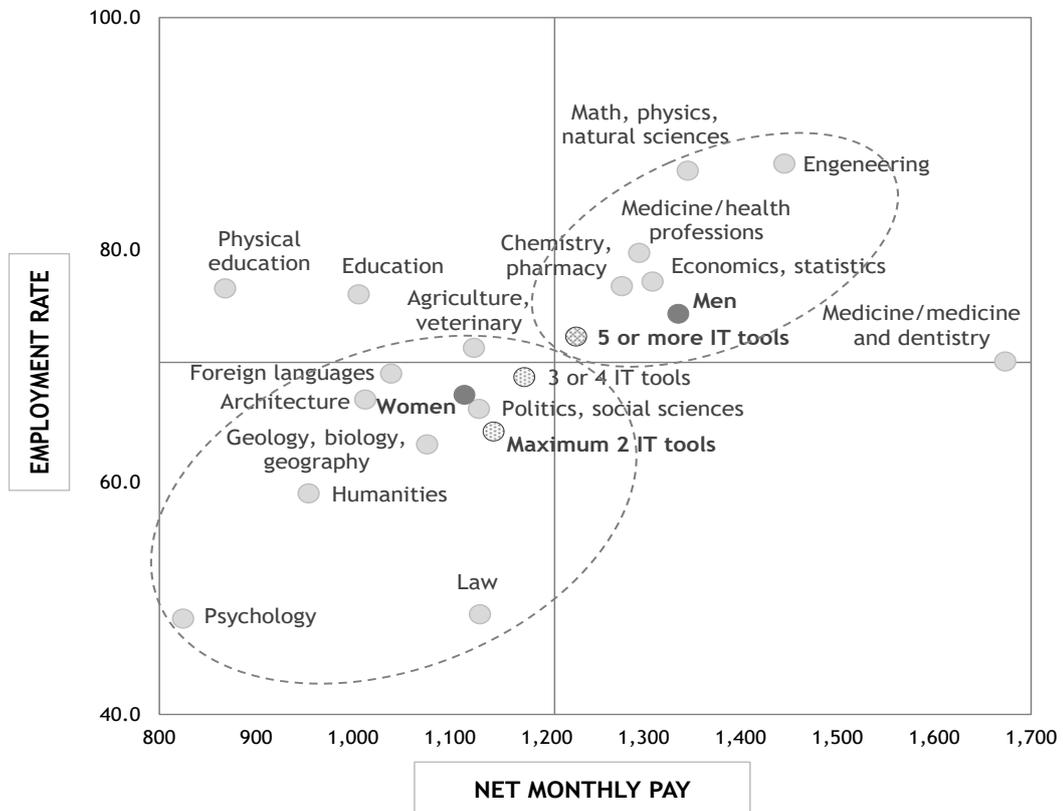


Source: elaboration by authors from AlmaLaurea data on Graduates’ Profile and Employment Status Survey. Note: for the first level only graduates not enrolled in another degree programme are considered.

In Figure 3 the X axis shows the net monthly pay received by graduates, and the Y axis shows the employment rate. The axes correspond to the average values observed for all graduates (€1,208 and 70.3%, respectively). On this chart the average values observed were projected according to the number of known computer tools, the fields of study and gender. Graduates with at least a “good” knowledge of five or more IT tools are placed in the above-average quadrant both in terms of employment and remuneration, together with fields which are traditionally known for generating good employment performance, such as the engineering and math, physics, natural sciences fields of study, and the male component. Conversely, graduates with a more limited knowledge of IT tools (less than five) are positioned in the below-average employment performance

quadrant, together with fields known to have low employability in the labour market, such as law, psychology and humanities, and women.

FIGURE 3. *Employment rate and net monthly pay of 2017 graduates one year after graduation, by gender, number of known IT tools and field of study (percentage values and average values in euros)*



Source: elaboration by authors from AlmaLaurea data on Graduates' Profile and Employment Status Survey. Note: for the first level only graduates not enrolled in another degree programme are considered.

3. COMPUTER SKILLS AND EMPLOYMENT: CLUSTER ANALYSIS OF GRADUATES

We furtherly expanded the study of IT tools knowledge through a multiple correspondence analysis (MCA) and then we associated it with a subsequent cluster analysis. Via MCA we reduced the complexity of the phenomenon in question by grouping the different IT tools surveyed into a fewer number of variables while via cluster analysis we generated homogeneous groups of graduates sharing the same level of computer skills¹.

¹ Graduates from first and second levels in the field defence and security together with graduates from two-year second-level in law were not included in the analysis given both their small numbers and the peculiarity of their field of studies.

TABLE. 1a. *Main features of graduates clusters (percentage values and average values in euros)*

	IT Adverse	IT Ordinary Users	IT Super Specialists	IT Excellent Users	Total
Gender (%)					
Men	38.6	38.1	48.0	48.1	44.0
Women	61.4	61.9	52.0	51.9	56.0
Degree programme type (%)					
First-level	32.7	26.9	26.7	19.8	24.8
Two-year second-level	46.5	55.7	60.1	65.6	58.6
Single-cycle second-level	20.9	17.4	13.2	14.6	16.7
Field of study (%)					
Agriculture, veterinary	3.1	3.0	1.4	2.4	2.6
Architecture	4.3	4.1	6.1	8.1	6.3
Chemistry, pharmacy	5.7	5.3	3.1	4.4	4.8
Economics, statistics	11.7	18.4	15.8	21.3	18.0
Physical education	4.9	3.3	2.7	2.3	3.2
Geology, biology, geography	3.2	3.5	2.0	3.5	3.4
Law	7.4	5.5	5.1	3.3	4.9
Engineering	9.7	10.8	23.4	20.4	16.1
Education	6.8	5.8	4.8	3.7	4.9
Humanities	10.3	8.9	7.0	5.3	7.3
Foreign languages	6.6	7.6	3.9	4.4	5.4
Medicine	8.9	7.0	5.0	6.2	7.0
Politics, social sciences	9.3	9.7	9.2	8.1	8.7
Psychology	6.0	5.9	3.4	3.8	4.7
Math, physics, natural sciences	2.1	1.2	7.2	2.8	2.6
Post-degree educational activity (%)	39.4	44.5	41.4	46.9	44.2
Employed graduates: employment status at graduation (%)					
Continuing work held before graduation	34.5	29.0	31.8	26.7	29.4
Not continuing work held before graduation	13.6	14.7	14.0	14.7	14.4
Started working after graduation	51.9	56.2	54.2	58.5	56.1
Type of work (%)					
Self-employment	10.7	9.2	8.9	9.7	9.9
Permanent contract	20.0	18.4	27.5	23.0	21.7
Training contract	9.2	12.4	13.4	15.3	13.1
Non-standard	37.2	39.0	32.5	35.1	36.1
Semi-subordinate	3.3	3.5	3.2	3.1	3.2
Other kinds of self-employment	8.3	7.6	5.9	6.7	7.2
Without a contract	10.7	9.5	8.2	6.6	8.3
Part-time (%)	45.0	39.5	34.3	29.4	35.5
Net monthly pay (average, in euros)	1,003	1,034	1,136	1,155	1,094
Company Sector (%)					
Public	17.2	14.7	14.0	12.2	14.1
Private	75.8	79.0	81.1	82.9	80.2
Non-profit	6.7	6.2	4.7	4.7	5.5
Branch of Economic Activity					
Agriculture	1.1	1.3	0.7	1.2	1.2
Engineering industries and precision engineering industries	3.2	4.8	5.9	6.8	5.5
Building industry	3.1	3.4	4.2	6.0	4.7
Chemistry/Energy	2.9	4.2	3.6	5.0	4.3
Manufacturing industry	3.5	4.6	5.3	5.8	5.0
Industry	12.8	17.1	18.9	23.6	19.4
Commerce	18.9	16.3	14.1	13.8	15.6
Credit and insurance	2.9	4.5	4.7	4.8	4.2
Transport, advertising and communications	4.1	4.8	5.1	5.0	4.7
Consulting	9.4	10.5	11.1	13.0	11.5
Computer science	2.4	2.3	9.7	5.6	4.4
Other services for companies	2.2	2.6	2.6	2.6	2.5
Public administration, armed forces	3.0	2.2	3.0	2.0	2.3
Education and research	12.9	12.7	10.6	9.4	10.9
Healthcare	9.2	7.5	5.4	6.6	7.4
Other services	20.0	17.0	13.1	11.5	14.7
Services	84.9	80.4	79.3	74.1	78.3
Profession (%)					
Managers, entrepreneurs and legislators	1.7	1.2	1.5	1.4	1.4
Professionals and other specialised professions	41.8	44.5	48.8	50.7	47.2
<i>Engineer, architect</i>	5.7	7.0	12.0	14.6	10.9
<i>Software analyst and developer</i>	1.5	1.6	7.2	3.9	3.1
<i>Medical doctor</i>	5.0	3.9	2.3	3.3	3.8
<i>Pharmacist and veterinarian</i>	5.6	4.7	3.1	3.8	4.4
<i>Project manager</i>	6.5	9.8	9.4	12.4	10.2
<i>Teacher, professor</i>	13.1	12.5	9.8	8.3	10.4
<i>Other highly specialised profession</i>	4.4	5.0	4.8	4.4	4.5
Technical profession	24.3	22.8	24.5	22.6	23.2
Office professional	11.3	13.9	10.9	12.1	12.1
Other less qualified profession	19.3	15.8	13.0	11.6	14.4
Effectiveness of the degree for the current job (%)					
Very eff./effective	48.8	50.1	52.9	55.0	52.4
Fairly effective	25.0	27.8	27.6	27.8	27.0
Not very effective/ineffective	26.2	22.1	19.5	17.2	20.5

Source: elaboration by authors from AlmaLaurea data on Graduates' Profile and Employment Status Survey.

The study variables involved are the eleven IT tools surveyed and described above while the illustrative variables cover the following topics: *a*) socio-demographic features: gender and family background (social class and parents' education); *b*) high school education: type of diploma and grade obtained; *c*) university education: reasons for enrolment, geographical area of the university, field of study, type of degree, graduation grade, time of completion, internship, study abroad and work experiences during studies; *d*) employment status after graduation: post-degree educational activity, continuing in the job held before graduation, company's branch of economic activity, company's sector, geographical area where working, profession, type of work, full-time/part-time work, wage, job satisfaction, effectiveness of the degree, usefulness of the education acquired during the university experience, job search.

Of the eleven factorial axes identified with the multiple correspondence analysis, attention has been focused on the first two factorial axes that account for a total of 49.0% of total variance². The first axis (32.5%) split those who possess computer skills from those who do not. The second axis (16.5%) discriminates those who declare to master good extent more specific computer skills such as the ability to develop websites, set up data networks, code using programming languages, manage databases and CAD, CAM, CAE - assisted designs from those who declare that they have a good knowledge of cross-cutting and widespread computer tools such as operating systems, word processors, spreadsheets, presentation tools and Internet browsing.

After identifying the factorial axes, the cluster analysis generated four homogeneous groups of graduates which are differently positioned with respect to the mastering of computer skills (the dichotomy being "at least good knowledge" versus "limited or no knowledge"). Table 1a shows the main socio-demographic, educational and employment characteristics of each cluster. Table 1b shows the same features of each cluster, broken down by gender. Data are briefly described below.

The cluster called *IT Adverse* includes 24.7% of those employed and consists of graduates who declare limited or no knowledge of all the IT tools surveyed. They are mainly women (61.4%) with a first-level degree (32.7%) or a single-cycle master degree (20.9%). Compared to the average, they come mainly from humanities, law, education and medicine, but also from physical education, psychology and foreign languages. These fields of study are predominantly female. Respondents in this cluster were largely integrated into the labour market already at the time of graduation: indeed, one year after graduation 34.5% continued to work in the job they held before graduation. Compared to the overall population of employed graduates, respondents in this cluster work to a greater extent under non-standard contracts, especially fixed-term contracts (37.2%) or without any contract (10.7%); for women in this cluster the percentages rise to 40.3% and 11.8%, respectively. The number of self-employed graduates is also slightly higher (10.7% overall), falling to 8.8%

² The choice of the first two axes derives from the analysis of the average self-value, according to the Kaiser criterion.

among women. The net monthly pay of €1,003 is well below the average, also because of to the substantial share of part-time workers (45.0%).

TABLE 1b. Main features of graduates clusters by gender (percentage values and average values in euros)

	IT Adverse		IT Ordinary Users		IT Super Specialists		IT Excellent Users		Total	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Gender (%)										
Men	100.0	-	100.0	-	100.0	-	100.0	-	100.0	-
Women	-	100.0	-	100.0	-	100.0	-	100.0	-	100.0
Degree programme type (%)										
First-level	33.5	32.1	25.8	27.6	27.9	25.5	18.5	20.9	23.6	25.7
Two-year second-level	48.0	45.5	58.5	54.0	62.3	58.1	69.2	62.4	62.3	55.7
Single-cycle second-level	18.5	22.3	15.7	18.4	9.7	16.4	12.3	16.7	14.1	18.7
Field of study (%)										
Agriculture, veterinary	3.8	2.6	3.7	2.5	1.4	1.3	2.7	2.1	3.0	2.3
Architecture	5.3	3.7	4.8	3.7	5.7	6.6	8.4	7.9	7.0	5.8
Chemistry, pharmacy	4.1	6.8	4.0	6.1	1.6	4.5	3.2	5.5	3.4	5.9
Economics, statistics	15.5	9.4	23.3	15.4	17.7	14.1	22.9	19.9	20.9	15.7
Physical education	7.7	3.1	5.4	2.0	3.2	2.1	2.9	1.7	4.4	2.2
Geology, biology, geography	2.8	3.4	3.0	3.9	1.4	2.5	2.8	4.2	2.8	3.8
Law	8.0	6.9	6.2	5.0	4.3	5.8	3.2	3.5	4.8	4.9
Engineering	19.2	3.8	20.7	4.7	38.0	9.9	32.6	9.0	28.1	6.8
Education	1.3	10.3	1.1	8.8	0.4	8.9	0.5	6.6	0.7	8.2
Humanities	8.0	11.7	6.9	10.2	3.7	10.0	3.2	7.2	4.9	9.2
Foreign languages	2.3	9.2	2.6	10.6	1.0	6.6	1.3	7.2	1.7	8.4
Medicine	8.2	9.3	6.9	7.0	3.9	6.0	5.6	6.8	6.3	7.6
Politics, social sciences	7.9	10.1	7.8	10.8	5.7	12.4	5.3	10.8	6.3	10.7
Psychology	2.6	8.2	2.5	8.0	1.6	5.1	1.7	5.8	2.0	6.8
Math, physics, natural sciences	3.3	1.3	1.1	1.3	10.3	4.2	3.9	1.8	3.8	1.7
Post-degree educational activity (%)	37.4	49.7	44.9	44.2	39.0	43.6	44.7	49.0	42.6	45.4
Employed graduates: employment status at graduation (%)										
Continuing work held before graduation	34.2	34.7	28.6	29.3	28.5	34.8	25.3	28.0	28.1	30.5
Not continuing work held before graduation	11.8	14.7	12.7	16.0	13.1	14.8	13.3	16.1	12.8	15.6
Started working after graduation	54.0	50.6	58.6	54.7	58.4	50.4	61.3	55.9	59.0	53.8
Type of work (%)										
Self-employment	13.7	8.8	12.1	7.4	10.4	7.6	11.5	8.1	12.0	8.2
Permanent contract	22.4	18.5	21.4	16.5	30.8	24.5	26.8	19.4	25.2	18.9
Training contract	10.3	8.6	14.0	11.4	17.0	10.2	17.0	13.8	15.0	11.7
Non-standard	32.3	40.3	33.9	42.2	26.9	37.7	30.7	39.1	31.3	39.9
Semi-subordinate	3.1	3.4	3.4	3.6	3.3	3.1	2.6	3.5	2.9	3.4
Other kinds of self-employment	8.7	8.0	7.7	7.5	5.0	6.7	6.2	7.2	6.9	7.5
Without a contract	8.9	11.8	7.0	11.0	6.3	9.9	4.9	8.2	6.2	9.9
Part-time (%)	38.3	49.2	32.1	44.0	26.6	41.4	22.1	36.2	27.6	41.7
Net monthly pay (average, in euros)	1,120	931	1,150	963	1,271	1,013	1,278	1,042	1,223	994
Company Sector (%)										
Public	14.2	19.1	12.2	16.2	10.6	17.1	9.6	14.7	11.1	16.4
Private	81.2	72.4	83.3	76.3	86.8	75.9	87.4	78.7	85.3	76.3
Non-profit	4.4	8.1	4.3	7.4	2.5	6.8	2.9	6.4	3.4	7.1
Branch of Economic Activity										
Agriculture	1.8	0.7	2.1	0.8	1.0	0.4	1.6	0.8	1.7	0.8
Engineering industries and precision engineering industries	5.4	1.8	8.2	2.8	9.1	2.9	10.1	3.7	8.7	3.0
Building industry	4.9	2.0	5.2	2.3	4.5	3.8	7.3	4.7	6.3	3.4
Chemistry/Energy	3.7	2.5	5.0	3.7	4.4	2.9	5.9	4.3	5.1	3.6
Manufacturing industry	4.3	3.1	5.5	4.1	6.7	3.9	7.1	4.6	6.2	4.0
Industry	18.2	9.4	23.8	13.0	24.8	13.6	30.4	17.2	26.3	14.0
Commerce	17.2	20.0	14.7	17.4	9.8	18.0	10.9	16.5	12.8	17.8
Credit and insurance	3.8	2.3	6.0	3.6	6.6	3.0	5.4	4.2	5.2	3.5
Transport, advertising and communications	4.5	3.8	4.9	4.7	4.7	5.5	4.9	5.1	4.8	4.6
Consulting	11.5	8.0	12.0	9.6	12.1	10.2	14.6	11.5	13.4	10.0
Computer science	4.1	1.3	2.9	1.9	15.2	4.6	8.0	3.4	6.8	2.6
Other services for companies	2.3	2.2	2.5	2.6	2.4	2.7	2.6	2.5	2.5	2.4
Public administration, armed forces	4.0	2.3	2.8	1.9	2.9	3.1	2.2	1.8	2.8	2.0
Education and research	7.4	16.3	7.0	16.2	7.0	13.9	5.4	13.2	6.2	14.7
Healthcare	8.0	9.9	6.9	7.9	3.6	6.9	5.6	7.5	6.2	8.3
Other services	16.2	22.4	13.2	19.3	9.2	16.7	7.7	15.0	10.5	18.0
Services	79.2	88.6	72.9	85.0	73.5	84.8	67.2	80.6	71.2	83.9
Profession (%)										
Managers, entrepreneurs and legislators	2.7	1.1	2.0	0.7	2.0	1.1	2.0	0.8	2.2	0.9
Professionals and other specialised professions	42.9	41.1	47.1	42.8	55.0	43.0	55.9	45.8	51.6	43.7
Engineer, architect	9.5	3.3	12.4	3.7	17.7	6.8	21.4	8.4	17.1	6.0
Software analyst and developer	2.8	0.7	2.3	1.2	12.1	2.7	6.0	2.0	5.0	1.5
Medical doctor	5.6	4.7	4.8	3.3	2.2	2.5	3.4	3.2	4.0	3.6
Pharmacist and veterinarian	3.7	6.7	3.2	5.6	1.6	4.6	2.6	4.8	2.9	5.5
Project manager	9.1	4.9	12.8	7.9	11.0	7.9	14.0	10.8	12.5	8.4
Teacher, professor	7.6	16.6	6.8	16.1	6.0	13.4	4.3	12.0	5.5	14.2
Other highly specialised profession	4.7	4.3	4.9	5.0	4.5	5.2	4.2	4.6	4.4	4.6
Technical profession	24.8	24.1	23.3	22.5	24.8	24.2	21.8	23.2	22.9	23.4
Office professional	11.0	11.5	12.1	14.9	7.8	13.8	9.9	14.2	10.3	13.5
Other less qualified profession	17.1	20.7	13.8	17.1	9.6	16.2	8.8	14.2	11.5	16.7
Effectiveness of the degree for the current job (%)										
Very eff./effective	47.9	49.3	50.7	49.8	55.7	50.3	56.7	53.4	53.7	51.4
Fairly effective	27.4	23.6	28.9	27.1	28.9	26.4	28.7	26.9	28.4	25.9
Not very effective/ineffective	24.7	27.1	20.4	23.1	15.4	23.4	14.6	19.7	17.9	22.6

Source: elaboration by authors from AlmaLaurea data on Graduates' Profile and Employment Status Survey.

Men have a higher net monthly pay than women (€1,120 compared to €931). This is also due to the higher prevalence of female part-time work:

49.2% compared to male part time work 38.3%). It is more likely that *IT Adverse* graduates, mainly women, work in the public sector (17.2%) or in non-profit organizations (6.7%). The vast majority are employed in the services sector (84.9%), above all in social and personal, cultural and sports recreation services (20.0%), commerce (18.9%), education and research (12.9%), consulting (9.4%) and healthcare (9.2%). 41.8% of *IT Adverse* graduates are in highly specialised professions like teacher/professor (13.1%), 24.3% in technical professions (predominantly in the social, recreational, cultural and sporting sectors) and 19.3% are in less qualified jobs, including those in the commercial and service sectors such as shopkeepers and clerks. Finally, *IT Adverse* graduates declare the widest mismatch between their studies and their jobs contents: 26.2% of those consider their degree not very or not at all effective while performing their job tasks. Women are more likely than men to report a lack of consistency between degree and job (27.1% compared to 24.7%).

The *IT Ordinary Users* cluster comprises 16.1% of those employed and is characterised by graduates who declare a good knowledge of some basic computer tools, such as word processors and Internet browsing, and limited or even no knowledge of the other programs surveyed. Again, in this case, the female component (61.9%) and the share of first-level graduates (26.9%) and single-cycle masters (17.4%) are significantly higher than the average, particularly for those graduated in foreign languages, humanities, and psychology. These fields are predominantly female. Compared to what was observed for all employed graduates, those who belong to the *IT Ordinary User* cluster are likely to work to a greater extent in non-standard contracts especially a fixed-term contract (39.0%) or without any contract (9.5%). This is very likely among women, whose percentages rise to 42.2% and 11.0%, respectively. The net monthly pay is below average, amounting to €1,034 per month net (€1,150 for men and €963 for women). Part-time work accounts for 39.5% of those employed, a share which is higher than the overall average. Part-time work amounts to 32.1% of men and 44.0% of women belonging to the *IT Ordinary User* cluster. Services sector absorbs 80.4% of the graduates of the cluster (72.9% among men and 85.0% among women), in particular the field of social and personal services and recreation, cultural and sports services (17.0%), commerce (16.3%) and education and research (12.7%). 44.5% hold a highly specialised profession, such as teacher/professor (12.5%), 22.8% a technical profession, 13.9% an executive profession in the office, while 15.8% hold other less qualified professions, predominantly in the commercial and service sectors as shopkeepers and clerks. One year after graduation, half of those employed report they are working in jobs for which their degree is “very effective” or in any case “effective”. However, a share of 22.1% of graduates belonging to *IT Ordinary Users* cluster outline that their degree is not very or not at all effective (respectively 20.4% and 23.1% for men and women).

A third cluster that we define as composed by graduates who are *IT Super Specialists* represents a niche of respondents (5.4% of those employed). Those graduates declared to have a good knowledge of some specific IT tools: databases, website development, data networks, programming languages, multimedia, CAD, CAM, CAE - assisted design,

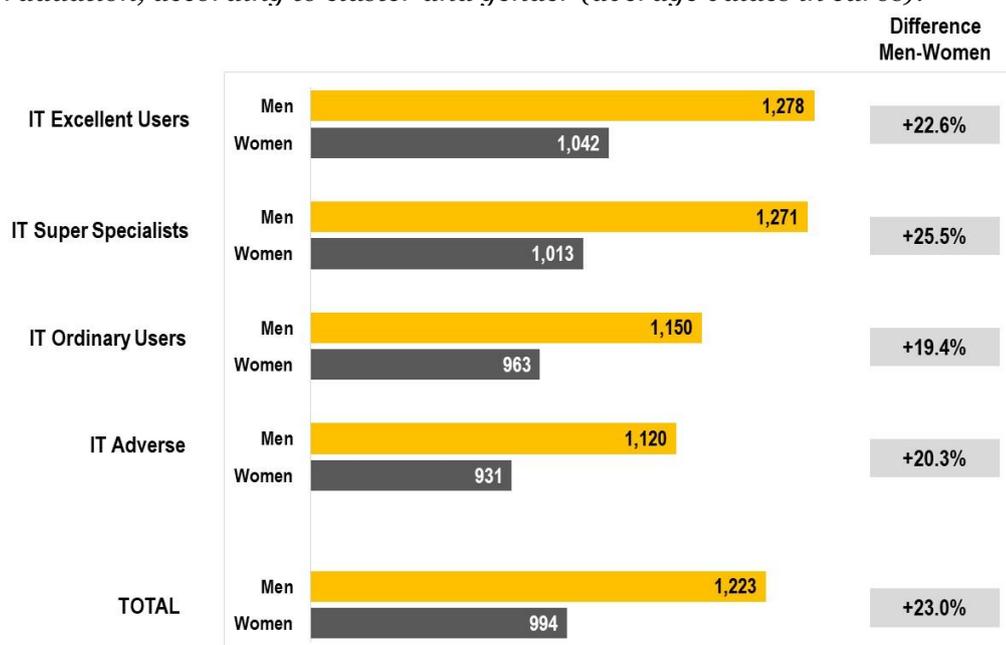
and also word processors. Among *IT Super Specialists*, the male component is equal to 48.0%. This percentage is higher than the share of men in the population of employed graduates (44.0%). Consequently, the female component is equal to 52.0% among *IT Super Specialists* and 56.0% in the overall population. More than average *IT Super Specialists* are first-level (26.7%) or two-year masters graduates (60.1%) in engineering and math, physics or natural sciences. These fields of study are predominantly male. 31.8% of *IT Super Specialists* - a share higher than the average of the overall sample - are employed in the same job they had before graduation. The share is 28.5% for men and 34.8% for women. To a lesser extent, however, 54.2% of the employed started their current job after graduation (58.4% for men and 50.4% for women). Only a slight percentage (27.5%) of *IT Super Specialists* is hired with a permanent contract, (30.8% among males and 24.5% among females) and 34.3% is working part-time (26.6% among males and 41.4% among women). *IT Super Specialists* receive a significantly higher than average net monthly pay of €1,136. A gender pay gap is however evident since on average men earn €1,271 while women €1,013. Services is the widest employing sector of *IT Super Specialists* with 79.3% of employed graduates working in it (73.5% of men and 84.8% of women). Among services, computer science is the widest with a percentage of 9.7%; this share reaches 15.2% of men. Compared to the total of graduates who were employed one year after graduation, the *IT Super Specialists* mostly work in highly specialised professions (48.8%), especially those of software analyst and designer (7.2%) and engineer and architect (12.0%), but also in technical professions (24.5%), mainly in the scientific and engineering sectors as surveyors, junior architects and computer programmers. Finally, one year after graduation the levels of degree effectiveness in job contents are broadly in line with the average: 52.9% declare that their degree is very effective or effective for their job (55.7% for men and 50.3% for women).

Just over half (53.9%) of the employed graduates belong to a cluster we defined *IT Excellent Users* which include the ones who reported a good knowledge of all the computer applications. Among *IT Excellent Users*, the male component is equal to 48.1%. This percentage is higher than the share of men in the population of employed graduates (44.0%). Consequently, the female component is equal to 51.9% among *IT Excellent Users* and 56.0% in the overall population. Compared to the average, among *IT Excellent Users* the share of two-year master's graduates (65.6%) is significantly higher, especially if we focus on graduates in economics, statistics, and engineering. These fields are predominantly male. *IT Excellent Users* report a greater propensity to continue their post-degree educational activity (46.9%; 44.7% for men and 49.0% for women), usually via internship. They largely entered the labour market only after graduation (58.5%; 61.3% for men and 55.9% for women). One year after graduation *IT Excellent Users* are employed more than the average with permanent (23.0%) or training contracts (15.3%). This is especially likely among men, whose percentages rise to 26.8% and 17.0%, respectively. Moreover, *IT Excellent Users* declare the highest pay levels (receiving on average €1,155 net per month; €1,278 in case of men and €1,042 in case of women) and the lowest diffusion of part-time work (29.4%; equal to

22.1% for men and 36.2% for women). Compared to the average, they are massively employed in the private sector (82.9%), mainly in industry (23.6%): engineering industries and precision engineering industries (6.8%), building industry (6.0%), manufacturing industry (5.8%) and chemistry/energy (5.0%). Considering the services sector (74.1%), a higher share than average is employed in the consulting sector (13.0%) and computer science (5.6%). Men are employed more than women in the various branches of industry, as well as in the consulting and computer science. *IT Excellent Users* have the highest share of employment in highly qualified professions (50.7%) as engineers and architects (14.6%) or project managers (12.4%). One year after graduation, *IT Excellent Users* declare the highest degree of effectiveness of their studies in relation to job contents (55.0%; 56.7% for men and 53.4% for women).

Further analyses have been carried out to identify gender divides in computer skills and employments features. As AlmaLaurea (2020) reported, graduated women are at a disadvantage, especially with respect to wages and the consistency between the field of study and their job. As previously highlighted in our analyses within each cluster these gender disparities persist and are even wider in the clusters with the highest employment outcomes, precisely among *IT Super Specialists* and *IT Excellent Users*: the pay gap between men and women overall reaches 23.0% in favour of the former. The gender pay gap rises to 25.5% among *IT Super Specialists* and is 22.6% among *IT Excellent Users*. The gender gap, while still in favour of men, tends to narrow among clusters with the most unfavourable employment outcomes: it is 20.3% and 19.4% among *IT Adverse* graduates and *IT Ordinary Users* respectively (Figure 4).

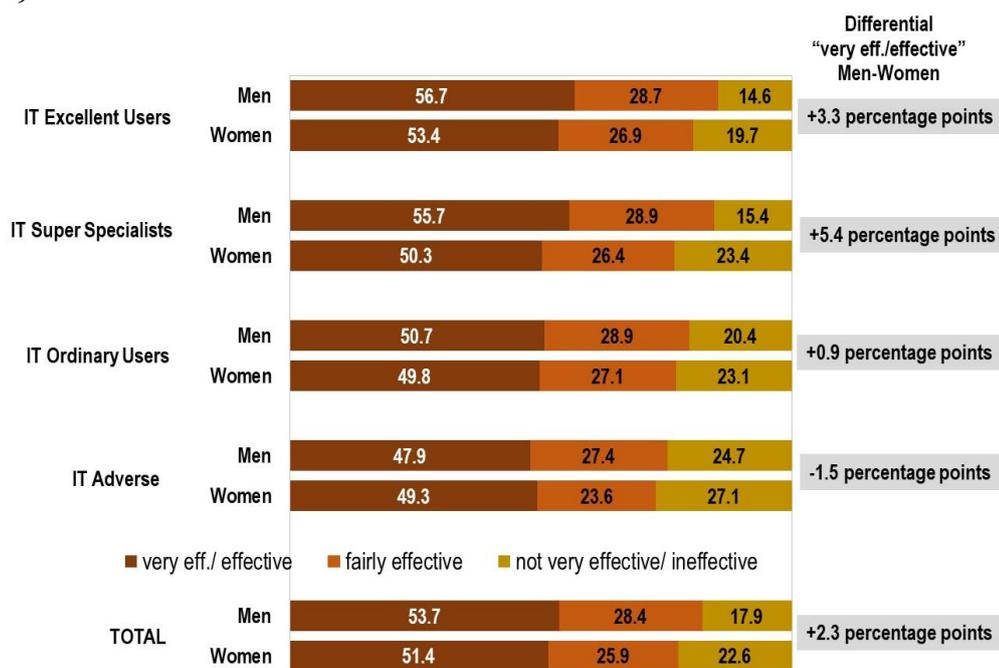
FIGURE 4. Net monthly pay of 2017 employed graduates one year after graduation, according to cluster and gender (average values in euros).



Source: elaboration by authors from AlmaLaurea data on Graduates' Profile and Employment Status Survey

Even in terms of the effectiveness of the degree we observe some differences between clusters (Figure 5). The gender gap is higher among *IT Super Specialists* (5.4 percentage points). The gap is reversed in favour of women among the *IT adverse* graduates (1.5 percentage points). However, graduated women are more likely than men to be employed in job whose contents are unaligned to the field of study they graduated.

FIGURE 5. Effectiveness of the degree of 2017 employed graduates one year after graduation, according to cluster and gender graduates (percentage values).



Source: elaboration by authors from AlmaLaurea data on Graduates' Profile and Employment Status Survey

However, those findings are correlated to the type of profession. In fact, it has been observed that in most cases, given the same profession, as the mastering of computer skills increase, gender differences tend to decrease.

Overall analysis has shown that graduated women have less access than graduated men to occupation as managers, entrepreneurs and legislators (2.2% for men and 0.9% for women) and professionals such as intellectual, scientific and other specialised professions (51.6% and 43.7%, respectively). This type of gender divide has been confirmed for each of the four clusters. Even among the ones in higher positions, gender differences are marked, especially with respect to wages, in favour of men: +24.9% in entrepreneurs, legislators and top managers and +20.8% in intellectual, scientific and highly specialised professions (Table 2). However, it is also true that increasing in IT skills (i.e. in the transition from the *IT Adverse* cluster to the *Excellent Users*) goes hand in hand with a reduction in gender differences for managers, entrepreneurs and legislators (from +30.7% down to +25.3%) and professionals (from +20.6% down to +19.6%), although the gap remains wide. The most evident narrowing of the gender gap has been observed primarily among engineers

and architects, project managers, teachers/professors, as well as other intellectual, scientific and highly qualified professions. It should be noted that gender gap between teachers/professors is at the advantage of women and tends to strongly diminish as IT skills increase.

TABLE 2. *Net monthly pay of 2017 employed graduates one year after graduation by clusters, profession and gender (average values in euros and percentage values).*

	IT Adverse			IT Excellent Users			Total**		
	M	W	Δ M-W	M	W	Δ M-W	M	W	Δ M-W
	€	€	%	€	€	%	€	€	%
Managers, entrepreneurs and legislators	1,510	1,156	30.7	1,480	1,182	25.3	1,487	1,190	24.9
Professionals and other specialised professions	1,294	1,073	20.6	1,383	1,157	19.6	1,354	1,120	20.8
<i>Engineer, architect</i>	1,327	1,038	27.8	1,392	1,140	22.1	1,384	1,127	22.9
<i>Software analyst and developer</i>	1,423	1,332	6.8	1,462	1,357	7.7	1,448	1,353	7.0
<i>Medical doctor</i>	1,813	1,589	14.1	1,773	1,536	15.4	1,789	1,568	14.1
<i>Pharmacist and veterinarian</i>	1,244	1,207	3.1	1,274	1,220	4.4	1,272	1,208	5.3
<i>Project manager</i>	1,486	1,316	12.9	1,481	1,345	10.1	1,471	1,331	10.6
<i>Teacher, professor</i>	760	843	-9.8	866	875	-1.1	815	859	-5.1
<i>Other highly specialised profession</i>	1,087	922	17.9	1,188	1,071	11.0	1,138	1,007	12.9
Technical profession	1,054	953	10.6	1,211	1,041	16.4	1,153	1,002	15.1
Office professional	1,177	1,063	10.7	1,258	1,125	11.8	1,225	1,100	11.4
Other less qualified profession	706	555	27.1	767	591	29.8	736	570	29.1
Total*	1,120	931	20.3	1,278	1,042	22.6	1,223	994	23.0

Source: elaboration by authors from AlmaLaurea data on Graduates' Profile and Employment Status Survey. * Includes missing responses to the question on current profession. ** Also includes graduates in the IT Ordinary Users and IT Super Specialists groups

Different access to certain professions by men and women, therefore, affects employment characteristics and therefore gender differentials. However, the data available do not allow us to assess whether this different access derives from personal motivations underlying the choice of one's education path, and therefore work, or from the still strong presence of gender stereotypes in the labour market, which can influence women's access to certain professions compared to others.

CONCLUSIONS

Knowledge of computer and digital applications is a key-factor for entering labour market in contemporary society. Almost all Italian graduates already master some digital tools and software (browsing the Internet, word processors and operating systems), while others lack skills for a minority of tools due to the specificity of the applications.

However, we have assessed a strong heterogeneity based on the field of study completed and at a gender level: male graduates report to master

the use of more specific tools if compared to women: assisted design - CAD, CAM, CAE, programming languages and spreadsheets are more likely to be in the male rather than female domain. This is at least partly due to the fact that women usually enrol in degree programme where skills in IT tools are typically less required and widespread.

Knowledge of the main IT tools has a major impact on job characteristics: a good knowledge of IT tools significantly increases the graduates' probabilities of being employed one year after graduation, and also contributes to higher wages. Some IT tools are cross-cutting and aimed at a wider audience of users; others are more technical and generally aimed at niches of graduates. Data show that knowledge of different type of IT tools corresponds to different job features.

Through a cluster analysis, four homogeneous groups of graduates based on computer skills have been identified. Then the main employment outcomes of each cluster have been analysed. Findings show that within each cluster gender pay gaps and gender differences in the mismatch between field of study and job contents play a keyrole in favour of men. These differences are even greater between *IT Super Specialists* and *IT Excellent Users*. However, this result is also linked to the type of profession: in fact, given the same profession, the more computer skills increase, the less gender differences are at play. Also, analysis has confirmed that women have less chances than men to enter occupations at higher positions.

A study issued by the European Commission (2018) points out the reproducing of stereotypes and biases related to different orientations by men and women toward both education and careers, as ones of the causes of gender gaps in digital skills. According to these stereotypes, common sense perpetuates the idea that women are less inclined to use computers and men are more suitable than women to develop technological and quantitative skills, as an American research has found (National Research Council, 2006). A more recent research conducted in Italy focuses on those factors which may influence gender inequalities from school to adult life as well as the labour market, highlighting the need to make the most of women's human capital (Di Castro, 2017). Gender stereotypes also affect employers' decisions, which often underestimate women's technical and scientific skills compared to those of men, as shown by several studies (Heilman, 2004; Reuben, 2014). One of the key missions of education and training is to combat stereotypes while good lifelong learning practices can enable women to acquire the skills necessary to face the opportunities and challenges of the digital economy.

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8

Coding and Educational Robotics Gender Stereotypes and Training Opportunities

Daniela Bagattini, Beatrice Miotti and Valentina Pedani

INTRODUCTION

This work authored by researchers from INDIRE – the National Institute for Documentation, Innovation and Educational Research, the Italian Ministry of Education’s oldest research organisation – investigates about the relationship between the use of innovative teaching methods and gender based dynamics. The approach is in line with recent studies that identify innovative methods as tools to tackle the obstacles that are still preventing female students from choosing educational and professional paths in STEM (Cheryan et al., 2015; Flore, Wicherts, 2015; Master et al., 2017; Banzato, Tosato, 2017, 2019).

2. THEORETICAL FRAMEWORK: CODING AND EDUCATIONAL ROBOTICS

Computational thinking and coding have been subject to many researches and countless attempts at definition during recent years. Wing (2006) proposed a definition of computational thinking (CT) linked to the skills citizens must possess in the 21st century. The definition given by Wing extends programming and problem-solving skills to non-computer scientists and places CT as a fourth basic learning skill, together with reading, writing and mathematics.

In literature, there are different points of view regarding educational robotics and coding: on the one hand they are understood as disciplines and therefore oriented to the study of computer science and to the development of programmers’ skills (Scaradozzi et al., 2015; Tuomi et al., 2018); on the other hand they are seen as methodologies in a laboratory-

type approach with the purpose to create an artefact (Merlo, 2017; Marcianò, 2017).

Coding and educational robotics can be defined as approaches to teach different disciplines through cognitive artifacts of different kinds and typologies. The expression “cognitive artifacts” is not necessarily referred to robots in the most common sense. Cognitive artifacts can be, for example, algorithms or software, as in the case of coding, or objects that can move using motors. In educational robotics and coding these types of objects are often combined, like in the case of robots that explore the physical space and respond to stimuli. According to INDIRE researchers, these artifacts are not the object of the study of educational robotics or coding, but they are tools that allows to develop further knowledge and skills (Nulli, Di Stasio, 2017; Di Stasio, Nulli, 2019). Coding and educational robotics are not specific disciplines, but educational approaches with which curricular subjects are addressed through cognitive artifacts. According to Italian *National guidelines and new Scenarios*, computational thinking, employed «in contexts of educational game (e.g. robotics), deploys its full capacity, because the pupil immediately acknowledges its multiple and concrete applications. This contributes to the development of mathematical, scientific, and technological skills, but also to the spirit of initiative, as well as the refinement of language skills» (MIUR, 2018: 13).

Seymour Papert proposed the learning-by-doing-methodology as the best way to deploy the potential of coding and educational robotics: «we all learn better when learning is part of doing something, we find really interesting. We learn best of all when we use what we learn to make something we really want» (Papert cited by Martinez, Stager, 2013: 72). Consistently with Papert’s findings, the proposed methodological approach in this research is laboratory-based (Miotti, Nulli, 2021) and is intended as a practical and experimental specialization of the broader category of active teaching. Students themselves are the architects of their own learning process, working collaboratively with peers, analysing problems, proposing solutions, creating prototypes and finally evaluating the results of the process. The teacher assumes the role of facilitator of students’ learning, directing and guiding them towards possible solutions (Papert, 1993). Frabboni (2004: 83) states that laboratory teaching also combines well with the development of that kind of «knowledge that today is largely collected outside the school walls», because «the school’s task is to teach students to learn and invent» laboratory teaching fosters that interdisciplinarity «through which the traditional “knowledge” of education can be identified and mastered. Therefore, the knowledge acquired can be dismantled and reassembled and new generative hubs are created».

Since 2016 INDIRE has been investigating about the impact of coding and educational robotics in different school stages (K-12). The focus is on the inclusion of these methodologies in the curriculum to improve the plain transmissive lesson and not only of those defined as STEM, but of every discipline. The research presented here, is based on a collaborative, exploratory and metacognitive/self-regulatory approach (Miotti, Nulli, 2021) defined by Bonaiuti (2014). The collaboration is guaranteed by teamwork between peers, essential in laboratory-based teaching

activities. The exploratory activity is supported by a problem-based teaching approach in which the proposed activity stimulated students to solve the given problem autonomously. Finally, the metacognitive/self-regulatory part is based on the *Think, Make, Improve* model defined by Martinez and Stager (2013): the three-step design cycle is used in class to guide students to develop their artifacts, and to help teachers in their class activities.

3. CAN EDUCATIONAL ROBOTICS BE AN OPPORTUNITY TO OVERCOME GENDER STEREOTYPES?

The possibility of using these methodologies for building scientific and mathematical skills is rooted into the broader context of education and still affected by the gender dynamics: «International research literature on computer science education continues to confirm a worrying under representation of women in the information and technology sectors, with disturbing results about gender impact. [...] The use of computers and ICT-related activities have been considered as a “male domain” in the recent past, and this interpretation still remains today, despite slight improvements in the treatment of the different genders» (Banzato, Tosato, 2019: 1)

Why does this happen? The factors are manifold: family and social constraints and expectations have an impact, but also the orientation given by training agencies are important (Biemmi, Leonelli, 2017). According to INVALSI (2019: 26) «females show a higher level of anxiety towards mathematics than males». Relying on late literature, we can suggest the hypothesizes of the existence of a self-fulfilling prophecy, highlighting that according to even the most recent studies in the field of neuroscience there are no obvious differences between the two sexes regarding the way their brains process mathematical calculation (Ashcraft, Ridley, 2005; Hyde et al., 2008; Kurtz-Costes et al., 2008; Bieg, et al., 2015; Ganley, Lubienski, 2016). The issue goes far beyond national borders: in general, the gender gap with respect to ICT is a problem that also affects other European countries and the United States, as shown by OECD PISA data (Cheryan et al., 2015).

In Biemmi's research, female students' choice of scientific tertiary education programmes is accompanied by greater determination and combines with excellent results in these disciplines since upper secondary school (Biemmi, Leonelli, 2017). Most female students see scientific subjects as “too difficult” and therefore gender differences for the perception of self-efficacy towards STEM disciplines are evidenced (Banzato, Tosatto, 2017).

Social influence and cultural stereotypes lead girls and young women to have less experience with technology, and therefore to perceive themselves as less competent. This, in turns, affects their future according to what was defined «stereotype threat» (Flore, Wicherts, 2015). For this

reason, experimental projects using methodologies such as coding and robotics started to move from the concept of self-efficacy to improve transversal skills to counteract this self-fulfilling prophecy effect. An example is the experience of the *School of Robotics*, with the project *Roberta - girls discover robots*. This project started in Germany and is dedicated to developing a methodology to work with girls on STEM disciplines, using educational robotics (Hartmann et al., 2007). The project had very positive results, both in terms of implementation and participation, and as an impact on future educational choices of the participating female students (Operto et al., 2008; Bagattini et al., 2020).

A recent work by Banzato and Tosato (2017: 346) on a small group of 11-12 years old students points out that «although the test does not show differences between males and females, there is an evident improvement in both groups in their sense of self-efficacy, especially in females, with an average of 0.889 points». An experimental project carried out on the same age students has shown similar outcomes (Screpanti et al. 2018). The results of a survey on primary school children carried out in the USA were also optimistic: «positive experiences with programming can lead to higher motivation in robotics and programming for girls, compared with girls without these experiences. Teachers, parents, and policymakers who create positive STEM experiences for girls have the potential to put girls on academic trajectories that can lead to more participation in computer [...] Although simply an initial step in a larger program to motivate more girls to enter STEM, the current findings highlight the importance of rich educational experiences in girls' motivation in STEM» (Master et al. 2017: 103-4).

The opportunity of using innovative methodologies to motivate girls to enter STEM is also supported by the reflections developed in gender literature: the deconstruction of stereotypes and gender education can be thought of «as a revision of the ways of transmitting knowledge within educational institutions» (Gamberi et al. 2010: 23). On this point also Biemmi and Leonelli (2017, 50) stated: «the frontal lesson [...] is not suitable for an educational offer that aims to achieve the active contribution of male and female students by pursuing transformative objectives as individuals and as a group».

4. THE CODING AND ROBOTICS PROJECT

We here highlight the preliminary outcomes from an Italian qualitative research on the effects of coding and educational robotics as didactic methodologies integrated in the curricular lesson of lower secondary schools' pupils (grades 6 to 8), with participating teachers required to have experience in conducting curricular activities according to active teaching methodology. The research is part of the *Coding and Robotics* project, implemented by INDIRE and funded by the European Social Fund, *National Operational Programme for schools. Competences and*

learning environments 2014 – 2020 and acts on a double mission¹⁰. One rationale is related to project experimentations combining teachers of pre-school and primary schools, who designed together a vertical teaching path connecting the two school levels. A second rationale includes teachers at lower secondary school (grades 6 to 8). Less attention and space have been usually given to collaboration between peers and laboratory activities in the Italian lower secondary schools' settings. Pairs of teachers of the same class but from different teaching disciplines were asked to propose a collaborative and interdisciplinary didactic planning to be carried out in a laboratory and cooperative way. An Arduino kit - an open-source electronics platform based on easy-to-use hardware and software - was provided for the entire class. Teachers with no experience in the field of educational robotics, were in-depth technical experienced for a 25 hours duration training course on the electronics and programming part.

Experimentations were expected to be carried out over an entire school year (2019-2020). However, due to the COVID-19 lockdown, the time available for in-person activities decreased significantly, especially for the group of non-expert teachers (NE) who initially followed a training course on the topics of interest (electronics, computer science), preparatory to the beginning of the classroom activity with their students.

Consequently, while the group of expert teachers (E), had the opportunity to start their classroom activities in October, compatibly with their timetable and the agreed planning, some pairs of NE teachers did the training in January, and therefore had reduced time to complete the activities. Due to school closures, some of them have been granted an extension of the project in order to start again in September with the same class or with a new one in case the current one was at the end of the school cycle. In this regard, however, we must point out that, despite school closures, the difficulty of organising distance teaching and the lack of equipment - which could not be distributed to students for safety reasons - some teachers continued the project experimentation online with simulation programmes such as Thinkercad for Arduino. Consequently, obtained results were different from expectations, but still relevant for research.

5. STUDENTS' SELF-PERCEPTION AND TEACHERS' POINT OF VIEW

The lockdown period introduced variables in the observation of the experimentation, with an impact, which is difficult to define. The interaction of students and teachers happened exclusively at distance through digital devices and social networks; the social divide and the risk of exclusion of disadvantaged socio-economic students increased;

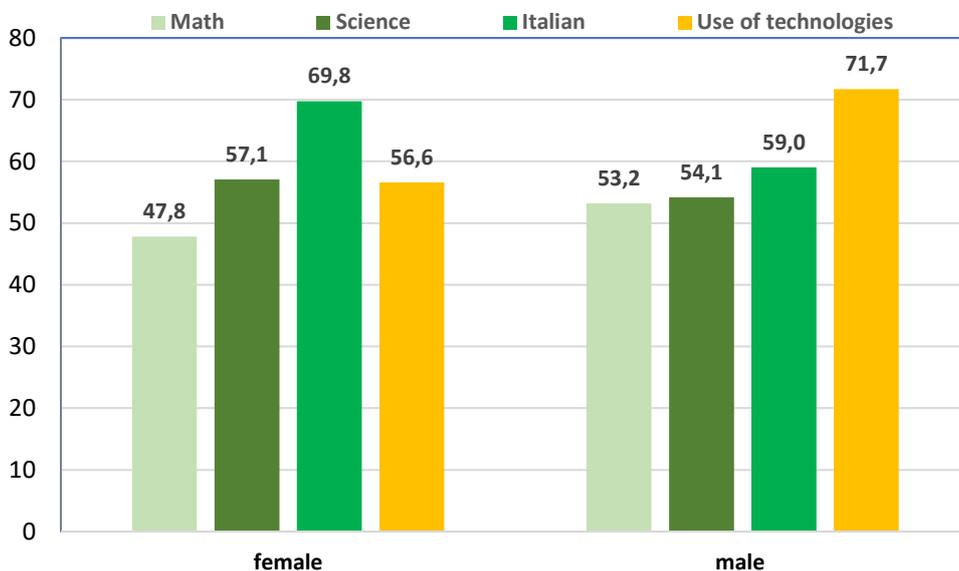
¹⁰ <http://www.indire.it/en/progetto/coding-and-robotics/>

precariousness and uncertainty pervaded in the homes where everyone was confined.

Taking into account the considerations above and the fact that not all students completed the project, it was decided to present the main results that emerged from the data collected in the pre-phase containing 410 questionnaires from 205 female and 205 male students (11-14 years), belonging to 23 classes of different schools. We therefore analyse the distribution of responses to the question on the level of students' self-confidence in three disciplines (Mathematics, Science, Italian) and in using technology on a 1-5 scale. Data confirm what the literature on educational self-segregation usually reports: girls perceive themselves as better in Italian, boys in Math and in the use of technology. Moreover, boys tend to have a high perception of their performance by placing themselves more in the extreme value of the "5" scale than girls.

The survey also included items from the first two sections of the MeMa questionnaire (metacognition and mathematics) which «allows to differentiate pupils' metacognitive level in relation to their performance in mathematical tasks» (Caponi et al., 2012: 22). Correspondingly, there is a difference between males and females, even if it is not comparable with the results from the sample used in the experimentations of the questionnaire, as it is not divided by gender.

FIGURE 1. Distribution of students perceiving themselves as being "good" or "very good" in Mathematics, Sciences, Italian and in the use of technology on a 1-5 scale, according to gender (percentage values).



It is worth mentioning that the widest score difference occurs in items referring to emotional, affective and motivational aspects, rather than in those indicating the awareness of strategic and control attitudes: the scores recorded on section A are 33.7 for females and 34.4 for males, and respectively 11 and 11.6 for section B, overall on average with the results of the sample by Caponi and colleagues (2012). Splitting section A in the two described areas, the average score for males is 17.5 for the first area and 16.9 for the second, while for females it is 16.5 and 17.2 respectively.

The schoolchildren were asked the following question: “are males, females or both better at carrying out the following jobs?” 40.5% of boys and 28.3% of girls believe that there are career opportunities more suitable for one gender and not the other: 72.2% of females, against 61% of males, consider the role of pre-primary schools educator as a “female job”, while military career and truck drivers are reputed male occupations. A third of males believe that computer science is a job that best suits their gender.

Teachers have been coupled together so that each one drafted a final report and wrote identical answers. Responses to the question relating to gender based dynamics during the laboratory experience and in students’ performances with respect to curricular subjects, have been analysed with TaLTaC software. Two main findings have been observed: there are no significant differences between male and female students in approaching robotics and the overall outcome speaks for a general increase of interest and motivation after the experimentation. The teachers themselves do not perceive gender gaps because they are persuaded that the Italian school system has narrowed the gender gap (Dello Preite, 2013). Nevertheless, outcomes instead show that this gap is still wide in the current school system.

The second finding proves that some differences in the approach between males and females are at works, even if in two different ways. A first group of teachers described students according to social categorizations deeply rooted in the traditional culture of opposed gender schemes which «are functional to the organization of knowledge of social reality» (Biemmi, Satta, 2017: X). Consequently, during laboratory activities males were passionate, resourceful, and ready to take risks; they worked more on the practical side, more inclined to technical activities, more intuitive than females, but less organised. Opposite, females were patient, methodical, orderly, precise, reflective, fearful of making mistakes; they showed greater theoretical involvement and preferred organizational, research, planning and documentation activities.

According to this point of view, what differentiates males and females during the laboratory activities would reflect preference of curricular subjects:

Girls have expressed themselves more in the creative parts, while boys in practical activities, this distinction is sometimes noticed even in class where girls prefer subjects such as Italian, history, geography, art, while boys are more inclined to technical - mathematical and scientific subjects. (54 years old, male, teaching Technology)

Boys showed greater practical involvement and specific creative attitude; girls showed more theoretical interest. These differences have confirmed their usual approach to study, which is more narrative for girls and more operational for boys. (43 years old, female, teaching Italian)

However, a second group of teachers conferred to the educational robotics project the added value of having pushed girls to achieve greater awareness of themselves, of their abilities and to increase interest in STEM disciplines.

Everyone participated enthusiastically, even though the girls more than once were amazed at the ease with which they learned certain new topics or quickly found solutions to the challenges. Some girls have highlighted skills that they didn't think they had at the start of the journey. (45 years old, female, teaching Technology)

Some girls in the class never showed interest or motivation for scientific disciplines and consequently in the project experimentation. Other girls at first showed perplexity with respect to the programming activity and then discovered that they were able to manage it and carry it out easily. This led to an increase in students' self-esteem, and to overcome some perplexities in approaching block programming. (54 years old, male, teaching Art and image)

I am firmly convinced that it is good to intervene immediately during primary school with laboratory teaching and educational robotics, I noticed that this has a very strong impact in particular on changing girls' learning style and interest, in particular towards technical-scientific disciplines, such as robotics and sciences [...] In this way, it is possible to improve and in certain cases facilitate learning in general, for both female and male students, especially in disciplines that imply reasoning, such as mathematics, science and technology, thus generating the conditions for meaningful learning. An improvement in the level of personal self-esteem can also be noticed in girls. (42 years old, female, teaching Technology)

A teacher questions the unwillingness to "dare" showed by three girls, inserting the issue into the dynamics of the class, and suggesting a possible explanation corresponding to what was revealed by the experts of the "school of Robotics" of Genoa, who, in their activities at schools, had already noticed that when there is a group of "hardened" male leaders, the girls risk losing enthusiasm (Operto et al., 2008).

Some girls, three to be precise, worked very hard during the preparatory lessons. They understood the transmitted concepts and put them into practice in the exercises. They are three very willing girls with an excellent average of marks in all disciplines. However, their application was limited to the proposed topics and did not result in the desire to experiment and expand independently what they had learnt. In short, they did not demonstrate the same euphoria and excitement towards robotics of the male school companions. They preferred to deal with the design of the path and the models of the monuments. Probably if the project had not stopped suddenly, we would have understood better the reasons for this choice, perhaps they did not want to prevaricate on the male group or perhaps they believed that within the group of "computer scientists", they would have been overwhelmed by the exuberance of the boys, or they did not consider robotics more important than the designing of three-dimensional models. It would have been interesting for us teachers to verify these hypotheses, but unfortunately the inauspicious events of this particular year did not allow us to do so. (49 years old, female, teaching Art and image)

When it comes to identifying the impact of robotics experimentations on disciplinary skills, teachers no longer distinguish between males and females, as they notice the improvement of understanding skills, selection and synthesis of information abilities and the consolidation of mathematical, geometric and technological contents in the whole class.

Robotics also seems to have had a positive outcome on transversal skills and on life skills: from the increase in the possibility of

confrontation and exchanging opinions to the consolidation of the class as a real group.

In a work of this type, it is also possible to enhance the Life skills related to the personal, social, interpersonal, and cognitive area. (43 years old, male, teaching Technology)

CONCLUSIONS. REFLECTIONS AND FUTURE WORKS

According to a gender sensitive perspective, Colella (2014) has identified some key-issues on teaching of mathematics and physics: it might be effective to select significant themes; to call in women and men testimonies alike in dealing with science and technology; to exploit non-formal opportunities to approach science and renew teaching methodologies. With respect to these ideas, proposing innovative teaching methods allows to create non-formal opportunities for approaching scientific disciplines, and to overcome transmission teaching, increasing the possibility for students to act and rethink themselves in the school environment.

Our chapter dealt with educational robotics, understood as a laboratory teaching methodology, which, due to its multidisciplinary facet, can also be used to build a dialogue between disciplines. Educational robotics has also the aim of helping girls and boys to overcome the barriers between different subjects, moving towards the kind of cross-cutting knowledge that is increasingly required by the jobs of the future.

Studies on the potentialities of the use of innovative teaching are optimistic with respect to the possibility of opening a space for change in girls' self-perception (Cheryan et al., 2015; Flore, Wicherts, 2015; Master et al., 2017; Banzato, Tosato, 2017, 2019; Screpanti et al, 2018). The analysis we carried out leads to believe that those practices are nevertheless not enough on their own. To what extent differentiated male and female attitudes might also be a consequence of what is expected from them? Why are those teachers who do not use stereotyped language the ones who point out possibilities for change?

Notwithstanding limitations due to the COVID 19 emergency, conclusions arising from our research stand for the need to raise teachers' awareness of how stereotypes and sense of self-efficacy influence each other, in order to tackle these biases in class activities. There are no pre-established recipes, because each class is a microcosm with its specific functioning: only teachers' analysis ability can lead to the best choice. Therefore, the challenge from our research is to include a special issue on gender preferences in teachers' initial training on future experimentations and to strengthen it when relating to the use of robotics in the interdisciplinary field of studies. A specific training for robotics experimentation accounting for gender dynamics would be gainful and it would be beneficial to the self-awareness and self-perception regarding the use of technologies among girls as well boys. Consequently, the

classroom activity, especially if led with methodologies based on learning process which starts from the ability to disassemble and reassemble and can help deconstruct those conditions that underlie gender horizontal segregation.

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9

Gender Gaps in Financial Education. The Italian Case

Luca Salmieri and Emanuela E. Rinaldi

INTRODUCTION

After the financial crisis of 2008, policymakers have been granting even further attention to financial education. The main reasons for this renewed concern stem from research demonstrating that individuals with greater financial literacy are more likely to perform better in terms of budgeting, saving money, and controlling expenditures (Perry, Morris, 2005; OECD, 2013); to do better at handling mortgages and other debt (Lusardi, Tufano, 2015); to plan for retirement (Lusardi, Mitchell, 2007, 2014); and to have greater financial resilience (Lusardi et al., 2020). Considering all these aspects, there has been increasing insistence on the importance of financial education over the last few years.

Nonetheless, levels of financial literacy remain low in many countries. As summarized by Preston and Wright (2019), research into financial literacy has developed along three main strands of inquiry: the effectiveness of financial literacy interventions and education programs (Fernandes et al., 2014), the determinants or correlates of financial literacy, and the effect of financial literacy on financial behaviours such as saving, retirement planning, and stock market participation.

Although many initiatives have been launched, there is no consensus on how to best implement financial education, and critiques have been raised about its efficacy as compared to other form of intervention (Willis, 2008). The outcomes of intervention vary widely depending on the characteristics of the target group. As Preston and Wright (2019) note, understanding the gender gap in financial literacy therefore constitutes a key research objective. It is central to the development of interventions to narrow the gender gap, improve the economic and financial security of women and support other social and economic outcomes linked to financial literacy.

Studies agree in finding women perform less well than men in financial literacy (Lusardi, Mitchell, 2008; Atkinson, Messy, 2012; Klapper et al.,

2015; Bongini et al., 2015; Bucher-Koenen et al., 2017; Hasler, Lusardi, 2017). Gender differences are found in all economies from developing countries to advanced economies, even if the gap in financial education appears to be narrowing (Grohmann, 2016; Lusardi, 2020).

However, few studies to date have attempted to explain why women are less financially literate than men (Fonseca et al., 2012; Cupák et al., 2018; Preston, Wright, 2019). Such limited attention is due in part to the relative lack of consensus about what constitutes financial literacy, with no global agreement yet reached on how to measure it. Indeed, defining financial literacy is a complex goal. Remund (2010: 284), reviewing how financial literacy has been interpreted and measured in research since 2000, defines financial literacy as «a measure of the degree to which one understands key financial concepts and possesses the ability and confidence to manage personal finances thorough appropriate, short-term decision making and sound, long-range financial planning, while mindful of life events and changing economic conditions». While recognizing that this definition may encounter criticism and that other encompassing ones are valid as well (Frühauf, Retzmann, 2016; Warmath, Zimmerman, 2019), we rely on Remund's formulation because it is generally in line with the definitions underlying the OECD-PISA assessments whose data we have processed in this chapter on the Italian case.

Italy is a noteworthy case study as it still ranks low in international surveys on financial literacy and is shaped by a marked gender disparity among different demographic and socioeconomic groups: teenagers (OECD, 2014a, 2017, 2020a; Davis et al., 2019) and adults (Di Salvatore et al., 2018; OECD, 2020b), but not preadolescents (Rinaldi, Todesco, 2012). Since individuals are currently called on to acquire the basics of financial knowledge at an early age and instruction is received only from parents or via interaction with others, this disparity may be particularly detrimental in creating social unbalances among social classes (Lusardi et al., 2010). We thus focus on Italian teenagers to explore the formation of a gender gap in financial literacy.

In the following analysis, we use data on financial literacy from the 2012, 2015 and 2018 Program for International Student Assessment (PISA) to compare the financial literacy skills of Italian 15-year-olds girls and boys. According to OECD (2020a: 43), financial literacy is «knowledge and understanding of financial concepts and risks, and the skills, motivation and confidence to apply such knowledge and understanding in order to make effective decisions across a range of financial contexts, to improve the financial well-being of individuals and society, and to enable participation in economic life». Before tackling the main topic of the chapter, the gender gap in financial literacy among 15-year-old Italian students, it is worth providing a brief overview of financial education in Italy.

1. FINANCIAL EDUCATION IN ITALY

Financial education is part of the school curriculum in many countries, even though such education continues to be limited (OECD, 2015). To minimize overload, teaching typically integrates financial literacy into other existing subjects and courses rather than introducing additional subjects into an already overburdened curriculum.

Before formally presenting key financial education content into the national curriculum, some educational systems have developed financial education pilot programs in a select number of schools to identify the most appropriate approach. For example, students can improve their financial competences by acquiring transversal skills such as problem solving and critical thinking in other subjects; at the same time, monetary-based problems can be used as real-life cases for teaching mathematics and other subjects. Few countries currently teach financial education in school through the official curriculum, and pilot and extracurricular programmes are still the norm in many countries. Recognising the importance of fostering financial literacy amongst young people and adults, a growing number of countries have developed, published and (sometimes) implemented nationally co-ordinated approaches to financial education, usually referred to as national strategies (OECD, 2014b).

Italy is one of the seven countries that participated in all three financial literacy PISA assessments conducted in 2012, 2015 and 2018, the other six being Australia, Poland, Russia, the Slovak Republic, Spain, and the United States¹¹. For our purposes, namely comparing Italy to other European countries and the United States, we have excluded Australia and Russia. We then added Bulgaria, Estonia, Finland, Latvia, Lithuania, Portugal, and Serbia in analysing data from the most recent, 2018 PISA assessment. Before discussing the results of the comparison, we provide a very brief outline of financial literacy teaching schemes in order to introduce our study of gender gaps in Italian performance when compared to other countries participating in the PISA financial literacy assessment (OECD, 2005, 2015; Grifoni, Messy, 2012; Kalmi, 2018).

Financial and entrepreneurship studies have been a cross-curricular theme in basic and upper secondary education in Finland for at least three decades. Nowadays, one of the goals of compulsory social studies/economics/ entrepreneurship education is to encourage students «to become independent societal and economic actors» and «to manage his or her personal finances». Topics in financial education are also included as part of «working life competence and entrepreneurship», a transversal skill woven into all subjects in Finnish basic education (Kalmi, 2018).

¹¹ Even if differences in test administration indicate for uncertainty in the comparison of student performance between 2015 and 2018, two-thirds of the test items in the 2018 assessment were also used in the 2012 and 2015 assessments, therefore assuring a minimum ratio for comparison.

Financial literacy topics are integrated into the general curriculum of both primary and secondary schools in Latvia and are taught mainly in economics classes. Financial education has been included as part of several mandatory school subjects, such as information science, mathematics, geography, and history, and recently teachers have been pushed to instill more extensive financial knowledge in students (Sarnovics et al., 2016). The Lithuanian school system likewise aims to develop students' financial literacy beginning in nursery and primary education. Financial literacy is taught through compulsory economics and entrepreneurship classes (OECD, 2015).

TABLE 1. *Financial literacy as educational content in national school systems (2015)*

Financial literacy as part of the national curriculum	Financial literacy integrated into other subjects	Financial literacy as <i>ad hoc</i> and pilot programmes
Finland (lower and upper secondary schools)	Estonia	Estonia Lithuania
Latvia (primary and secondary schools)	USA Portugal	USA Portugal
Lithuania (primary and secondary schools)	Poland	Italy
USA (in 5 states)	Slovak Republic	Spain

Source: data processed by the authors.

Estonians schools have integrated financial literacy into civics studies in lower and upper secondary schools since 2010. Financial literacy is also a component of economics and entrepreneurship studies, but only as an optional subject. The Estonian school curriculum offers teachers a high degree of autonomy over teaching methods and contents (OECD, 2015, 2020a; Põder et al., 2020).

Since 2013, Portuguese state schools have enacted financial education by educational stage (kindergarten, basic school which is up to grade 9, and secondary up to 12). Financial literacy is taught only indirectly, however, via lessons on budgeting, the financial system, financial products, savings, credit, ethics, and the rights and duties of financial consumers. The teaching of *Education for citizenship* also includes basic financial education and this subject has been compulsory since 2008 (OECD, 2015).

Spain promotes financial literacy only by means of voluntary programmes in place since 2010. Several voluntary schemes address students at all educational levels, and financial education may also be part of the social sciences in primary school (OECD, 2015).

In the United States, financial skills education is provided in various ways at the state and district levels. In some states, district-level educational boards task schools with offering optional programmes in personal finance, while others opt for different subjects. In other states, personal finance content is inconsistently included in other courses, often economics or mathematics. In 2015, five states had middle schools teaching personal finance as a standalone course and high school students required to complete a set number of credits in this subject to graduate (Pelletier, 2015).

In both Poland and the Slovak Republic, financial education is a compulsory subject that is part of mathematics in lower secondary schools, although it features only very basic computational tasks related to money savings, loans and interest rates (Swiecka et al., 2020; Klieštiková et al., 2020).

Neither Bulgaria nor Serbia has an extensive education programme on financial literacy among state schools: financial skills may be incidentally connected to spontaneous teaching in mathematics and economics (OECD, 2015).

Financial education is not compulsory in Italy and it is not part of the national school curriculum. Although there have been several calls over the past few years for providing official courses which might develop pupils' skills in financial literacy, financial education is still not part of the official curricula in Italian primary or lower secondary schools (Rinaldi, 2015). Just recently, in 2017, the Italian government established a committee to plan and co-ordinate financial education in the country, both directly and in co-operation with public and private organisations and NGOs. In 2017 the committee formulated a *National strategy* targeting the entire Italian population with a specific section addressing youth. Nevertheless, the lack of either official curricular programs on a national scale or clear policy coordination from the committee probably explains the proliferation of numerous, heterogeneous ad hoc projects carried out extracurricularly by various actors (Rinaldi, 2019a). The lack of clear, specific educational goals for these initiatives along with the "one-size-fits-all" approach underlying many projects may have undermined both the efficacy and the efficiency of the entire strategy (Cervellati, 2017).

2. GENDER GAPS IN FINANCIAL EDUCATION IN ITALY

Based on the mean score of 15-year-olds students on the last PISA assessment of financial literacy skills, Italy occupies the lowest positions, eleventh among OECD countries and twelfth out of the total of twenty countries that participated in the 2018 assessment (Table 2). Boys performed much better than girls only in Italy, Poland and the USA (by 15, 7 and 6 score points, respectively), while girls outperformed boys in Bulgaria, Georgia and Indonesia (by between 12 and 20 points). There is no statistically significant difference in the other 14 participating countries¹². Therefore, while the financial skills gap between boys and girls is generally not statistically significant or minimal in most countries, in Italy not only is the gap wide and at the expense of girls but it appears within an already lower PISA

¹² Gaps in terms of 2-5 score points are a small difference and does not reflect a notable disparity in the types of tasks that boys and girls are able to do. This is especially true given the large variation in performance observed amongst both boys and girls.

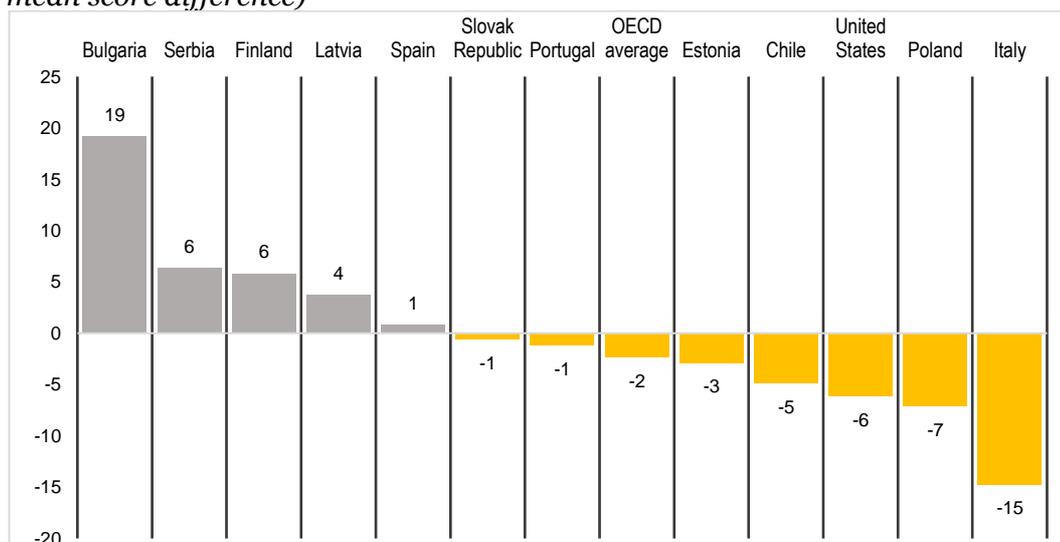
assessment score. The difference between Italian girls' and boys' performance in financial literacy in the last PISA assessment is the widest gender gap in terms of score points among the selected countries (Figure 1).

TABLE 2. *Financial literacy performance at the national level*

	Mean score	Range of ranks			
		OECD countries/economies		All countries/economies	
		Upper rank	Lower rank	Upper rank	Lower rank
Estonia	547	1	1	1	1
Finland	537	2	3	2	3
Canadian provinces	532	2	3	2	3
Poland	520	4	4	4	4
Australia	511	5	6	5	6
United States	506	5	8	5	8
Portugal	505	6	8	6	8
Latvia	501	7	9	7	9
Lithuania	498	8	9	8	10
Russia	495			9	11
Spain	492	10	10	10	11
Slovak Republic	481	11	12	12	13
<i>Italy</i>	476	11	12	12	13
Chile	451	13	13	14	14
Serbia	444			15	15
Bulgaria	432			16	16
Brazil	420			17	17
Peru	411			18	18
Georgia	403			19	19
Indonesia	388			20	20

Sources: processing of OECD 2020 (Volume IV), Table IV. B1.2.1.

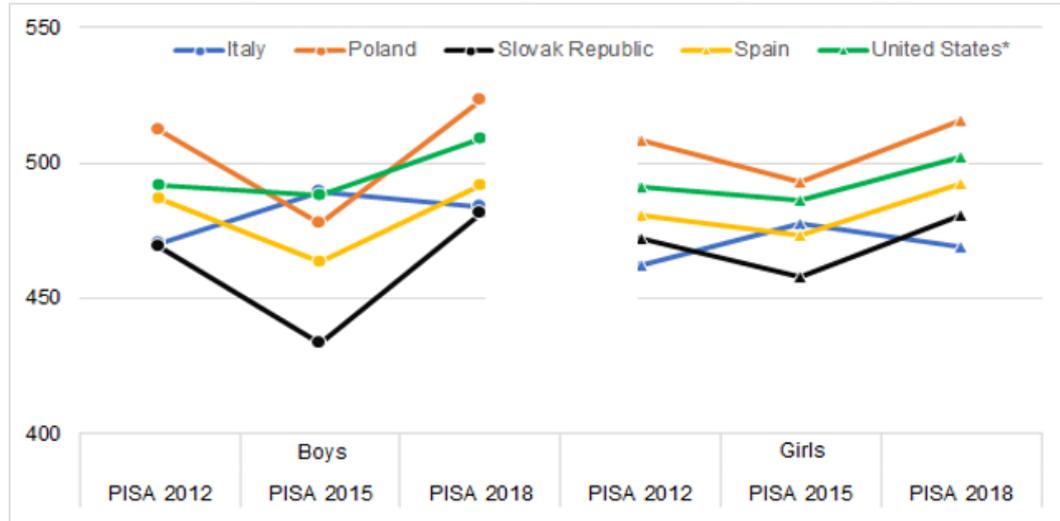
FIGURE 1. *Gender differences in financial literacy performance (girls/boys mean score difference)*



Sources: processing of OECD 2020 data (Volume IV), Tables IV. B1.3.4, IV. B1.3.10 and IV. B1.3.22

Italian boys' and girls' performances show a similar trend over the three assessments: scores increase from 2012 to 2015 while decreasing in 2018 (Figure 2).

FIGURE 2. Change over time in mean financial literacy scores, by gender.



Source: processing of OECD 2020 data, Table IV. B1.3.8. *Data did not meet the PISA 2018 technical standards but were accepted by OECD as largely comparable

The trend in Italy's data runs counter to the other countries, as they instead show improving results for both boys and girls. Likewise, the share of students with the highest financial literacy scores have been decreasing over time in Italy and increasing in other countries: the percentage of Italian boys scoring a level 5 proficiency increased from 3.2% in 2012 to 8% in 2015, to then fall to 5.9% in the latest 2018 assessment. Top performing girls made up 3.1% in 2018 after having been 5% in 2015 and only 1% in 2012 (Table 3).

TABLE 3. Change over time in the proportion of top performers in financial literacy, by gender

	Boys proficiency level 5			Girls proficiency level 5		
	PISA 2012	PISA 2015	PISA 2018	PISA 2012	PISA 2015	PISA 2018
Italy	3.2	8.0	5.9	1.0	5.0	3.1
Poland	9.9	8.0	14.7	4.7	8.0	9.0
Slovak Republic	6.5	5.8	7.8	4.7	6.9	6.5
Spain	4.5	5.9	6.3	3.0	5.3	5.2
United States*	10.1	11.4	14.3	8.8	9.1	10.4

Source: processing of PISA 2018 results (Volume IV) - OECD 2020 Table IV. B1.3.9 *Data did not meet the PISA 2018 technical standards but were accepted by OECD as largely comparable.

One Italian girl out of five was a low performer¹³ in 2012, and the same in 2015 and 2018. The same proportion and trend can be observed for Italian

¹³ Below Level 1=below 325.57 score points; Level 1= from 325.57 to less than 400.33 score points; Level 2= from 400.33 to less than 475.10 score points; Level 3= from 475.10 to less than 549.86 score points; Level 4= from 549.86 to less than 624.63 score points; Level 5= at or above 624.63 score points.

boys – except for a very slight improvement occurring in 2015 – meaning that the gender gap widens as we move up the financial proficiencies grading (Table 4).

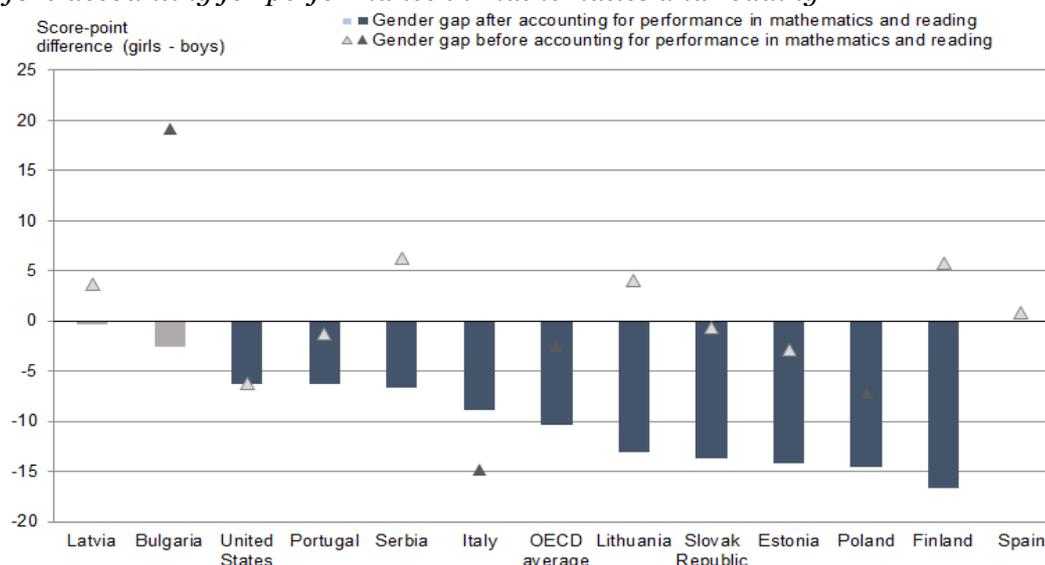
TABLE 4. Change over time in the share of low performers in financial literacy, by gender

	Boys proficiency level 1			Girls proficiency level 1		
	PISA 2012	PISA 2015	PISA 2018	PISA 2012	PISA 2015	PISA 2018
	Italy	22.0	19.2	19.8	21.4	20.5
Poland	10.9	23.4	10.6	8.7	16.6	8.5
Slovak Republic	25.3	39.3	21.8	20.3	29.7	20.6
Spain	16.5	27.2	16.3	16.5	22.3	13.7
United States*	19.0	22.5	16.7	16.8	20.7	15.2

Source: processing of PISA 2018 results (Volume IV) - OECD 2020 Table IV. B1.3.9 *Data did not meet the PISA 2018 technical standards but were accepted by OECD as largely comparable

Globally, girls perform better in reading, and boys show a very slight advantage in mathematics. Since mathematics performance is strongly correlated with financial literacy proficiency, part of the tenuous, minor gap in this latter skill might be partially explained via mathematics. Nonetheless, reading scores are likewise strongly correlated with financial literacy proficiency.

FIGURE 3. Gender differences in financial literacy performance after and before accounting for performance in mathematics and reading

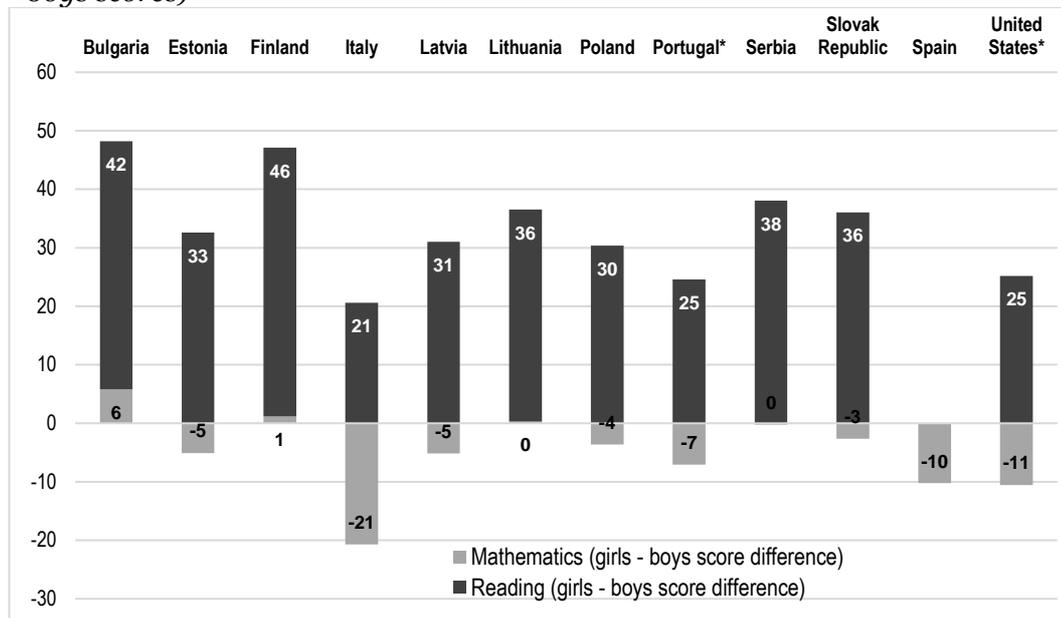


Sources: processing of OECD data, PISA 2018 Database - OECD 2020

Across participating PISA 2018 assessment countries, the correlation between financial literacy and mathematics performance averaged 0.87 and that between financial literacy and reading performance averaged 0.83. Therefore, there is a very slim difference in the way mathematics might influence financial literacy scores as compared to reading, also because the correlation between mathematics and reading performance is 0.81,

meaning that the strong correlation observed among the three skill types is mutual, reciprocal and triangular. Considering all the participating countries, an average of 20% of the variation in financial literacy performance is independent of performance in mathematics and reading. That means 20% of the difference in how students perform in financial literacy is independent of how they perform in both mathematics and reading. Yet for Italy, even controlling for the effect of the influence of mathematics and reading proficiency (Figure 4), the gender gap in financial literacy is almost 10 in mean scores.

FIGURE 4. Gender differences in mathematics and reading performances (girls - boys scores)



Source: processing of PISA 2018 results (Volume IV) - OECD 2020 Table IV. B1.3.5

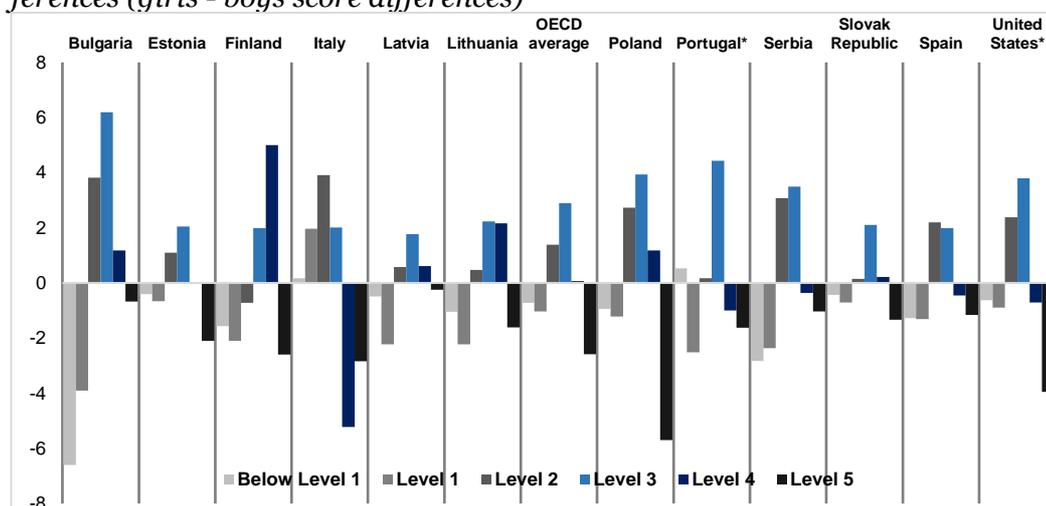
Furthermore, it must be stressed that Italian girls' advantage over boys in reading is lower than in other countries, and boys' advantage over girls in mathematics is the highest among all selected countries, meaning that girls' lower financial literacy performance compared to that of boys might depend more directly on the mathematics gender gap in Italy than in other countries.

The significance of Italian gender gaps in financial literacy is more evident when controlling for students' distribution along each proficiency level. The proportion of Italian girls scoring in the low proficiency level in financial literacy is the highest amongst the countries considered in the analysis of change over time. Italian 15-year-old girls outnumber 15-year-old boys in low and medium proficiency levels, while they are outnumbered by boys in top levels 4 and 5 (Table 3 and 4). It is true that similar patterns appear in almost all the other countries, but it is equally true that Italian boys' outnumbering of girls in levels 4 and 5 is the most substantial among the selected cases (Figure 5).

While on average across selected countries there are more top-performing boys than top-performing girls (12% compared to 9%) and, on the other

hand, there are more low-achieving boys than low-achieving girls (16% compared to 14%), the Italian case is different: 5.9% of boys are top-performing compared to a meagre 3.1% of top-performing girls.

FIGURE 5. Students at each proficiency level in financial literacy, by gender differences (girls - boys score differences)



Source: processing of PISA 2018 results (Volume IV) - OECD 2020 Table IV. B1.3.6.

TABLE 5. Students' sources of information about money matters, by gender (girls - boys %)

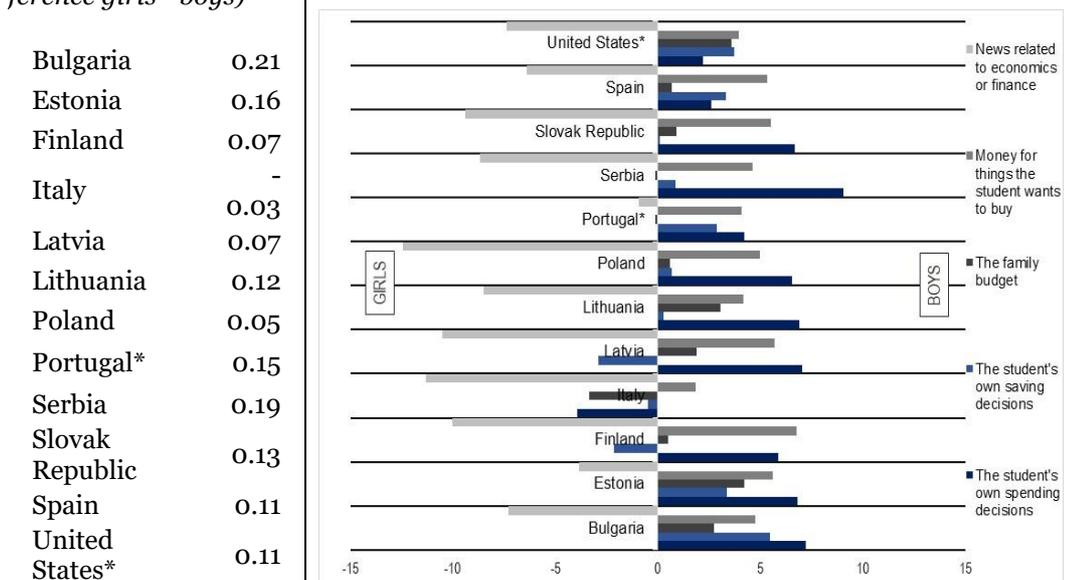
	Parents, guardians or other adult relations	Television or radio	The Internet	Teachers	Magazines	Friends
Bulgaria	4.6	-0.7	-1.5	-2.0	-5.1	-5.6
Estonia	3.3	0.2	1.3	-2.3	-4.8	-1.6
Finland	3.6	-8.5	0.5	5.6	-8.9	-3.9
Italy	5.0	1.7	2.6	3.4	-4.5	-12.5
Latvia	3.4	2.7	1.9	1.3	-1.5	-4.0
Lithuania	4.6	2.8	1.7	0.3	-0.1	-4.3
Poland	4.2	3.0	-0.4	-1.9	-0.2	-0.4
Portugal*	1.9	3.2	-1.0	-0.3	1.3	-7.0
Serbia	2.6	-1.3	1.0	-2.3	-4.4	-5.8
Slovak Republic	5.3	1.9	1.1	0.2	-1.2	-1.7
Spain	3.6	-2.6	-1.2	6.1	-2.4	-5.2
United States*	1.6	-2.5	-2.3	-4.1	-3.1	-8.4

Source: processing of PISA 2018 results (Volume IV) - OECD 2020 Table IV. B1.4.2. *Data did not meet the PISA 2018 technical standards but were accepted by OECD as largely comparable

Multiple elements may contribute to the gap between boys and girls in financial literacy. Unexpectedly, across the selected countries girls are more likely than boys to declare that they receive information about money matters from their parents (96% of girls versus 93% of boys). In every selected country, the parents-daughter relationship is found to be more statistically sensitive as a source of information on money issues than is the media. It is noteworthy that, once again, Italy has the widest gender gap in the parents-

children information flow about money matters (5% more girls than boys report parents as an information source, as shown in Table 5). This gender gap is noteworthy because there is no difference between Italian girls and boys in the index of parental involvement in matters of financial literacy (Figure 6).

FIGURE 6. *Students discussing money matters with parents, by gender*
Index of parental involvement in matters of financial literacy (difference girls - boys)
Percentage of students who discuss the following topics with their parents at least once a month, by gender (difference girls - boys in %)



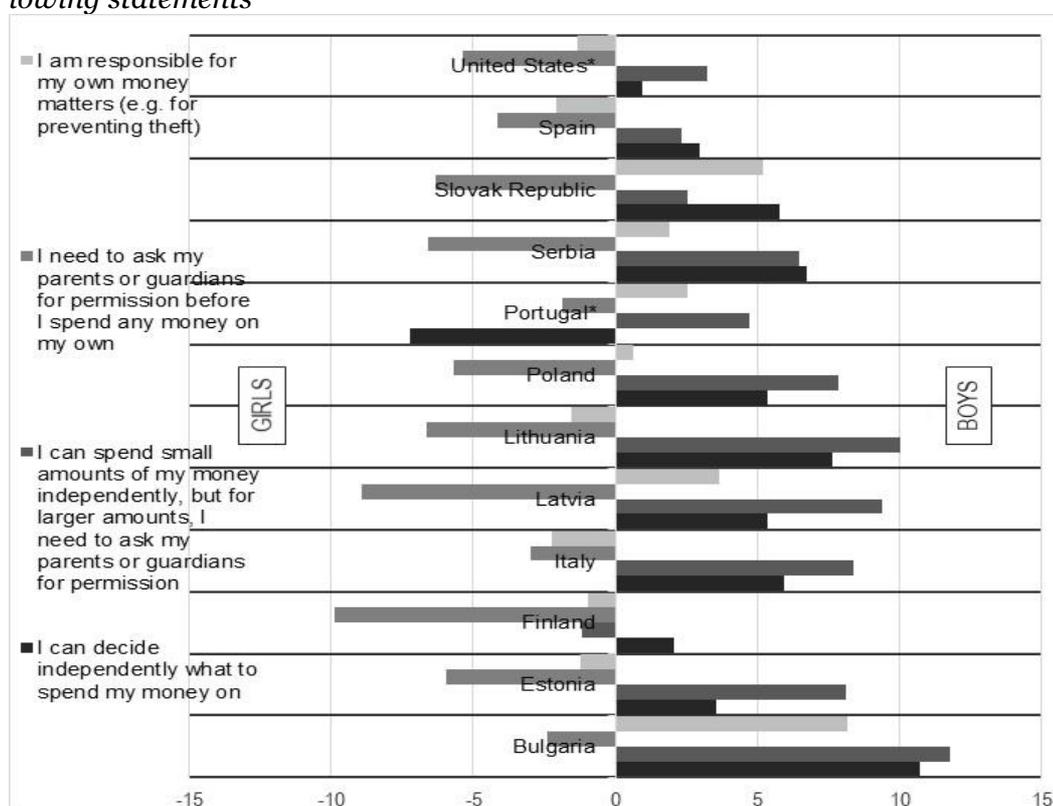
Source: processing of PISA 2018 results (Volume IV) - OECD 2020 Table IV. B1.4.7. *Data did not meet the PISA 2018 technical standards but were accepted by OECD as largely comparable

Nonetheless, the most striking finding for Italy is the gender gap in friends as a source of information: 12% more Italian boys report gaining information about financial matters from friends than do Italian girls. No selected country except for Italy reported a two-digit percentage gender gap in this area. Perhaps this is a sign of how widely interests vary between male and female peer groups in Italy and how, more than in other settings, cultural differences in gender stereotypes affect the topics of discussion within peer groups.

In Italy, the proportion of 15-year-old girls accustomed to discussing economics- or finance-related news with their parents at least once a month is much lower than boys. While this type of gender gap is (relatively) prominent across the other countries as well, Italy stands almost alone as a context where boys outnumber girls in discussing the family budget, their own saving, and spending decisions with parents. It is only in relation to money for things students want to buy that Italian girls are more numerous than boys in engaging with parents (Figure 6). Yet, a figure that might reduce the gap in using financial information is that girls seem to marginally outnumber boys in turning to the internet as a source of information about money matters (Table 5).

On average across the PISA 2018 countries, girls reported having more autonomy than boys in their spending decisions, with a percentage of Italian girls consistently higher than boys declaring they can decide independently about their money (Figure 7). Of course, independent money management at 15 years of age does not automatically mean to possess a strong financial proficiency¹⁴. However, girls on average seem to be less familiar with money-related terms, familiarity with financial concepts being the total number of concepts that the student had both learned at school and knew how to define. This score ranges from 0 to 18 and the Italian female index is one of the lowest (6.07) among the selected countries.

FIGURE 7. Students' autonomy in handling money, by gender. Girls-boys difference in the percentage of students who agreed/strongly agreed with the following statements



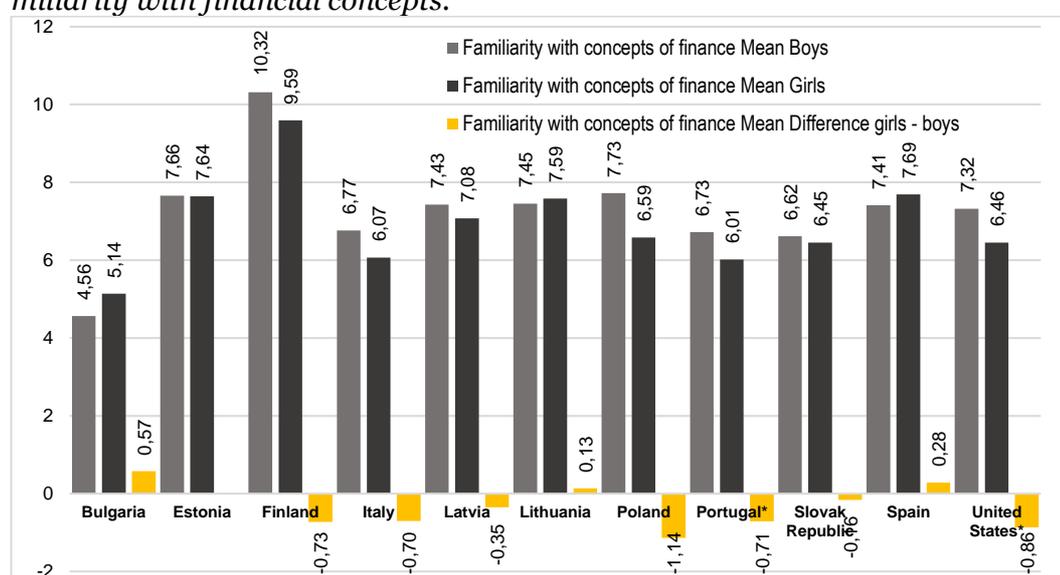
Source: processing of PISA 2018 results (Volume IV) - OECD 2020 Table IV. B1.4.12. *Data did not meet the PISA 2018 technical standards but were accepted by OECD as largely comparable

Considering the average of all selected countries, 15-year-old girls are falling behind boys in the number of complex financial terms for which they know the correct meaning. In this respect, however, the Italian gender gap is not much wider than that found for other countries (Figure 8). Obviously, in

¹⁴ A classic example could be that girls are autonomous in spending money, but not free in earning it. For instance, some Italian parents forbid their daughter from working as waitresses, as they consider it an occupation “not appropriate” for teenage girls (Rinaldi et al., 2003). Indeed, in Italy work experience during the teenage years is less widespread among girls than boys (ISTAT, 2019).

most cases boys and girls in all countries are taught in gender-mixed classrooms and consequently follow the same curriculum and teaching programmes. Therefore, girls and boys might be expected to participate to the same degree in financial education lessons, programmes, and contents. Still, the results show girls reported having less experience in financial education programs and initiatives than boys. As a personal and subjective recollection of the past, girls might well tend to forget occasions of financial education more than boys, perhaps because such teaching took place in the context of other subjects or because selective memory focuses more on the lessons that aroused the most interest. In any case, however, this data indicates boys' and girls' divergent relationship with financial education in socialization outside of school (Bowen, 2002; Danes, Haberman, 2007, Webley, Nyhus, 2013; Agnew et al., 2018).

FIGURE 8. *Learning about financial/economic terms in school, by gender: familiarity with financial concepts.*



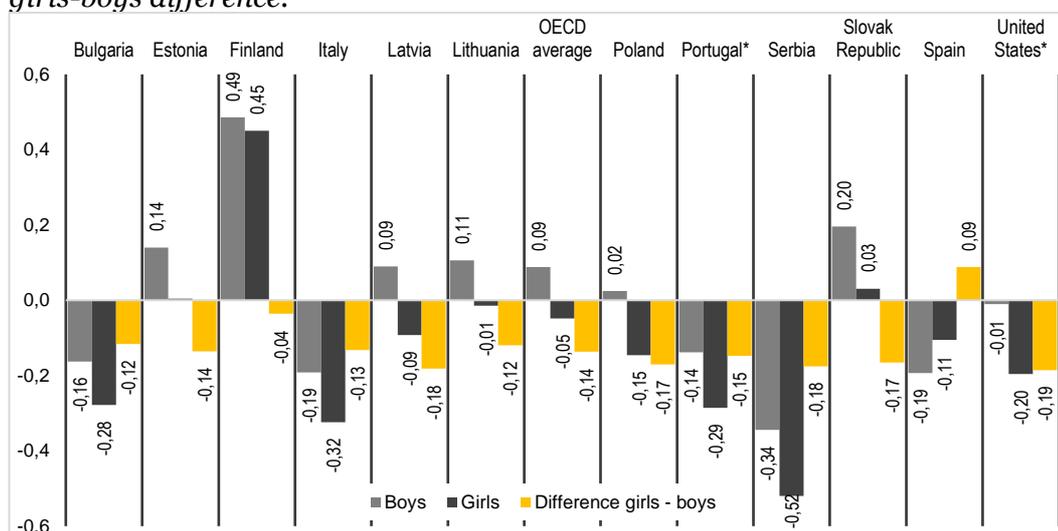
Source: processing of PISA 2018 results (Volume IV) - OECD 2020 Table IV. B1.5.3. *Data did not meet the PISA 2018 technical standards but were accepted by OECD as largely comparable

As the figure above clearly shows, Italian girls' mean score for financial education via school lessons¹⁵ is the lowest of all the girls considered here (except for Serbia) and 0.13 points lower than that of Italian boys. This gender gap in favour of boys can also be seen in the proportion of students who had encountered money-related tasks and activities in class. In Italy, this gender

¹⁵ The index of financial education in school lessons (FLSCHOOL) is constructed by OECD-PISA experts by aggregating students' responses as to «how often (“never”, “sometimes”, “often”) describing the purposes and uses of money; exploring the difference between spending money on needs and wants; exploring ways of planning to pay an expense; discussing the rights of consumers when dealing with financial institutions; discussing the ways in which money invested in the stock market changes value over time; analysing advertisements to understand how they encourage people to buy things» (OECD, (2020a: 148). Positive values mean that students are more exposed to financial education in school lessons than is the student average across countries.

gap is statistically significant for tasks and activities related to financial institutions (8.7 percentage points) and stock market value change over time (9 percentage points) (Table 6).

FIGURE 9. Mean index of financial education in school lessons by gender and girls-boys difference.



Source: processing of PISA 2018 results (Volume IV) - OECD 2020 Table IV. B1.5.10. *Data did not meet the PISA 2018 technical standards but were accepted by OECD as largely comparable

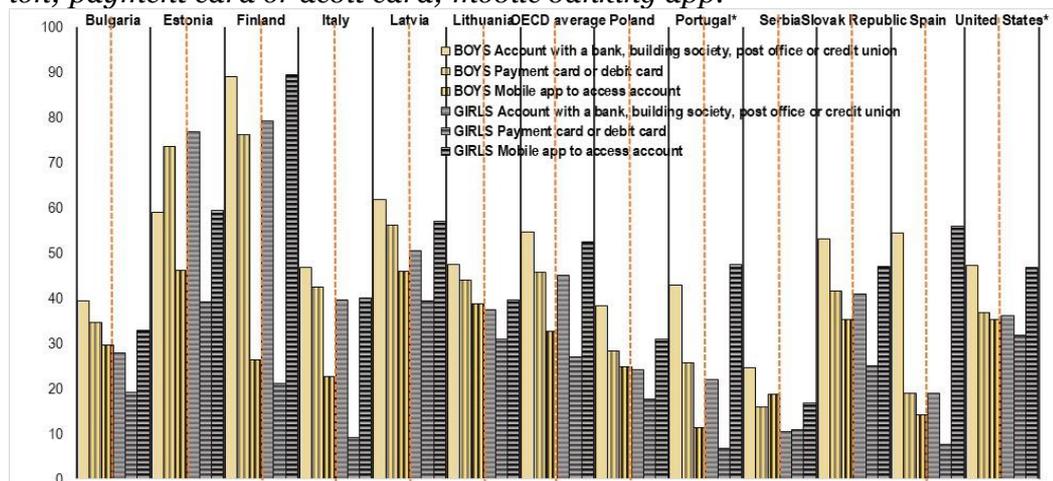
TABLE 6. Difference in girls-boys percentage for those who had encountered the following types of tasks or activities sometimes or often in a school lesson over the previous 12 months

	Describing the purpose and uses of money	Exploring the difference between spending money on needs and wants	Exploring ways of planning to pay an expense	Discussing the rights of consumers when dealing with financial institutions	Discussing the ways in which money invested in the stock market changes value over time	Analysing advertisements to understand how they encourage people to buy things
Bulgaria	-3.4	-1.8	-2.5	-5.8	-4.7	-0.4
Estonia	-2.3	-3.8	-4.5	-11.0	-10.0	1.1
Finland	1.8	-2.2	-8.3	-3.3	-5.5	-0.5
Italy	-6.4	-2.6	-5.6	-8.7	-9.0	-4.4
Latvia	-5.6	0.3	-5.9	-11.0	-14.8	-8.8
Lithuania	-1.9	-3.1	-2.7	-7.2	-6.2	-1.5
OECD average	-4.1	-3.1	-6.3	-8.7	-8.7	-3.0
Poland	-2.0	-5.0	-8.5	-8.8	-8.7	-2.7
Portugal*	-8.3	-3.7	-7.9	-9.0	-10.6	-2.1
Serbia	-3.6	-6.9	-7.1	-9.8	-10.2	-6.3
Slovak Republic	-2.6	-3.1	-6.4	-11.2	-11.5	-6.6
Spain	-1.4	4.1	-0.7	-3.2	-0.5	5.1
United States*	-6.6	-5.5	-8.5	-13.1	-9.6	-5.5

Source: processing of PISA 2018 results (Volume IV) - OECD 2020 Table IV. B1.5.10. *Data did not meet the PISA 2018 technical standards but were accepted by OECD as largely comparable

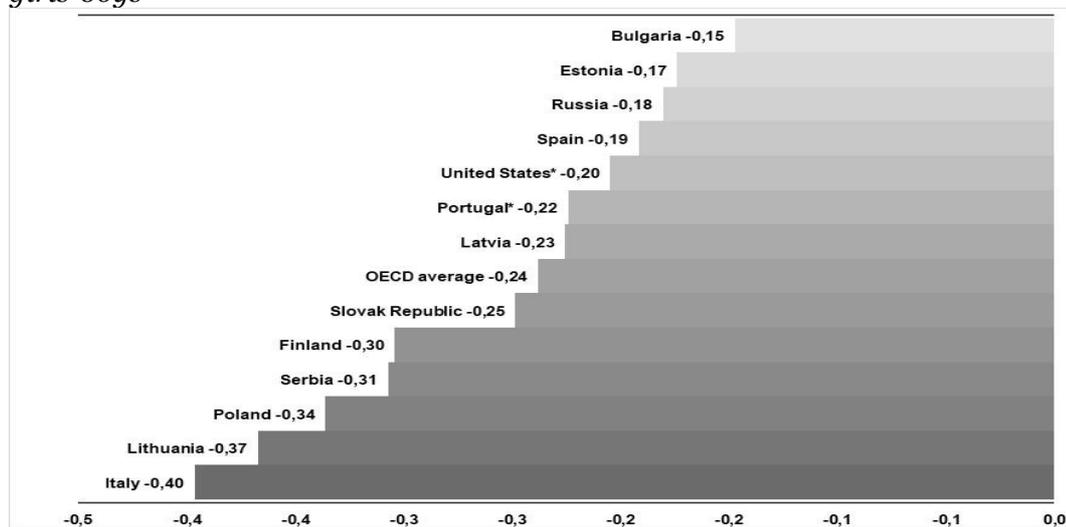
According to OECD-PISA 2018 assessment data, girls have fewer chances to maintain an account with a financial institution or a payment/debit card and, above all, to be involved in digital financial transactions. Although the proportion of Italian boys with a bank account, debit card or a mobile banking app is lower than the average of boys in other countries, it is still higher than that of Italian girls who have these basic financial tools (Figure 10).

FIGURE 10. *Having basic financial products, by gender. Percentage of boys and girls who have an account with a bank, building society, post office or credit union; payment card or debit card; mobile banking app.*



Source: processing of PISA 2018 results (Volume IV) - OECD 2020 Table IV. B1.6.3. *Data did not meet the PISA 2018 technical standards but were accepted by OECD as largely comparable

FIGURE 11. *Index of confidence in using digital financial services. Difference girls-boys*



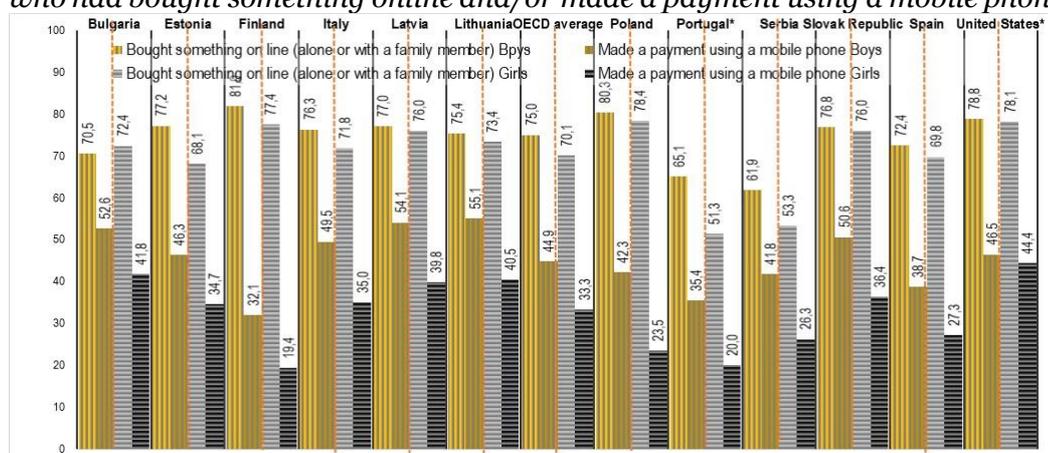
Source: processing of PISA 2018 results (Volume IV) - OECD 2020 Table IV. B1. 7.2. *Data did not meet the PISA 2018 technical standards but were accepted by OECD as largely comparable

Boys on average also seem more familiar than girls with making use of digital financial services: in all the countries considered, the index of

confidence in using digital financial services¹⁶ is higher amongst boys; Italy has the highest gender gap disadvantaging girls (Figure 11).

Hence, within a global trend of gendered patterns of socialization in digital financial tools impacting on teenagers' financial literacy (Helsper, 2010; Gammage et al., 2017), Italian girls risk being left far behind in digital finances: the proportion of Italian 15-year-old girls who had made an online purchase or a payment using their mobile phone in the last year is respectively 4.5 and 14.5 percentage points lower than that of Italian boys. These outcomes suggest that girls' digital financial technology habits are far less established than boys' (Figure 12).

FIGURE 12. Digital financial activities, by gender. Percentage of boys and girls who had bought something online and/or made a payment using a mobile phone.



Source: processing of PISA 2018 results (Volume IV) - OECD 2020 Table IV. B1. 6.10. *Data did not meet the PISA 2018 technical standards but were accepted by OECD as largely comparable

Gender stereotyped habits might be a key factor in explaining the gap between girls and boys in financial awareness and skills. As a matter of fact, on OECD average less girls than boys report receiving money from an allowance, working outside school hours in petty or informal jobs, working in a family business or selling things (Table 7). The Italian girls versus boys gap in earning pocket money is remarkably wide for working outside school hours and/or in a family business, a sign that families and society at large are still inclined to provide beginning job opportunities according to a traditional gender role division by which boys need to be trained and accustomed to earning money to strengthen their masculinity while girls can wait to bolster their femininity until they finish school (Mortimer et al., 1990).

¹⁶ The index (FLCONICT) is calculated on the extent to which students feel “not at all confident”, “not very confident”, “confident” or “very confident” when «using digital or electronic devices outside of a bank: transferring money; keeping track of their balance; paying with a debit card; paying with a mobile device instead of using cash; and ensuring the safety of sensitive information when making an electronic payment or using online banking» (OECD, 2020a: 148). Positive values mean that students express more familiarity with using digital financial services than does the average student across OECD countries.

TABLE 7. *Sources of money, by gender. Percentage difference between girls and boys receiving money from various sources.*

	An allowance or pocket money for regularly doing chores at home	An allowance or pocket money without having to do any chores	Working outside school hours (e.g. a holiday job, part-time work)	Working in a family business	Occasional informal jobs (e.g. babysitting or gardening)	Gifts from friends or relatives	Selling things (e.g. at local markets or on eBay)
Bulgaria	-10.7	5.5	-13.9	-15.4	-13.7	8.0	-16.9
Estonia	-17.3	5.0	-5.5	-7.2	-6.3	6.8	-11.7
Finland	-10.6	-1.8	-4.8	-8.5	2.4	5.3	1.2
Italy	-7.8	-3.1	-12.6	-12.0	-6.6	7.6	-19.1
Latvia	-14.4	7.4	-11.4	-12.1	-3.9	8.8	-16.7
Lithuania	-11.4	0.2	-15.7	-12.9	-5.3	6.9	-15.3
OECD average	-8.6	2.5	-9.1	-9.3	-2.1	6.1	-12.9
Poland	-12.1	4.5	-11.7	-10.1	-7.7	9.5	-14.3
Portugal*	-6.5	-0.9	-10.4	-10.0	-5.4	2.5	-15.3
Serbia	-16.7	3.2	-22.0	-15.7	-15.1	6.3	-20.0
Slovak Republic	-10.8	4.6	-12.6	-9.6	-10.0	6.1	-13.6
Spain	-6.6	1.8	-7.2	-8.7	-0.5	4.2	-14.5
United States*	-5.0	9.4	-10.7	-8.7	1.2	5.0	-17.3

Source: processing of PISA 2018 results (Volume IV) - OECD 2020 Table IV. B1. 6.15. *Data did not meet the PISA 2018 technical standards but were accepted by OECD as largely comparable

4. SELECTED FACTORS EXPLAINING GENDER GAPS IN BOYS AND GIRL'S FINANCIAL LITERACY AND ATTITUDES

Despite the extensive literature published in the last decade, there is no clear, standalone model adequately explaining gender gaps in financial literacy. However, here below we review the main approaches we believe may contribute to framing Italian teenagers' gender gap.

4.1. Materialism

European countries are still characterised by a set of values in which materialism remains highly important, even more for men than for woman (European Commission, 2012). We can define materialism as the importance given to money as a mean of achieving happiness. Statistics shows that men do earn more than women, with a gender pay gap significantly higher in southern European countries (European Commission, 2017). Indeed, surveys on children (Rinaldi, Giromini, 2002; Orizzonti TV, 2018), preadolescents (Rinaldi, 2010) and teenagers (Dei, 2006) in Italy find that boys assign more relevance to money as a route to happiness and success than do girls. Furthermore, boys more frequently associate money with positive concepts such as respect, power, prestige and job satisfaction than negative or ambivalent ones such as greediness, cupidity, or selfishness (Prince, 1993;

Zelizer, 1994; Deutsch et al., 2003), while girls display a more mixed attitude. Since money is more relevant and positive for boys than for girls, it is reasonable to expect boys will also be more implicitly “embedded” in social contexts and personal realms correlated with the financial domain, thereby achieving greater financial literacy.

A recent survey of 1,200 Italian primary school students found that, at as young as 8-10 years old, boys are significantly more willing than girls to have a high-paying job as adults (Orizzonti TV, 2018). Such orientations may foster the beliefs that create the cultural framework that actors, even at an early life stage, use to perceive and enact gender differences and inequalities. For example, if girls think that “money is dirty” or expect to earn less than men, they may be less willing to talk about it with peers, spend time studying it, negotiate a higher salary at job interviews or chose more remunerative careers and jobs. This mechanism may reproduce, in adulthood, gender gaps not only in financial literacy, but also in income and job type.

4.2. Parents as role models

Gender differences in values as well as perceived abilities or expectations do not appear suddenly; they develop over time. They are influenced by gender-role socialization, stereotyped expectations and encouragement from others, and sociocultural norms as well as individual characteristic and experiences. Over the course of socialization, studies have shown that parents can act as powerful role models for children in many domains such as smoking (Jester et al., 2019) or sports (Côté, 1999).

If we accept the hypothesis of social learning from a parent’s example, observing a specific distribution of financial power, knowledge, management or control within the family, children may consolidate – through identification with the same-sex parent – their attitudes and ultimately behaviours around money. It bears recalling that gender differences in financial literacy among the adult population remain significant in Italy (Hasler, Lusardi, 2017). As Preston and Wright (2019) note, gender disparities in adulthood financial literacy may reflect a rational choice by partners based on their assessment of the costs/benefits of time use and preferences for the maximisation of utility in the household (Becker, 1985). Indeed, empirical studies show that males in Italian households are more likely to be the primary decision-makers regarding saving, investment and borrowing when their female partner is less educated (Facchini, 2008; Fonseca et al., 2012). Such divisions of labour or “household specialisation” may reflect a rational choice by respective partners (on the assumption that households act as single decision-making units). Therefore, it would be rational for the partner specialized in financial activities to invest more effort and time in acquiring more knowledge in the financial domain. For example, research into the social construction of gender identity conducted among preadolescents in Italy (Besozzi, 2003) has documented that boys are more willing than girls to “demand” their right to receive money from their parents: when ranking the features of “good parents”, boys assign greater importance to “giving children the possibility to have money” than do girls.

These findings may also be due in part to the fact that, as indicated by Williams (2001), girls are more affected than boys by «commodification anxiety», i.e., the fear of a world sullied by the commodification of intimate relationships in which money pervades even family relationships and the «economy of care», as also found in Italy (Rinaldi, 2010). Thus, girls (like or partially following their mothers) may tend to attach less importance to money and the right to receive it, reducing their chances of learning how to manage and use it. These hypotheses may be theoretically supported by popular family studies theories from the mid-20th century, such as Blumer's symbolic interactionism in which gender roles were socially assigned specific duties, with men given the role of financial provider and allocator (White, Klein, 2002), and women that of (unpaid) care-giver and emotional support provider (Preston, Wright, 2019). Although couples in which the women earn more than men show signs of more pro-female financial arrangements (Fraboni, 2019), the hypothesis of same-sex parental role-models having significant influence in familial financial socialization seems to play a key role in explaining the Italian financial literacy gender gap.

4.3. Gendered values and norms within the family

International research suggests that the gender gap in financial literacy arises from gender-differentiated sets of practices and expectations that parents display towards children, which may cause girls to develop distinct fears, preferences, and confidence levels in financial matters (Prince, 1993; Rabow, Rodriguez, 1993; Zelizer, 1994; Newcomb, Rabow, 1999).

Italian studies find that boys receive more pocket money than girls (Ruspini, 2012). During childhood, boys declare that parents encourage them to pursue more remunerative jobs in the future than girls (Rinaldi, Giromini, 2002). A further survey from ISTAT (2011) documented that 53% of boys aged 14-17 have a regular allowance but only 42.1% of girls do, although the latter occasionally receive money "on demand". This suggests that parents encourage boys, more than girls, to develop financial skills and autonomy, in keeping with the results discussed above (Figure 2). Furthermore, as money is a "sensitive" subject in family relationships, students' self-reported answers may be insufficient, while questionnaires filled in separately by parents and children could provide more accurate results (Webley, Nyhus, 2006; Rinaldi, 2007).

4.4. Self-confidence in the financial domain

Several studies have also found that boys are more confident in managing money than girls (Chen, Volpe, 2002; Hira, Mugenda, 2000; Hira, Loibl, 2008) and the same is true among adults in Italy (Hasler, Lusardi, 2017). Prior research suggests that males are more overconfident than women when the behaviour or task is expected to be masculine or in uncertain situations (Barber, Odean, 2001). Many aspects of financial planning such as investing have historically been considered masculine tasks and fraught with risk (Hira, Mugenda, 2000; Croson, Gneezy, 2009). These results may reflect a status belief, once again in line with status characteristics theory

(Berger et al., 1998; Ridgeway, 2001; Ridgeway, et al., 2009). According to this theory, gender inequalities are due in part to status beliefs, i.e. «widely held cultural beliefs that link greater social significance and general competence, as well as specific positive and negative skills, with one category of a social distinction (e.g., men) compared to another (e.g., women)» (Ridgeway, 2001: 638). Under this premise, Italian girls might feel less self-confident about their money knowledge (and management) than boys, since their self-evaluation is affected by a status belief. This could explain why significantly more women answer “do not know” in financial literacy tests than do men, even when they actually know the correct answer (Bucher-Koenen et al., 2017).

CONCLUSIONS AND IMPLICATIONS

The study of gender differences in financial literacy, and in adolescents' and adults' financial socialization patterns more broadly, is currently considered highly relevant for multiple reasons. Firstly, the 2008 financial downturn has strongly affected women's labour market participation in Europe, increasing the chances of falling into poverty especially for single parent, divorced, widowed and/or elderly women (European Commission, 2017). Even today labour markets offer young women fewer job opportunities than men, especially in Italy where women's current economic disadvantage may be even more dramatic because of COVID-19. Secondly, despite their increasing educational achievements, Italian women still are more likely than men to work temporary, low-skilled and low-paying jobs and to receive lower pension benefits when retired (Barbieri, Cutuli, 2009; Angelici et al., 2020).

After a brief overview of the state of the art of financial education project in Italy as compared to other countries, the chapter focussed on 15-year-old Italian students' financial literacy as measured by the most recent PISA 2018 assessment. As highlighted by previous waves of PISA, gender gaps in financial literacy are considerably deeper (and more statistically significant) in Italy than in other countries, and overall performances have deteriorated over time. Italy's data trend, furthermore, runs opposite to that of other countries that instead show improving results for both sexes. Similarly, the share of students scoring highest for financial literacy has been decreasing in Italy and increasing for the other countries: in fact, the proportion of Italian girls with low financial literacy proficiency scores is the highest amongst all the countries included in the PISA assessment. Moreover, Italian girls outnumber Italian boys in the low and medium levels of proficiency, while they are outnumbered by boys in top levels 4 and 5. Even considering the influence of proficiency in mathematics and reading, the gender gap in financial literacy in Italy persists. Looking for variables that differentiate teenagers' financial socialization patterns, we found a striking gender-

marked factor in “friends as a source of information about money matters”: in Italy, boys report receiving financial information from friends more than girls do. Research conducted abroad (Erskine et al. 2006) and in Italy (Rinaldi, 2010) on adolescents and preadolescents has shown peer groups play a significant role in money-saving behaviours. We can then speculate that this influencing role may also affect interest in finance and financial knowledge, with boys talking more about money matters and promoting informal learning which, in turns, increase their financial literacy. In addition, a recent study by Driva and colleagues (2016) on 13-15-year-olds finds that stereotypes also play a major role in certain areas of financial socialization: females’ financial knowledge deteriorates with stereotype intensity, whereas males’ knowledge increased. While there is no proven causal relationship between gender stereotypes and financial knowledge, financial literacy gender gaps and stereotypes are both at play at young ages, which is consistent with the notion that stereotypes influence teenagers’ investments in acquiring financial literacy. As there is evidence of powerful stereotypes in occupational segregation beginning in childhood in Italy (Sagone, et al., 2018), further research is needed to establish such causal links and, more generally, to understand the formation of gender stereotypes in domains straightforwardly related to the financial realm.

Another noteworthy finding is that Italian girls’ mean score in the index of financial education in school lessons is the lowest among girls from major western countries: this may be due to either less frequent exposure to money-related tasks and activities in class, or a more limited “recollection” of it (while boys, being more interested in certain topics, may be better able to remember these more engrossing subjects). Italian male teenagers are also more familiar with bank accounts, payment or debit cards, and mobile banking apps, tools which may enhance their familiarity with the terms, activities, and information comprising financial knowledge. Both results require further investigation.

There is still no clear model that can satisfactorily explain the gap in Italy. We have discussed possible meso-factors that may permeate Italian boys’ and girls’ financial socialization context (such as materialism, expectations in the couple, gendered values and norms in family practices, and self-confidence), but we do not yet have a standalone explanation. A recent study by Longobardi and colleagues (2018) on factors explaining gender differences in financial literacy suggests that the family still has a direct impact on financial literacy attainment even after accounting for the mediating effect of students’ gendered attitudes and motivations, thereby highlighting the important role of the familial context in shaping financial literacy gender differences. In other words, as posited by the cultural perspective on the sociology of money framework (Baker, Jimerson, 1992), the symbolic meanings, preferences and attitudes that boys and girls associate with money while growing up may play a significant role in their use of money and acquisition of financial knowledge. These factors, together with the influence of socio and cultural dimensions, deserve further investigation.

The ever-increasing number of projects promoting financial education in Italy can be considered an encouraging sign of various institutions’ efforts

to improve Italians' financial knowledge (Banca d'Italia, 2017). Nonetheless, some critiques have been raised on the effective non-commercial purposes of some of these initiatives. In our opinion, financial literacy would best be improved not by either eliminating financial literacy programmes to rely instead on improved control and law enforcement (a measure that we consider complementary and not substitutive of financial education), or by making it a compulsory subject in the national curriculum, aware that such inclusion does not automatically address gender gaps. Based on our analyses and suggestions made by practitioners and scholars in Italy (Rinaldi, 2019b), three priority policies would need to be implemented and reinforced:

i) Better coordination of all existing projects: this could be carried out by an independent entity, legitimized by the main institutional actors, which could provide detailed guidelines and clearer and more specific goals, such as improving female financial literacy. Previous editions of the *National Strategy of Financial Education* provided very general goals which are not much help in designing more effective interventions.

ii) Additional resources and tools for evaluation would be needed to study the efficacy of financial literacy projects in terms of enhancing girls' competences. It is fundamental for evaluations to be carried by independent research groups that do not have conflicts of interest with those carrying out the projects and are able to provide suggestions and feedback during the course of the project and not only *ex-post*.

iii) The one-size-fits-all approach mainly used to date has dramatically disregarded the highly divergent financial education needs of different segments of the population (Cervellati, 2017; Nicolini, 2019). Attempts should be made to enact educational projects not only targeted more specifically to girls, but also with better communication campaigns to raise motivation and awareness. Families and parents may also play a significant role in promoting better financial literacy among girls: inter-generational projects may be tested as well as web-based activities engaging both students and their parents, using the internet to augment familiarity with digital financial tools. Italian policy makers and educational authorities should allocate resources to enhancing not only the quantity of financial education activities but their quality as well, promoting real improvements in the financial literacy and well-being of Italian girls and boys now and in future generations.

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10

Contradictions and Critical Limitations of the Gender Category in the Use of OECD-PISA Datasets

Marialuisa Villani and Chiara Carbone

INTRODUCTION

The conceptual focus of the theoretical excursus presented here is the category of “gender” and its intersections with the design of standardized educational assessment tools. Our aim with this chapter is to contribute to fostering deep thinking about gender analysis and its interpretation in relation to large-scale assessments in the field of education. This attempt is part of ongoing reflection conducted through an exploratory study with an analytic-epistemological purpose: to begin interpreting gendered PISA (Program for International Student Assessment) dissemination publications using a combined quanti-qualitative analytical approach.

PISA is the OECD’s (Organization for Economic Co-operation and Development) Program for International Student Assessment. It is used to measure 15-year-olds’ ability to apply their skills and knowledge in reading, mathematics, and science. Since 2000, the PISA assessment has been conducted every three years and in over 90 countries. In this chapter we outline the epistemological issues surrounding the design of the assessment and the gender category in particular. Furthermore, we investigate the idea of gender that is disseminated through this standardized assessment as well as the analyses conducted by OECD and reproduced in part by the scholars who use PISA datasets for their secondary analysis. This initial analysis is aimed at developing an interpretative framework of the processes through which gender inequalities are reproduced through the erroneous use of the categories of sex, gender, and gender identity (Sullivan, 2020).

We have chosen to focus on PISA because the OECD has come to represent the leading organisation in statistical data design and production in the field of education specifically thanks to the implementation and dissemination of its assessment program (Bottani, Vrignaud, 2005; Morgan, 2011; Sellar, Lingard, 2014; Pettersson, 2014).

In response to the array of issues raised by second-wave feminism and especially Simone De Beauvoir's book *The Second Sex*, the western world began reflecting on the concept of difference as a category of analysis. The acknowledgment of women's specificity that is central to De Beauvoir's work is expressed in different forms and with different emphases; indeed, this ground-breaking idea points to the existence of rich and fruitful "feminine" reflection taking place even in fields traditionally considered "male domains" such as history, philosophy, the social sciences, and politics: in short, the "public" dimension of culture.

This innovative concept drove thinkers to recognize the need to overcome the dominant patriarchal vision positing women as "the other" and "the second sex", subordinated to "the first sex", that is the male sex, commonly treated as "the norm". This hierarchical division also provides the foundations for society's heteronormative structure and the concept of normativity (Butler, 2006). Such conceptual developments paved the way for the perspective considering the category of gender to be a social construction built around the male and female sexes and through which we can connect our reflection to Simone de Beauvoir famous assertion that «one is not born, but rather becomes, a woman» (De Beauvoir, 1989: 273). Feminists introduced the term gender during the Seventies to highlight the fact that sexual difference, a fundamentally biological aspect, is different from that which is socially and culturally constructed. Gender has been used, therefore, as a code implying reciprocity, that is, a constant dialectic between its basic components. In social research, gender is frequently treated as a dichotomous variable because the introduction of a gender perspective leads to prioritising female and male experiences, reinforcing what is considered normative and what is not. It might instead be useful to consider the gender category as an analytical tool with its own heuristic capacity and to take into account its dynamic and fluidity. In light of this point and building on the insights of poststructuralist theories, contemporary feminist thinking has stressed that it would be fair, desirable, and non-discriminatory to replace the binary with a plurality of possibilities capturing the complexity of human beings. In this feminist work, the rigid conception of gender conveyed by the normative binary distinction has been translated into multiple positionings, thereby moving beyond masculine-feminine polarization.

Looking at the relationship between gender and education during the late Sixties and early Seventies, feminist scholars searched for ways to unveil and break down common stereotypes linked to roles that would have in some way disadvantaged one or the other gender in the school setting. In poststructuralist feminist epistemology, scholars' rejection of the binary notion marked their acceptance of the idea that gender is fluid. In so doing, postmodern theoretical formulation acquired a powerful sense of creativity: human beings, such theories asserted, can invent themselves and become whatever they need and desire to be. In educational research, however, the application of the interpretative paradigm of postmodern gender theory to local or situated realities has yet to be deeply examined or developed (Pillow, 2000).

As national and international assessment programs were developed in western societies, standardized tools were formulated to evaluate

educational performance; the PISA evaluation tool in particular has come to be used widely as the main tool for carrying out international comparisons and guiding the decisions of national educational policy makers. When referring to standardized evaluation procedures, it is essential to bear in mind that the inclusiveness of this tool is epistemologically debatable. Indeed, scholars (Carvalho, Costa, 2014; Sjøberg, 2015; D'Agnese, 2015) have raised doubts about the epistemological efficacy of evaluation systems on the grounds that international surveys are validated in multiple and sometimes highly heterogeneous school systems without considering the situated, local system of knowledge operating in each case (Connell, 2009). Another set of critiques has to do with the way the tests and their content are constructed, suggesting that the cultural belonging and subjectivities of those who write the tests cannot help but condition the way they are put together. The literature in this field is aimed at demonstrating that the construction of these standardized tests is strongly influenced by a western, heteronormative point of view and the confused conception of gender that prevails in international large-scale education assessment (ILSA) tools (Mons, 2009; Carvalho, 2012; Carvalho, Costa 2014, D'Agnese, 2015; Addey, 2017)

2. METHODOLOGY

We conduct a qualitative analysis of the content of PISA reports (2015-2018), specifically focusing on the 2015 report *The ABC of Gender Equality in Education: Aptitude, Behaviour, Confidence* (OECD, 2015). The challenge is to apply an epistemological gender perspective to the analyses of the heteronormative data production (Mons, 2009) of PISA reports and the secondary analyses carried out using PISA databases.

We have considered 14 articles analysing PISA data and gender differences for the period 2002-May 2020, that is, from the first to the most recent secondary analyses of PISA data. We are aware that the number of articles considered here is limited, and indeed our work is not intended to produce generalizations but rather to constitute an initial step forward. Employing the mixed-method framework (Greene et al., 1989) in a complementary way, we will go on to use the outcomes of this work to guide text-mining analysis (Ferreira Mello et al., 2019) to be carried out between winter and spring 2021.

3. GENDER AND PISA

PISA 2018 Insights (OECD, 2019b) describes a small gender gap in mathematics and the sciences. If we analyse the national scores in mathematics for some of the countries more relevant in this area, however, the

results indicate a different situation. While the OECD average of the mathematics gap is 5 points in favour of males, the Italian average, for example, is 16 (OECD, 2019b). However, methods and processes of building female and male identities in school vary according to the cultural framework of each local context, and consequently give rise to different behaviours and different PISA results. As Meier and Diefenbach (2020) claim, the OECD epistemological framework is built on a dichotomous idea of gender. This is true despite the OECD's declaration in the *ABC of Gender Equality in Education* report (OECD, 2015: 3) that:

Gender disparities in performance do not stem from innate differences in aptitude, but rather from students' attitudes towards learning and their behaviour in school, from how they choose to spend their leisure time, and from the confidence they have – or do not have – in their own abilities as students (OECD, 2015: 3)

According to Meier and Diefenbach (2020), OECD reports employ an untheorized concept of gender following a traditional dichotomous formulation. In addition, there is no reflection on the educational and scientific implications and biases related to the dichotomous gender concept.

To move forward with a content analysis of PISA reports (2015, 2018), we consider the relationship between the cognitivist framework of the PISA program and the use of gender category in PISA analysis. We define PISA's paradigm as a cognitivist one because of the way the object is defined and measured in the OECD program. Specifically, to achieve good results in the three areas under investigation, students must have developed problem-solving skills (OECD, 1999). Bacchi (2020) finds that the definition of problem-solving underlying the PISA epistemological framework is a «technocratic», «expert-led» conceptualization of the idea of problem-solving and learning process. Therefore, students' success in the PISA test depends mainly on their acquiring rules and standards that can be correctly employed in effective processes of learning and building a subjectivity ready to meet the needs of the labour market. This viewpoint echoes that of other scholars (Bottani, Vrignaud, 2005; Mons, 2009; Villani, 2018) who also highlight the normative nature of PISA. The expansion of this cognitive paradigm impacts the concept of gender disseminated through PISA.

The PISA cognitivist paradigm uses attitudes, variables and indexes as causal predictors in gender-focused analysis to explain “the gender gap” in students' performance. In the 2015 report, the indicator of self-confidence in maths is used as a causal predictor of girls' lower performance:

In fact, PISA reveals that students who have low levels of mathematics and science self-efficacy perform worse in mathematics and science than students who are confident about their ability to handle mathematics and science tasks (OECD, 2015: 71).

Even many high-achieving girls have low levels of confidence in their ability to solve science and mathematics problems and express high levels of anxiety towards mathematics. Results presented in Tables 3.1b and 3.2b indicate that even among boys and girls who are equally capable in mathematics and science, girls tend to report lower levels of subject-specific self-efficacy and self-concept. This means that while girls' lower performance in mathematics and science among the highest-achieving students may reflect lower levels of self-

confidence and higher levels of anxiety, the differences in levels of self-confidence and anxiety between boys and girls are greater than differences in mathematics and science performance (OECD, 2015: 78).

We postulate three specific problems: the first lies in the binary representation of gender, that is, treating gender as if it were sex; the second has to do with the way OECD analyses reproduce and normalize low levels of mathematics self-confidence among girls (Meier, Diefenbach, 2015); and the third is the use of an epistemological link in applying attitude variables as elements with a causal effect on students' performance. We have found that attitudes are considered a linear, causal variable in the PISA epistemological and theoretical framework. Sociological analysis of pupils' attitudes instead suggests that these are "circular variables" in the sense that attitudes can be dependent or independent variables in relation to school behaviour (Giancola, Viteritti, 2014).

Analysing the analytical and assessment framework reports for PISA 2015 and 2018 (OECD, 2017, 2019), we find the attitudes variable used as a causal variable to explain students' performances in sciences and financial literacy (OECD, 2017; OECD 2019). The epistemological problem surfaces when these indicators are used as causal predictors of school achievement, as they do not consider the effect of structural and socio-economic inequalities that influence the information conveyed by the indicators (Rindermann, 2018). In PISA, the variables representing students' attitudes at school are considered predictors of school performance, i.e. they are used as a causal element to explain students' performance (OECD, 2017, 2019a). The variables that measure attitudes (which are generally charted in PISA through attitudinal scales, i.e. Likert scales) related to student performance can produce a spurious correlation. It thus follows that it is not possible to establish whether attitudes indicators are the cause or the effect of pupils' performance.

Our aim is not to critique the statistical reliability of the attitude indicators designed and implemented in PISA; rather, we point out the epistemological bias produced by the normative PISA framework. The OECD uses the variable of self-confidence in mathematics in a way that can produce two kinds of bias. First, the use of the pupils' attitude variable as a causal variable instead of a covariance variable. Second, in the OECD 2015 report, researchers assume that girls' lower performance scores in mathematics are directly related to their lower level of confidence in mathematics (OECD, 2015). In this case, the circularity effect of attitude variables makes it all but impossible to ascertain whether the low level of self-confidence is a cause or result of girls' poorer performance in mathematics (Meier, Diefenbach 2015).

In contemporary society, mathematics skills play an increasingly crucial role in multiple professional fields, especially those involving scientific and technological innovations. Scholars define this trend as a «stereotype threat» (Nguyen, Ryan, 2008) and argue that it could drive girls to avoid competing with boys. It is therefore possible to say that gender differences in mathematical skills translate into real forms of inequality and, on the other hand, that gender inequalities affect individuals' educational and professional trajectories.

Our analysis of PISA documents suggests that the OECD paradigm leads to the exclusion of students' minority traits (mental and physical learning disabilities, linguistic background, belonging to the SOGIESC community) from the assessment (OECD 2018). The use of PISA databases for secondary analysis reproduces this exclusion.

4. THE USE OF PISA DATA SET FOR SECONDARY ANALYSIS AS REPRODUCTION OF GENDER BIAS AND INEQUALITIES

PISA disseminates knowledge that is measured in relation to human capital criteria (Bottani, Vrignaud, 2005; Mons, 2009; Rindermann, 2018) and over the last 20 years and the application of this tool impacted curriculum changes and transformation at a national level, i.e. the case of the transformation of the mathematics curriculum after PISA2000 (Breakspear, 2012). Therefore, it is possible to highlight a regulatory effect of the tools used to carry out assessment (i.e. the transition from assessment paper The PISA disseminates knowledge that is measured in relation to human capital criteria (Bottani, Vrignaud, 2005; Mons, 2009; Rindermann, 2018) and the application of this tool over the last 20 years has brought about curriculum changes at the national level, such as for example the transformation of mathematics curriculum following PISA2000 (Breakspear, 2012). Therefore, it can be said to exercise a regulatory effect on the tools used to carry out assessment (as seen in the transition from paper-based to computer-based assessment) and on the mechanisms for producing and evaluating knowledge acquisition (Carvalho, 2012).

We adopt Williamson's definition of datafication, namely the process that enables us to measure quality, actions and phenomena. The possibility of measuring these elements offers the illusion that the phenomenon in question is objective, wholly overshadowing the theories that have guided the measurement process (Giancola, Viteritti 2014; Williamson, 2018). The result is a linear interpretation of educational phenomena that excludes from the process of analysis all the socio-economic and cultural factors that influence, for example, gender differences in performance between boys and girls (Giancola, Viteritti, 2014; Villani, 2018). To carry out our study, we have conducted an initial analysis of papers in which dataset outcomes are interwoven with gender issues. Some of the selected papers employ only PISA datasets to produce secondary analyses (Stoet, Gery, 2013; Hek et al., 2017), while others also use data from other assessment programs (Saygin, 2018).

In proceeding with our analysis, three recurring, critical issues come to light. These three crucial features can be examined separately or considered in connection: *i*) the overlap between the categories of sex and gender, used interchangeably; *ii*) the habit of interpreting gender gaps in student performance without analysing contextual factors, social background and cultural specificities; *iii*) the absence of a critique of the prevailing binary and dichotomous vision.

TABLE.1 Main Features of the analysed papers

Paper Title	Author(s)	Topics	Categories used	Focus	Dataset(s) used
Sex Differences in Mathematics and Reading Achievement Are Inversely Related: Within- and Across-Nation Assessment of 10 Years of PISA Data.	Stoet, Geary (2013)	Reading Mathematics Literacy	Sex	Analysing the performance gap of between boys and girls using the variable of sex, to promote gender equality. No reference is made to any conceptualisation of gender	PISA 2000, 2003, 2006, 2009
Strengths and Weaknesses in the Swedish and Swiss Education Systems: A Comparative Analysis Based on PISA Data.	Fredriksson et. al (2009)	Reading Mathematics Literacy	Gender	Analysing PISA results for Switzerland and Sweden. No reference is made to any conceptualisation of gender.	PISA 2000-2003
La influencia del género en el aprendizaje matemático em España. Evidencias desde PISA	Fuentes de Frutos, Renobell Santara (2020)	Mathematics Achievement	Gender and Sex	The intergenerational transmission of gender and role performances.	PISA 2000-2003-2006-2009-2012-2015
Cross-National Gender Gaps in Educational Expectations: The Influence of National-Level Gender Ideology and Educational Systems	McDaniel, (2010)	Educational expectations	Gender and Sex	Gender differences in educational expectations. No reference is made to any conceptualisation of gender.	PISA 2003
Examining gender DJF and gender differences in the PISA 2018 reading literacy scale: A partial invariance approach	Khorramdel et. al (2020)	Reading Literacy	Gender	Gender differences in reading due to gender-specific differential item functioning. No reference is made to any conceptualisation of gender. The authors consider 3 sources for the gender gap: socio-cultural, bio-cognitive, and test-taking.	PISA 2018
Gender Differences and Similarities in PISA 2003 Mathematics: A Comparison between the United States and Hong Kong	Liu, O. L, Wilson M (2009)	Mathematics	Gender	A dichotomous “male”/ “female” analysis, comparing performance scores between students in the USA and Hong Kong.	PISA 2003
Do schools affect girls’ and boys’ reading performance differently? A multilevel study on the gendered effects of school resources and school practices	Hek et al. (2017)	Reading Literacy	Gender and sex	Investigating how school characteristics (resources, teachers, proportion of girls) influence girls’ reading performances. No reference is made to any conceptualisation of gender.	PISA 2009
Gender gaps in PISA test scores: The impact of social norms and the mother’s transmission of role attitudes	González de San Román, de la Rica(2012)	Reading and Mathematics Literacy	Gender	The intergenerational transmission of gender role attitudes, especially from mother to daughters, as well as girls’ performances. The authors develop a conceptualisation of gender as a social construction.	PISA 2009
Gender-differences in Self-efficacy ICT related to various ICT-user profiles in Finland and Norway. How do self-efficacy, gender and ICT-user profiles relate to findings from PISA 2006	Tomte, Hatlevik (2011)	ICT	Gender	Exploring the relationship between self-efficacy, Information and Communication Technology (ICT) user profiles, and gender. No reference is made to any conceptualisation of gender.	PISA 2006
Reading, Gender, and Engagement: lesson from five PISA countries	Brozo et al (2014)	Reading Literacy	Gender	Bringing attention to bear on the intergenerational transmission of positive roles from fathers to sons, to improve boys’ reading performances. The authors develop a conceptualisation of gender as a social construction.	PISA 2000, 2009
Debunking Myths about Gender and Mathematics Performance	Kane, Martz (2012)	Mathematics Literacy	Gender and sex	Producing an econometric and dichotomous analysis of pupil performances. No reference is made to any conceptualisation of gender.	PISA 2009, TIMMS 2007, IMO 2001–2010
Can test construction account for varying gender differences in international reading achievement tests of children, adolescents, and young adults? – A study based on Nordic results in PIRLS, PISA and PIAAC	Solheim, Lundstræ (2018)	Reading Literacy	Gender	Comparing how reading literacy is operationalized in these surveys; the product is a dichotomous analysis. No reference is made to any conceptualisation of gender.	PIRLS 2011, PISA 2009 and PIAAC 2012
Automatically analysing text responses for exploring gender-specific cognitions in PISA reading	Zehner et al (2018)	Reading Literacy	Gender	Cognition elements in reading performance scores; the product is a dichotomous analysis. No reference is made to any conceptualisation of gender.	PISA 2012
A Multidimensional Rasch Analysis of Gender Differences in PISA Mathematics	Liu et al. (2008)	Mathematics Literacy	Gender	Dichotomous analysis and statistics models. No reference is made to any conceptualisation of gender.	PISA 2003

The overlapping between the categories of sex and gender is a critical issue across all 14 of these publications. Specifically, it is possible to identify the category of gender assigned the same theoretical significance as the variable of sex in Fredriksson et al. (2009) and Zehner et al. (2018). In Mcdaniel (2010), we found both gender and sex categories used without considering gender as a social construction, and indeed the category of gender is used interchangeably as a synonym for sex.

In some cases, researchers can be seen to employ a stereotype about belonging to sex-based categories, as in Brozo et al (2014) and Kane and Martz (2012). In Kane's study in particular, the lack of STEM orientations among girls is connected to their belonging to the sexual category "female" and considered a "natural tendency" instead of a "cultural-social construction":

In addition, women's nature might include a tendency to prefer the more nurturing fields, such as nursing and teaching young children, to the more quantitative ones, such as mathematics, physics, and engineering. If so, it might not make sense to encourage and direct any but the unusual female toward studying and seeking employment in these latter fields. (Kane and Martz, 2012: 10)

As for the second critical issue, Zehner and colleagues (2018) explain gender differences following a cognitivist analysis in which mental features are the only and crucial factors producing gaps between male and female reading literacy scores. As seen in the study by Fredriksson and colleagues (2009), the term "gender" is repeatedly used to mean the category of sex. No mention is made of context factors, social background or cultural specificities.

The first and second issues appear in the article *Sex Differences in Mathematics and Reading Achievement Are Inversely Related: Within- and Across-Nation Assessment of 10 Years of PISA Data* by Stoet and Geary (2013), who analysed PISA datasets from 2000 to 2009. For the 2000, 2003 and 2009 editions, the authors used "sex" as the category of assessment while they switched to "gender" for the 2006 PISA datasets. Stoet and Geary's (2013) paper focuses on sex differences for the evaluation of mathematics and reading performance scores, but the analyses do not include any elements concerning gender socialization in relation to learning.

In Hek and colleagues (2017), the category of gender is not considered at all as the result of social construction processes and ascribed roles; rather, socio-economic factors are used to explain the gender gap and attribute differences between boys and girls to purely economic phenomena.

A social context analysis is provided by two papers in which intergenerational role transmission is considered as a factor which improves performance in PISA tests. For example, González de San Román and de la Rica (2012) analyse the 2009 PISA data for Spain. According to the authors, having a working mother favours intergenerational transmission of the ideal-type of the successful woman, and this ideal counteracts the stereotype of the male breadwinner in the Spanish context.

Brozo and colleagues (2014) analyse PISA datasets on reading literacy scores for the USA in 2000 and 2009. Their aim is to propose pedagogical

tools to foster the intergenerational transmission of interest in reading from fathers to their children. Both papers analyse the gender category, and the authors clearly specify that gender identity is a social construct. However, a gender binary division is still used in analysing parenthood and the intergenerational transmission of models and roles.

Fuentes de Frutos and Renobell Santara's study (2020) displays an attempt at considering context factors, social background, and cultural specificities. The authors find that the gender gap in performance begins after a specific student age and stress the importance of investigating the effect of teaching practices on school results, in relation to both gender and the transmission of roles in education more broadly.

Finally, we found that a critique of the binary, dichotomous vision was missing in many studies, and especially in the work of Solheim and Lundetræ (2018). The researchers explore whether differences in the way "reading literacy" is operationalised can add to our understanding of varying gender differences in international large-scale surveys. The investigation is based on a polarization of male/female variables, and consequently the results display a binary and dichotomous vision of these categories. Tømte and Hatlevik (2011) present a critique of the binary vision of gender analysis but only as a final consideration, while the data analysis itself actually reproduces a binary interpretation of performance. Liu and colleagues (2008) focus their study on statistical models and in particular the Rasch Model, and find that this tool is dichotomous in character. This acknowledgement is important for the purposes of our discussion in this chapter as it does not take for granted the neutrality of the evaluation tools in question.

Despite claims of neutrality and lack of bias, assessment procedures have frequently been found to be gendered. The PISA can provide indicators of how a specific national policy is working in comparison with others, but it is less useful for identifying particular causal factors or revealing what should or could be done to create a more inclusive gender system (Topping et al., 2003). In our view, it is key that researchers seek to strengthen LSA tools but also and especially that they be aware of these tools' limitations (Hopfenbeck, 2016) in order to develop an analysis that deconstructs gender role stereotypes in the context of education. The category of gender plays a significant role in educational evaluation systems in terms of reproducing stereotypes and pre-existing gender models.

CONCLUSIONS

On the basis of our analysis, it seems that the three critical issues appearing in the secondary analyses of the publications in Table 1 give rise to a process of reproducing gender stereotypes (Elwood, 2006). We noticed that the epistemological and critical issues appearing in the OECD report (2017, 2019) are reproduced once again in the secondary analyses formulated in a number of papers (Khorramdel et. al., 2020; Tømte, Hatlevik,

2011; McDaniel, 2011). Gender stereotypes are also reproduced through researchers' methodological choices and statistical analyses; an example is the use of attitude variables as a causal element to explain student performance (Giancola, Viteritti, 2014) in regression models (Khorramdel et al., 2020; Tømte, Hatlevik, 2011; McDaniel, 2011).

Gender difference is not something that simply exists, as some papers would appear to assume (Brozo et al., 2014; Liu, Wilson, 2009). Rather, gender is generated in practice and, therefore, is actively created in the process of analysis and data production.

The development of sophisticated new technology and statistical tools (Bennet, 2015) allows scholars and experts to investigate phenomena related to gender differences in education with greater accuracy and precision. The gender education policies implemented in response to the political pressure brought to bear by feminist movements have traditionally performed well in spotlighting differential treatment and removing obstacles to the fair treatment of boys and girls. Today, however, it is possible to move forward, imagining how to design standardized evaluation tools in a way that takes into account the fact that sex and gender belonging are two separate spheres within the socialization process.

Western school systems replicate the male-centred societies within which they are embedded. If gender norms are traditional and rigid, therefore, this will directly impact the construction of individual gender identity, gender performance in the school context, the process of socialisation and the way young people perceive themselves in terms of their personal inclination to pursue certain school subjects and skills.

If girls continue to believe and be told that they are less skilled in mathematics than boys, the stereotype could become a self-fulfilling prophecy (Merton, 1949) internalized by girls. Consequently, no evaluation system should ever be considered gender neutral. In reality, they will all continue to reproduce traditional sex-gender differences and stereotypes if we do not decolonize and deconstruct our tools and measurements. The duality of the binary sex system in particular helps to maintain gender hierarchies in education, hierarchies which have been imposed by patriarchy (Lerner, 1986) in its connection with compulsory heterosexuality (Rich, 1980). Breaking with the duality of gender cultures and questioning data collection could be a first step forward in the effort to avoid reproducing traditional gender roles and to overcome the kinds of widespread gaps and disparities highlighted by the above-cited studies.

Despite the disciplinary tensions that have surfaced in the last few decades (Carbone, Jahnke, 2020), it is fundamental that we create an interdisciplinary research space in which gender studies and the sociology of education serve as the keys to nurturing a flourishing debate.

We would do well to avoid the tempting and common tendency to lean heavily on the PISA and other ILSA tools that operate as devices of discipline, and instead strive to generate non-stereotyped analysis and to reduce the risk of gender bias. Specifically, we must critically reflect on the possibility that the overlapping of sex and gender categories is a risk and questionable methodological choice that perpetuates disparities in performance, thereby nurturing stereotypes and self-doubting behaviours.

In our view, continuing to use only two variables (male and female) for the category of gender constitutes a form of discrimination.

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***Reading Networks through
“Gender Lenses”
Scientific Collaborations at the
University of Naples, Federico II***

Ilaria Marotta

INTRODUCTION

Sandra Harding (1986: 31) argues that «women have been excluded from the practice of serious science more systematically than they have been excluded from the exercise of any other social activity, with the possible exception of the war on the front line». For example, considering the Nobel Prize, the highest level of academic distinction, from 1901 to 2020 a total of 874 men received the prize compared to only 58 women, accounting for 6% of all awards.

Moreover, according to the data presented in She Figures 2018, the number of women holding significant research and institutions roles in the European academic field is still very small. More specifically, there continues to be a gender imbalance among researchers given that, as of 2016, only one third of EU researchers were women. The further up the professional ladder we look in the academic sphere, the less women are represented. In the same year and again in Europe, women represented 48% of doctoral students and graduates, 46% of grade C academic positions (lecturer), 40% of grade B (associate professors) and 24% of grade A academic positions (full professor) (European Commission, 2018).

In the context of Italy as well, the data from a study by the Ministry of Education (2019) show that the Italian academic situation is characterized by low numbers of women, nationally. Women still constitute a minority, accounting for 40.2%; the proportion of female academics decreases when passing from the position of researcher (46.6%) to that of associate (37.5%) and full professor (23%) (MIUR, 2019).

According to the prevailing cliché, there are fewer women in science (mainly in positions of responsibility) because science is an extremely competitive environment. As such, it forces women to back out, either because they do not share men’s ways of working, because they are not

prone to disputes, or even because they are overwhelmed by a larger share of family-care tasks (Cherubini et al., 2011). However, the interpretative framework that might help explain this impasse is much more complex and multi-faceted, with multiple phenomena contributing to perpetuating this discrimination against women and defining the larger «gender order» (Connell, 2002). In fact, Le Feuvre (2015) notes that now more data are available (especially comparative data for the different European contexts) and there is widespread awareness of the factors determining gender inequalities and their embeddedness in institutional and cultural contexts.

Another issue to consider when considering women's relative presence in the academy is the type of collaborations they engage in and their role in universities. According to Milojević (2010), collaborations are the basis of modern science. Indeed, most of the scientific areas are interconnected and these connections give rise to a complicated mega-science system. Sonnenwald (2007) argues that scientific collaboration can be defined as the interaction that develops in a social context between two or more scientists. Such interaction facilitates the sharing of ideas and helps scientists carry out tasks so as to achieve common objectives. Moreover, in recent years the study of scientific collaborations has attracted more and more interest, for the physical sciences as well as the social sciences (Batagelj, Mrvar, 2002; Newman, 2001; Tommasini, Luthi, 2007; Moody, 2004). The progressive growth in these studies shows that there is increasing interest in exploring the factors that lead two or more colleagues to collaborate in an academic setting (for example, in drafting a scientific article).

The increase in this type of study over the years reflects a greater awareness that collaborations bolster research results (Zhai, Li, Yan, et al., 2014). Furthermore, collaboration tends to reduce the arduousness of research, save resources, and reduce costs (Jiang, 2008). Collaborations are thus a fundamental variable for promoting scientific progress and development, so much so that the number of collaborations within the academy can be seen as a measure of a nation's scientific progress.

In particular, numerous studies (Abbasi et al., 2012; Abbasi et al., 2010; Wuchty, 2007; Barabasi et al., 2002) have been proposed in the specialized scientific literature to study the structure of collaboration networks. On one hand, this research focuses on constructing models to represent and analyze the structure of links, identifying the dynamics of networking; on the other hand, such studies employ the social network analysis approach (Wasserman, Faust, 1994) to investigate the role actors play in the network and different forms of collaboration. Nevertheless, despite the increasingly collaborative nature of scientific research in the academy and growing scholarly interest in such interactions, gender as an aspect of collaboration between researchers has been treated quite marginally (Abramo et al. 2013) even though gender differences in scientific success have been investigated in depth (König et al. 2015). In light of these points, it is necessary to grant adequate importance to the collaborations carried out among researchers in the academy in order to identify systematic those in collaboration, especially differences linked to gender.

These dynamics of collaboration can be key to the construction of a scholar's social network, a web in which each node occupies a specific position that in turn allows the scholar in question to access specific opportunities in the academic world. The objective of this chapter is thus to carry out an exploratory analysis of the position women hold in two different case studies in an academic setting. The selected case studies are degree courses offered at the University of Naples Federico II - the first one is related to the Social Sciences Department and the second one to the Humanities. This chapter is mainly concerned with the level of feminization, the presence or absence of a glass ceiling, and the role of women in collaborative networks. Networks were reconstructed through an online survey involving all the professors and researchers associated with the selected degree courses. The methodological approach underlying this analysis is social network analysis (SNA) and the study seeks to map social reality from an examination of the totality of the social connections in which the actors are or are not included and the connections that have a determining effect on their behaviour. The social structure is understood as a social network which consists of the actors (representing the nodes of the network) and the relationships that connect the actors (representing the links of the network, these relationships have been precisely classified).

The chapter is organized as follows: the next section outlines the role of women in Italian academia while the following section describes the methodological aspects of research on networks of scientific collaboration. Finally, the last section is dedicated to a detailed description of the data and a presentation and analysis of the networks identified for the two case studies. Analysis is structured as follows: the starting point is the given by discussing the stratification of women in the University Federico II; the case study of the Department of Social Sciences will then be examined and lastly the case of Humanities Department.

2. THE POSITION OF WOMEN IN SCIENCE

Gender is certainly a significant variable for analysing the functioning of a group, and this variable acquires even more significance if we take this approach to the study of the labour market. Even today, in fact, women face disparity in employment due to stereotypes and disadvantages that are relatively easy to identify but difficult to break.

It is well known that, despite the various policies implemented by local, national and European governmental institutions and companies¹⁷, women still suffer from specific occupational disadvantages. They are the

¹⁷ In this context, we refer to the Diversity Management policies implemented to ensure equal employment rights and opportunities to a host of identities which, over the years, have had difficulties in accessing and retaining positions in the labor market. The variables in this case include gender, religion, age and, (in recent years) also sexual orientation and gender identity.

victims of segregation, essentially under-represented in sectors and positions that not only lack high remuneration but also offer better opportunities for career development. This under-representation manifests in the so-called “glass ceiling”, a barrier based on gender segregation that largely blocks women’s access to top-tier management roles.

In the academic field, the situation does not appear to be much different. On the contrary, gender represents an even more significant variable in this sector (Facchini, 1996) in influencing career trajectories, and one that is useful for showing the behaviour of a specific scientific community (Bianco, 2002). The university is a microcosm characterized by very complex social and cultural stratification and a specific level of development of gender relations (Giannini, De Feo, 2008). One widespread hypothesis is that there is a strong positive correlation between the feminization of different roles and the decrease in the prestige of these roles. Bourdieu argued as early as 1998 that the number of women decreases when approaching the highest positions, stating that «the rate of feminization is the best index of the relative position and value of the different professions» (Bourdieu, 1998: 108).

An analysis of official data from the Italian Ministry of Education, University and Research (MIUR, 2019) shows significant differences between women and men in the structuring of role models as well as recruitment and career development in Italy (Agodi, Picardi, 2016). Differences remain despite the multiple directives, recommendations and guidelines issued by European institutions aimed at reducing gender inequalities and promoting equal opportunities, efforts which are considered one of the cornerstones of the EU. More specifically, data show that the number of women in academia tends to decrease substantially the further up the career hierarchy we look: If we consider education alone, MIUR (2019) finds that women make up at least 50% of individuals in the academic field, of which more specifically 55.5% of those enrolled in degree courses; 57.6% of the total number of graduates; 50.0% of those enrolled in doctoral courses and 51.8% of the total number of PhDs. In 2017, women accounted for 40.2% of the 67,917 professors and researchers, with differences between the various academic career levels (MIUR, 2019). They represent just over half (50.3%) of the total number of post-docs, 45.9% of researchers and 34.6% of associate professors while they account for just 23.0% of all full professors (MIUR, 2019). This figure tends to worsen further if we consider women’s access to and duration in higher organizational roles (such as rectors, prorectors, directors, etc.). The CRUI - Conference of Rectors of Italian Universities - found that in 2019 only six female rectors had been elected to Italian universities as compared to 89 male rectors.

As mentioned above, women’s standing in the university can also be interpreted by studying their collaborations and the relative positions they hold in these networks. Numerous international studies have investigated the type of collaborations women carry out in the academic world, highlighting some problematic issues. Indeed, it seems that women in science have different and more limited (including in terms of extension) collaborative relationships than their male colleagues (McDowell et al. 2006; van Rijnsoever et al. 2008).

One of the differences researchers have noted is that women tend to develop collaborations that are more formal (Abramo et al., 2019) but extend beyond their own specific interests in some way (Leahey, 2006). This tendency also generates a greater propensity for interdisciplinary collaborations (Rhoten, Pfrman, 2007), although Araújo and colleagues (2017) argue that women are more likely than men to engage in interdisciplinary collaborations only in the natural sciences.

At the same time, however, women's collaborations are less international than those of male colleagues (Larivière et al., 2011) for a variety of reasons. There are economic reasons, that is, linked to the availability of research funding, which may be due to prejudicial peer review procedures in the evaluation of project proposals (Ledin et al., 2007). On the other hand, international collaborations also depend on a family variable: it has been suggested that family ties, specifically having children and a husband who works, could limit both the duration of collaborations and their geographic scope (Frehill et al., 2010). Men less burdened by family responsibilities, on the other hand, are freer to travel - since they can arrange for their spouses to come with them - and tend to travel abroad more frequently or commonly regardless of age (Zimmer et al., 2007).

Another important element in mapping women's collaborations in the university is that of social capital. Women have less social capital for two reasons. They are in the minority in many disciplines, which leads to their having fewer opportunities than their male colleagues (Rivellini et al., 2006). Furtherly, their social capital accumulation is limited by mechanisms of gender homophilia whereby values and methodological approaches are shared with colleagues of the same gender (Boschini, Sjögren 2007). This clearly reduces both the possibility of collaborating and the type of collaboration women can access. From this point of view, studying collaborations through the lens of gender enables us to understand the position that women hold in the academy. In fact, collaborations allow scholars to enrich their social capital and improve both their position and level of integration in the academy.

3. RESEARCH ON THE UNIVERSITY OF NAPLES FEDERICO II: METHODOLOGICAL NOTES

The data presented below are the result of empirical research conducted between 2019 and 2020 by two researchers at the Department of Social Sciences of the University of Naples Federico II, in collaboration with the LGBT Center.

As outlined above, the objective of the research was to conduct an in-depth analysis of two case studies to investigate the degree of feminization as well as the presence or absence of a glass ceiling and, finally, the position of women in science in collaboration networks in , which grants case studies. First one at the Department of Social Sciences where a Bachelor's degree in Sociology and a Master's degree in Public, Social and

Political communication are provided and the Department of Humanities where a Bachelor’s degree in Psychological Science and a Master’s in Cultural Heritage Management are taught. The choice of departments to be included in the analysis is mainly guided by convenience, as these departments hosted mediators who helped in the phase of presenting the research and disseminating the questionnaires. The aim was to use a mainly female lens to read and interpret the available data. The choice of departments to be included in the analysis is mainly guided by convenience, as these departments hosted mediators who helped in the phase of presenting the research and disseminating the questionnaires.

We carried out a document analysis to assess the relative presence of women, primarily in the university as a whole and in the selected cases. The aim was to understand how the selected cases reflect or differ from the trend characterizing the Italian university as a whole.

To reconstruct collaborations, a structured online questionnaire was administered to the academic staff of the selected degree programs. The areas covered by the questionnaire are listed below: personal information (each respondent was asked to indicate his/her position and disciplinary sector¹⁸) and the relational aspects of the collaborations. In this case, each professor and lecturer were asked to indicate the level of collaboration he or she engaged in with the rest of the academic staff during the last 3 years, 2016-2019. The collaborations were carried out at two different levels: *i*) Research products (writing of scientific articles, books, attending conferences, etc.); *ii*) Research projects (PRIN - Projects of national interest, Horizon2020, Marie Curie, etc.)

To analyse this data, social network analyses was chosen as the methodological approach. The objective is to study the relationship models connecting social actors within social systems (in this case, academia), the way in which these models affect the actor’s behaviour, and the flow of resources conveyed by the connections. However, another key parameter of investigation is the way in which the social actors contribute to changing the social structure through these same interconnections.

Networks are also important for the study of scientific communities: relationships can facilitate or prevent cognitive exchanges and the achievement of certain objectives. The sum of the relationships in which cultural exchanges occur give rise to a reticular structure and these exchanges derive both from the specific structure of the networks, and from the position occupied by the actors.

The initial idea that led to this research design is that professors have a particularly high cultural and educational background to begin with, but the ability to translate this background into career development tools depends on the structure of the academic field in which they operate and the way social relationships are configured. The aim, therefore, was to

¹⁸ The disciplinary affiliation of Italian university teachers or scientific position that each teacher assumes in the university system is divided into disciplinary groupings. Pursuant to Article 15 of Law 240 of 2010, each of these groups is divided into three levels from the general to the more particular, represented respectively by: Competition Macro Sectors (to date, there are 86 of these); Competition sectors (190); and the scientific disciplinary sectors (383)

examine how the structuring of these relationships can constitute a visible manifestation of women's status in the selected cases. Such structuring can be interpreted as a detectable external symptom of the potentially gendered structure of the academic context.

Our hypothesis overturns the idea that women occupy a position of lesser visibility in the case studies considered, suggesting that they may instead be central actors in the networks.

Thanks to the methodological structure of SNA, our analysis was able to consider some auxiliary variables that can be linked both to the nodes, in this case the professors, and to the links, in this case the level of collaboration. These variables are generally called attributes. In this context, the variable attribute of "gender" linked to the node takes on significance. We have also reconstructed the interpretative framework of the analysis of relational connections by employing additional attribute variables concerning node characteristics, such as academic roles and their respective scientific- disciplinary fields. The response rate was 60% for the social sciences degree programs and 30% for the humanities programs. The networks presented below, summarized in the tables and illustrated in the graphs, were constructed using all of the responses received. It may be assumed that even those who did respond but were "referenced" by other degree course teachers are an active part of the network of collaboration. However, respondents who were not referenced are considered isolated nodes since no information has been provided regarding their collaborations.

Some descriptive measures of the networks (typical of SNA) have been used, as useful tools for framing the research object. The global index of the network (like range and number of ties) provides the overall description, while the local description (in-degree and betweenness) identifies the groups and actors whose centrality makes them particularly influential in these networks. The main results of the research are described in the following sections.

4. WOMEN IN SCIENCE AT THE UNIVERSITY OF NAPLES FEDERICO II

Before starting, it is appropriate to outline the gender segregation in the specific case of the University of Naples Federico II so as to indicate the contours and extent of this phenomenon.

The First Gender Review¹⁹ conducted by the University of Naples (2016) emphasizes the university's composition, political choices and economic-financial commitments from a gender perspective with the aim of moving toward a more efficient, transparent, fair and intentional

¹⁹ This review was carried out as part of GENOVATE: Transforming Organizational Culture for Gender Equality in Research and Innovation, an FP7 research-action project funded by the European Commission in the context of the 7th Framework Program with the aim of ensuring equal opportunities for women and men in research and innovation.

management of resources. It analyses students, teaching staff and technical administrative staff, outlining the overall structure of the workforce and the gender gap that continues to characterize these populations. The data collected and analysed show that the number of women who enrol in university courses at the university has increased substantially in recent decades. Another finding is that, on average, graduated female students have even better grades than male students and the proportion of women is still higher in more advanced academic training programs (PhDs, specialization schools). Despite the increase in the share of female graduates (58%) and of those engaged in post-graduate training courses (56%), women still constitute a minority in the academic field, with the number of women gradually decreasing further up (only 20% of associate professors are women).

Women's difficulty in achieving career advancement can be measured through the glass ceiling index, defined as the ratio between the number of women in an academic role and those in the immediately preceding role (associate professors/researchers; full professors/associate professors). While the male glass ceiling index remains approximately in all the transitions from one position to the next, signalling that there is an equal number of men in the different roles, for women the thickness of the glass ceiling is greater, the more prestigious the target role. In particular, the value of the female glass ceiling index in the transition from the role of associate professor to that of full professor is 2.5, which means that the number of female professors is less than half the number of associate professors (40%). The data on the university's teaching and research staff show that some fields remain exclusively male domains (e.g. engineering, physics, medical sciences).

The data confirm that there are cultural and structural obstacles that, on the one hand, lead women to reject scientific careers and, on the other hand, reproduce mechanisms of horizontal and vertical segregation, with some areas and positions reserved exclusively for men. The existence of a glass ceiling is demonstrated by analysing institutional positions and governance among the teaching staff: only 15% of institutional positions are held by women. In particular, the data regarding the coordinators of specialization schools is remarkable: out of 53 coordinators, only 7 are women. Furthermore, the distribution of institutional positions among the various government roles shows that only 21% of institutional positions are held by associate professors, while the remaining 79% of positions are granted to full professors.

4.1. Social Sciences

The first case study comprises two degree courses in the Department of Social Sciences (DSS). It includes 54 professors and lecturers, 59% men and 41% women (a figure quite in line with the general breakdown of the University Federico II as whole, which employs 63% of men and 37% women as professors and researchers).

Table 1 shows the distribution of roles (full professor, associate professor, permanent lecturer, temporary lecturer) in relation to the gender variable. In this case, the number of women is lower than that of men; with reference to the role held in the university system, the position of full

professor and temporary lecturer are less covered by women. The positions of associate professor and permanent lecturer feature more encouraging data, in contrast, with the number of women almost equivalent to that of men.

TABLE 1 - *Distribution of roles in relation to gender (DSS)*

	Male	Female
Full professor	7	4
Associate professor	9	8
Permanent lecturer	10	7
Temporary lecturer	6	3
Total	32	22

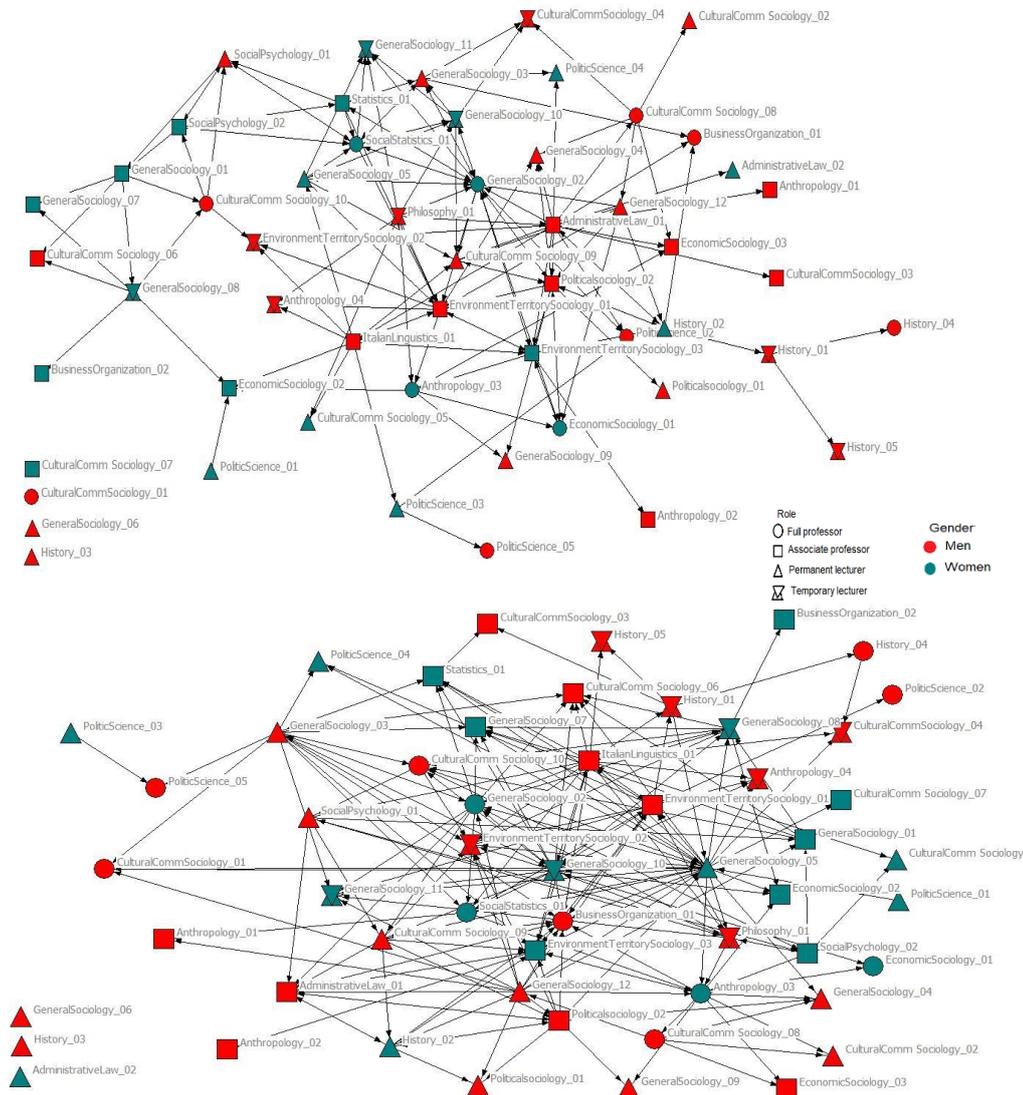
Considering instead the index of the glass ceiling, the transition from researcher to associate professor is 1.25 for woman (the equivalent value for the entire university is 1.4). In the case of the step up from associated professors to ordinary professors, the data show a ratio of 2 for woman (the equivalent value for the entire university is 2.5). In the first case, the value of the index is approximately 1, suggesting that in the role transition from researchers and associate professors, the number of professors is only slightly higher. In the second case, however, that of the role advancement to the highest position, only half of associate professors achieve the position of full professor. In fact, the number of full professors is half that of associate professors. Moreover, comparing the data of the DSS courses with those of the university overall shows that there is a glass ceiling in the case under examination, but to a slightly lesser extent than the general trend of Federico II.

Let us now consider the structure of collaboration networks mapped to ascertain the position of women. These networks refer to collaboration in the drafting of research products (such as scientific articles and books), conference participation and research projects over the last three years.

The network in Figures 1 and 2 comprises 54 nodes, and the graphic representation shows that there are 4 isolated nodes in the first case and 3 in the second. The isolated nodes represent individuals who have not been involved in any collaboration of this type. At the global level of the network, we consider the number of arcs in order to understand the relational volume. For the network of research products, there are 178 arcs; on the other hand, for research projects there are 232 arcs. This finding shows that there is a greater tendency to collaborate in research projects. Locally, however, a knot can be read as follows: the colour represents the gender, with red for men and green for women, while the shape refers to the position/role of each network participant. More specifically, a circle refers to full professors, a square to associate professors, a triangle to permanent lecturers and a double triangle to temporary lecturers. Furthermore, all the nodes in the network have been codified to indicate their respective disciplinary area by progressive numbering. As far as the distribution of the scientific fields is concerned, there are 14 different fields²⁰ (being a department of social sciences), of which only 4 are sociological.

²⁰ Anthropology; Philosophy; History; Political science; Sociology of culture and communication; Business organization; Sociology of the Environment and Territory;

FIGURE 1 - 2- Network of research products and projects



In order to identify the position of women in science within these networks, we take into account the centrality indices at the local level of the nodes. The references in this case are: i) in-degree, measuring the prestige of the actors (this is the number of incoming connections for each node). For the network of research products, the most central nodes for DSS are²¹: general Sociology_02 (full professor, woman), social Statistics_01 (full professor, woman) and Sociology of the environment and territory_03 (associate professor, man). In the second case, the networks around research projects, the most central actors are²²: business organization (full professor, man), general Sociology_02 (full professor, woman), sociology of the environment and territory_01 (associate professor, man), and general Sociology_05 (full professor, woman). ii)

Law; Social psychology; Statistics; Italian linguistics; Economic sociology; Political sociology and General Sociology.

²¹ In order, the In-degree values are 13, 10 and 10.

²² In order, the In-degree values are 12, 11, 10, and 10.

Betweenness refers to the intermediation capacity of the network nodes. This is an indicator of a node's ability to control information exchange and resource flows within a network. The most central nodes for the first network are²³: general Sociology _02 (full professor, woman) and political Sociology _02 (associate professor, man). For project network collaborations, the results show a single node with a high index occupying a central position²⁴: general Sociology _02 (full professor, women). All the other nodes have values below 6.

The calculation of these two centrality indices tells us something interesting about the central actors in the department. As we can see, in fact, it is mainly women who play a role of prestige and intermediation. Indeed, it is even more interesting that these women also hold the position of full professors.

These data tell us that, despite the greater number of men in the degree courses under examination and despite the greater number of full and associate professors, in reality it is women who play central roles in terms of both prestige (in-degree) and the mediation they carry out within the networks (betweenness).

The results of this case study with regard to the three dimensions investigated provide a specific picture of the role of women in science in the Department of Social Sciences. The degree of feminization in this case is not particularly high, due to the fact that the academic staff features more men. The glass ceiling is still present, in this case in favour of female researchers (as compared to associate professors) and associate professors to the detriment of full professors.

The SNA results, on the other hand, contrast with the claims outlined above. Indeed, the actors who effectively move information and resources within these collaboration networks are women, both associate and full professors. This situation might be due in some way to a generational factor in which some women in science have become the soul of the department over the years. For instance, it should be noted that one woman held the position of Department Director from 2013 to 2018 and she was also the first female headmaster of the University Federico II.

4.2. Humanities

The second case study under investigation comprises two courses in the Department of Humanities (HD), where there are 44 lecturers and professors of whom 68% are women. Table 2 indicates the distribution of roles (full professor, associate professor, permanent lecturer, temporary lecturer) in relation to the gender variable.

In this case, the majority of the academic staff is female. This figure depends largely on the study courses selected, which, as mentioned above, are psychology and the management of cultural heritage and are predominantly female. However, this data seems interesting to us because it demonstrates that women maintain a greater presence in specific areas. Despite this prevalence, however, the role of full professor is mostly held

²³ In order, the values of Betweenness (normalized index to compare the position of nodes in different networks) are 12.962 and 10.560.

²⁴ The value here is 12.068

by men while the position mainly maintained by women is that of associate professor.

TABLE 2. *Distribution of roles in relation to gender (HD)*

	Male	Female
Full professor	5	4
Associate professor	7	14
Permanent lecturer	2	9
Temporary lecturer	-	3
Total	14	30

If we consider the glass ceiling index for women in moving from researcher to associate professor, the data show an index of 1.16, while the index for the upgrade from associate to full professor is 3.5. While the former figure (concerning the researcher-associate professor transition) appears largely in line with the university trend as a whole, the relationship between full and associate professors, suggests that there is still a substantial barrier in accessing the most prestigious position. In fact, the number of female associate professors is more than three times that of full professors. In this case as well, we examine the networks of collaborations formed around research products (Figure 3) and research projects (Figure 4) to investigate which individuals have greater prestige and centrality.

Both networks are made up of 44 nodes. More specifically, the first network has 68 ties and 16 isolated nodes (professors and lecturers without any collaborative relationships), while the second one has 72 links and 19 isolated nodes. This finding might depend more significantly on the high number of non-responses to the questionnaire, although responses by even a part of the professors should be significant for understanding the level of collaboration. As for the disciplinary sectors of the academic staff, 10 fields have been identified²⁵. The two indexes of centrality have been used in this case as well as a reference to identify the most central actors of these networks. In terms of In-degree²⁶ for the network of research products, the greatest degree of prestige has been found for the following nodes: psychology_07 (associate professor, woman), psychology_16 (full professor, woman), psychology_20 (lecturer, man). In the network of research project collaborations²⁷, the most prestigious node was psychology_07 (associate professor, woman). As for the betweenness index, however, in the first case the most central one is economy_03 [full professor, man]²⁸, while in the second it is psychology_06 (associate professor, woman)²⁹.

²⁵ Psychology; Economy; Art history; Classical archaeology; Sociology; Pedagogy; Philosophy; and Geography and Law.

²⁶ The values assumed by the In-degree are in order: 21, 12,12.

²⁷ The values assumed by the In-degree are in order: 7.

²⁸ The values assumed by the nBetweenness is1.8.

²⁹The values assumed by the nBetweenness is 1.3.

4. FINDINGS

We can conclude that there continue to be significant differences between the numbers of men and women holding academic positions in Italy, considering the most prestigious career positions. Indeed, although female students stand out in both numerical prevalence and performance during the university years, in general these women scholars do not pursue leadership positions later on, that is, during their post-degree careers. If this finding sounds strange, it should be recalled that the environment in question is characterized by a high degree of cultural capital acquired during a lengthy trajectory of training, education, and apprenticeship.

The fact that this capital and the subjects who bear it are not adequately valued and utilized represents a very challenging issue, one that concerns both the university itself, conceived as a microcosm, and society as a whole.

In this article we have tried to answer the following questions: what is the level of feminization in the two departments considered? Is there a glass ceiling? What is the role of women in science examined via collaborative networks?

Our first observation is that, in both cases under consideration, the fact that the departments in question are human sciences means that there is a relatively high percentage of women in the teaching staff. This is especially true with regard to the two Department of Humanities degree courses, where the level of feminization is certainly much higher than the national and university averages. As regards the presence of a glass ceiling, however, it must be noted that this barrier does continue to operate in these departments, especially in the transition from the role of associated professor to full professor. The results of the analysis of collaboration networks contrast with this finding, however. Let us take a closer look at the networks. First, actors in the SSD degree courses establish considerably more collaborations than the ones in HD. This can be explained in part by the fact that one of the degree courses considered for HD, namely Management, was established more recently. This data could be interpreted in the light of the hypothesis that collaborations are established and strengthened over time: the fact that the degree course in management was established more recently, therefore, has meant that it hosts fewer collaborations between teachers and researchers, so far in this initial phase of its development.

Very generally speaking, academics usually establish more relationships in research projects than they do in co-authoring research publications. The difference is due to a number of variables, including the fact that research projects (in particular European ones) require multidisciplinary collaboration. At the same time, research publications (such as papers) tend to restrict collaboration. For instance, consider that papers in this area of research tend to have no more than three co-authors and that the disciplinary sector plays a much more substantial and binding role. On the other hand, however both networks clearly show the multidisciplinary nature of the collaborations. Actors tend not to limit relationships to other scholars within their own disciplinary field, but rather

enrich their scientific collaborations by also expanding partnerships in fields far from their own.

As for the lens of gender, however, both the graphic representations of the networks and our calculation of the different indices of centrality highlight that the networks are predominantly populated by women. Women in power (considering the In-degree index) and women with central roles are able to control the exchange of information and resources in the network. This is even more evident in the case of disciplinary fields where female researchers and professors do not make up the majority of the teaching staff. It should be noted that role segregation depends to a large extent on the degree of compactness of the networks, according to Bott (1995). The less compact the network (as in our case), the lower is the degree of segregation between men and women. We can also define these networks as loose-knit. These types of networks exert a less pressing degree of social and regulatory control, allowing greater variation in ideology, obligations, and norms of behaviour. In these types of networks, women in science are the central actors.

In order to ascertain the situation in other departments, the survey would need to be administered there as well, including the so-called hard sciences degree courses and verifying whether women are able to take on roles of centrality and prestige despite their under-representation in these male-dominated fields.

SNA could therefore represent an appropriate theoretical-methodological perspective for the study of gender dynamics in the academic framework. Indeed, it offers the opportunity to study the complexity of our social system by exploring roles among individuals as well as within groups, and to effectively map structures and collaboration models in scientific fields with an eye to gender.

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The Education of Gender. The Gender of Education Sociological research in Italy

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Published by



ASSOCIAZIONE "PER SCUOLA DEMOCRATICA"

Under the coordination of:



ASSOCIAZIONE ITALIANA DI SOCIOLOGIA
Sociologia dell'Educazione
and
Studi di genere

Chapter 8 - *Coding and Educational Robotics Gender Stereotypes and Training Opportunities* by Daniela Bagattini, Beatrice Miotti and Valentina Pedani – has been drafted under the European Structural and Investment Funds 2014-2020.

National Operational Programme for schools. Competences and learning environments 2014 – 2020. FSE/FESR-2014IT05M2OP001 - Axis 1 – Education. OS/RA 10.2, Project "CODING e ROBOTICA", project code 10.2.7.A2-FSE PON-INDIRE-2017-1, CUP B59B17000000006



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2014-2020



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PER LA SCUOLA - COMPETENZE E AMBIENTI PER L'APPRENDIMENTO (FSE-FESR)

ISBN 978-88-944888-3-8