

# Female students in the STEM disciplines: an investigation of “atypical” academic routes

**Irene Biemmi**

Università degli Studi di Firenze

## Abstract

This essay investigates the cultural and educational influences which effectively contribute to distancing female students from scientific culture such that they are discouraged from pursuing studies in the “STEM” disciplines (science, technology, engineering and mathematics). The second half of the paper reports the results of research conducted through narrative interviews of a sample of female university students who made the unconventional decision to enroll in degree programs in which they are a minority (engineering, computer science, etc.). Analyzing the ways in which these “divergent” choices develop and uncovering ideas about science that young women internalize can be useful tools for opening avenues that combat gender stereotypes in schools and universities.

Il contributo si propone di indagare i condizionamenti culturali e educativi che agiscono in maniera pervasiva nell’allontanare il genere femminile dalla cultura scientifica e che, di conseguenza, disincentivano le giovani donne a intraprendere percorsi formativi nell’area delle discipline “STEM” (Science, Technology, Engineering, Mathematics). Nella seconda parte del saggio sono riportati i risultati di una ricerca condotta tramite interviste narrative su un campione di studentesse universitarie che hanno elaborato

Irene Biemmi – *Female students in the STEM disciplines: an investigation of “atypical” academic routes*

DOI: <https://doi.org/10.6092/issn.1970-2221/9880>



scelte anticonvenzionali, iscrivendosi a Corsi di laurea dove risultano essere gruppo di minoranza (ingegneria, informatica ecc.). Analizzare in che modo maturano le scelte “divergenti” e svelare gli immaginari sulla scienza interiorizzati dalle giovani donne può essere utile per progettare percorsi educativi finalizzati a depotenziare il peso degli stereotipi di genere nelle scelte scolastiche e accademiche.

**Keywords:** educational choices; gender stereotypes; gender segregation in education; women and science; qualitative research

**Parole chiave:** scelte scolastiche; stereotipi di genere; segregazione formativa di genere; rapporto donne e scienza; ricerca qualitativa

## 1. Segregation in education as an indicator of gender inequality

With the enactment of the Treaty of Lisbon on 1 December 2009, equality between men and women was formally recognized as one of the foundational values of the European Union. Gender equality is a fundamental human right; indeed, it is more than that, as today it is unanimously viewed as a necessary condition for attaining the goals of economic growth, employment and social cohesion (Di Sarcina, 2014; Donà, 2006). Failure to acknowledge the contributions of women tends to impede the social and economic development of the entire collectivity. The struggle for gender equality is therefore a central objective of EU and international organizations such as the United Nations. The fundamental tool in achieving this aim is education. The “European Parliament resolution on eliminating gender stereotypes in the EU” (12 March 2013)<sup>1</sup> states that “gender roles are shaped and imposed through a variety of social influences, notably the media and education, and are formed during the socialization phases of childhood and adolescence, therefore influencing people throughout their lives.” This document therefore recommends raising awareness so as to overcome sexist stereotypes in educational contexts.

One of the unresolved problems in regard to the relationship of female students and education is attributable to the lack of participation on the part of women in training and research in science, technology, engineering and mathematics (the so-called “STEM” (fields). The problem is common to all European countries, as it is demonstrated by the periodic *She Figures* reports published by the European Commission.<sup>2</sup> The most recent report (2018) shows that in Italy today women make up over half of the 1,659,855 total students enrolled at university (55.5%) but that their

---

<sup>1</sup> This document can be viewed at:

<http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=P7-TA-2013-0074&language=IT&ring=A7-2012-0401> (most recently accessed on 19 September 2019).

<sup>2</sup> The *She Figures* report has been published by the European Commission every three years since 2003. It provides information on female participation in the world of science and research and offers tools to evaluate steps taken toward gender parity in these contexts and to measure inequalities which still persist.

distribution among the various faculties is uneven. Indeed, their greatest proportional representation is in the Humanities and Arts, where they constitute 77.6% of total students, while their presence in more technical and scientific fields is notably less, where they make up only 48.1% of enrollees in Agricultural and Veterinary Sciences and 27.4% in Engineering and Technology, the sector with the lowest percentage of female students.<sup>3</sup>

This divide in the choice of university faculties and career paths between men and women goes by the name of “gender segregation in education”; it can be interpreted as the litmus test of the gender inequality that still today characterizes our schools and universities (Biemmi, 2015). This separation is rooted in the sexism inherent in our educational system, which channels pupils toward traditional career choices based on gender, either into “male” fields (technical and scientific) or “female” ones (the humanities, and in particular those vocations involving education and care). These attitudes greatly condition choices that both boys and girls make at school and university, not only in Italy but throughout the world (Bradley, 2000; Francis, 2000; Francis, Hutchings, Archer & Amelling, 2003; Jacobs, 1996; Reimer & Steinmetz, 2009).

How can we explain this phenomenon? Is it because young women, presented with the novel opportunity of being able to enter various fields of knowledge and consequently embark upon new career paths, “choose not to choose,” instead opting to dutifully remain in those occupational areas that tradition has always assigned them (Barone 2011; Jonsson 1999)? Can such a decision be truly viewed as a free one on the part of young women (a kind of self-segregation), or is it rather the simple effect of social and cultural influences that so subtly and pervasively shape their choices, in the end making them appear genuine and “natural”?

A recent study on the incidence of gender stereotypes on the abilities of girls to solve mathematical problems (Passolunghi, Rueda Ferreira and Tomasetto, 2014) indicates that the belief that “boys are better than girls in math” is internalized by girls from

---

<sup>3</sup> European Commission-Directorate General for Research and Innovation, *She Figures 2018*, February 2019. The report can be viewed at: [https://ec.europa.eu/info/publications/she-figures-2018\\_en](https://ec.europa.eu/info/publications/she-figures-2018_en) (most recently accessed on 19 September 2019).

childhood, negatively influencing their skills and their ability to learn the subject by affecting their perception of their abilities. If on the one hand the acceptance of the stereotype on the part of boys bolsters their assessment of their skills, on the other hand this same perception on the part of girls has a negative effect by compromising their opinion of their potential.

## **2. Women and scientific culture: a complex relationship**

The problem of scientific training for young women has been the subject of particular attention as far back as the 1995 World Conference on Women in Beijing. Numerous studies have examined the possibilities of the causes of the phenomenon and have concluded that a multitude of interrelated factors are at play (Alic, 1986/1989; Wertheim, 1995; Alichio and Pezzoli, 1988), some of which are of a strictly educational nature (Lopez, 2009). Feminist criticism of the epistemology of science (Fox Keller, 1985/1986; Donini, 1991) has highlighted, for example, that scientific knowledge is represented as a process requiring a suppression of subjectivity, affectivity and relationality, while science and technology are interpreted as instruments of potentially unlimited power and domination over reality: these beliefs constitute important elements of a scientific ethos that is alien to – or at least distant from – feminine culture. Not by chance *objectivity*, the basis of modern science, is inextricably linked to *masculinity*, in the same way as, conversely, *sensitivity* and *irrationality* correspond to stereotypical traits connected to *femininity*. Scientific thinking and objectivity are interwoven to the point that a statement which is not objectively demonstrable (or cannot at least be subjected to the test of objective confirmation or refutation) cannot form part of scientific knowledge.

Feminist critiques have seriously called into question the presumed impersonality and universality of scientific knowledge:

[...] the claim of objectivity has rather been the expression of a quite particular subjectivity, one which is far from impersonal and universal: that, namely, of social group of men who at the beginning of the modern era drew the new horizons of a scientific revolution in Europe, in close connection with the contemporary phenomena of the bourgeois and industrial revolutions (Donini, 2000, pp. 113-114).

Irene Biemmi – *Female students in the STEM disciplines: an investigation of “atypical” academic routes*  
DOI: <https://doi.org/10.6092/issn.1970-2221/9880>



The canons on which science is founded are then neither neutral nor universal but rather the product of a culture forged by men in flesh and blood in a particular historical and political context. It is significant that in order to make them comprehensible to the public and to spread them on a vast scale these canons were translated into metaphorical terms that were more effective in guaranteeing their dissemination throughout society. As Luisella Erlicher and Barbara Mapelli remind us, metaphor is a “communicative model that has the task of making socially comprehensible – and therefore acceptable or not – the aims, intentions and relational modes between humanity and nature underlying a certain scientific paradigm” (Erlicher and Mapelli, 1991, p. 50). In her book *The Death of Nature* (1980), the scholar Carolyn Merchant analyzes the metaphors used in scientific texts of the 16th and 17th centuries, demonstrating that the foundational paradigms of modern science are closely interwoven with sexual symbolic production. In examining the passage from the Middle Ages to the modern era in Europe, she highlights the transition which took place in the collective imagination: from a “world as organism,” based on a relationship of respect for a generating and nurturing nature, to a modern metaphor of a “world as machine,” associated with the project of manipulation and domination and of replacing the natural with the artificial. The latter metaphor fed the technical and scientific impulses of the 17th century and worked hand in glove with the expansive and aggressive entrepreneurial spirit of nascent capitalism. In effect, we witness the passage from a conception of nature as “the body of a mother to be respected” – corresponding to a feminine line of reasoning – to that of “an inanimate mechanism, a series of parts which can be replaced and manipulated” – an image with a clear masculine stamp.

Is this perhaps the source of the distance felt by women with regard to scientific knowledge? Research conducted by Erlicher and Mapelli in the late 1980’s (1991) focusing on an investigation of the scientific imagination in female high school students would seem to confirm this hypothesis: in addition to traditional fears of personal shortcomings for the study of science, girls harshly criticize the ways of performing and transmitting science. In the imagination of the female students, science is supposed to represent a thrilling adventure rather than a systematic accumulation of cognitive data; scientific knowledge should be placed in relation to the world rather than be interpreted

as a subjugation to human interests. Young women show a feeling of unease, sometimes spilling over into intolerance, with a type of science presented in the form of laws which are distant from empirical reality and indifferent to ethical and social problems; they express impatience with objective, unchanging laws which are removed from the subjective dimension and the acknowledgement of the emotional, creative and inventive aspects of the “scientific subject.” In this context, Simonetta Ulivieri writes:

If science is viewed and experienced as something masculine, other than itself, then any girl as she develops her social sexual identity will tend to avoid it in order to fit into the majority of choices proposed by feminine models so as not to feel “different”. She will do so because it is quite difficult to maintain a positive animus strong enough to resist the collective will (Ulivieri, 1995, p. 156).

To this we should perhaps add that in the collective imaginary the figure of a woman of science is represented as eccentric, bizarre, solitary, without a family and affects, willing to give up her private life for love of science, which is viewed as a “mission”. This image, incidentally, has some grounding in reality, as we discern from the self-portrait of Rita Levi Montalcini, who describes her university years in these terms:

I don't know if my disinclination to make friends with my many fellow male and very few female students is to be attributed to the fact that commitment to science seemed to me irreconcilable with the Bohemian activities that were by contrast favored by most students in those years ... a type of cuttlefish ready to spray its ink ... this was the image of the young woman that I was then, the girl with the somber expression who dressed almost like a nun (Levi Montalcini, 1987, p. 69).

Such a picture is certainly not appealing to young women who may harbor a series of fears about finding themselves in a similar position. To these difficulties should be added the conduct of teachers – male and female – who are often guided by the recurring idea that success in mathematics on the part of girls is the result of constant study and diligence, while for boys it stems from natural intuition (Mapelli, Bozzi Tarizzo & De Marchi, 2001, p. 247). Rather than supporting girls in embarking upon new, relatively

unexplored career paths, schools do no more than rehash the belief that science is not suited to them:

Girls who choose scientific career paths are always reminded that they are out of place. On the one hand, they have to face solitude within a context made up exclusively of men and deal with the usual sexist remarks [...]. On the other, there are teachers in these schools who on the basis of attitudes that are often developed unconsciously constantly communicate to girls that their presence in male classes is inopportune. The accusing look of others therefore demands conformance – more or less explicit – on the part of girls. This is a crucial factor in guiding female students toward more conventional faculties (Clair, 1995 cit. in Mapelli, Bozzi Tarizzo & De Marchi, 2001, p. 248).

As these reflections should make clear, the relationship between women and science is a problematic and controversial theme, in which a series of cultural factors come into play which together produce an alienation effect toward scientific knowledge in young women.

### **3. Dissenting voices: an investigation of young women enrolled in technical and scientific university degree programs**

To investigate the complex relationship between female students and technical and scientific culture, Irene Biemmi and Silvia Leonelli<sup>4</sup> conducted a qualitative study – by means of biographical interviews (Atkinson, 1998/2002; Bichi, 2002; Demazière and Dubar 1997/2000) – aiming to analyze decisions made by young women to pursue educational routes considered gender atypical: choices, that is, that challenge gender horizontal segregation in education. The aim of this research was to trace the motivations that led to non-conventional decisions and to analyze how young women are received in contexts in which they appear as “black sheeps”. Research was based on reconstructing their experiences and anecdotes as school students in the attempt to

---

<sup>4</sup> This research was conducted by the author of the present essay. The results are reported in the second part of the volume I. Biemmi & S. Leonelli (2016), *Gabbie di genere. Retaggi sessisti e scelte formative* (Turin: Rosenberg & Sellier), entitled “Fuori dalle gabbie di genere: una ricerca su percorsi accademici atipici” (pp. 111-197). In the present paper, the results are analyzed and presented in unpublished form.



bring details to the surface that contributed to understanding key moments and critical junctions. The study sample included three Tuscan universities (Florence, Pisa and Siena), in which faculties with evident gender-based segregation were selected. Within these degree programs, a sample of female students<sup>5</sup> belonging to the minority was chosen. Biographical interviews were conducted of 22 female students enrolled in these degree programs: engineering (mechanical, aerospace, electronic and telecommunications), computer science, geological science and technology, earth science, enology, life sciences and physical therapy. Interviews were conducted during the 2012/13, 2013/14 and 2014/15 academic years.

### **3.1 Decision to enroll in a university faculty**

A first set of questions during the interviews concerned the decision to enroll in a specific faculty: how did this choice come about? What were the motivations that led the female students to pursue an atypical route in their university studies? When asked the question, “Why did you choose to enroll in this faculty?”, female students gave a variety of answers, which can be grouped into two overarching categories.

The first category of answers is represented by those students who spoke of a *coherent choice which had been thought out and planned for some time*. This is what Marta, a prospective engineer, had to say:<sup>6</sup>

Let’s say that from the beginning of high school I had the aim of enrolling in engineering. During my last year of school, I was undecided between mechanical and aerospace engineering, which are the most important fields, at least in terms of tradition and prestige. In the end I chose mechanical engineering. (Marta)

At the other end of the spectrum, a second category of answers is characterized by the desire to pursue new and unknown career paths, ones that were not at all premeditated and perhaps even completely in contrast with ambitions that developed during high

---

<sup>5</sup> The names of the interviewees have been changed to guarantee their anonymity.

<sup>6</sup> The names of the interviewees have been changed to guarantee their anonymity.

school. This is the *path towards the unknown*, which generated fears but also great passion and curiosity:

In my last year of high school I wanted to study philosophy, which would have been a “comfortable” choice in the sense that it was the subject that I loved most and that I was best at. Then I thought, “I’m 20 years old; I’d like to choose something different. If it doesn’t work out, it means I’m not destined for that field. I want to challenge myself, to understand how far I can go.” So I browsed the Internet and found electronic engineering. I looked into it on my own: my parents aren’t engineers, nor are my friends. I’m the only one in my family to have pursued this path. (Emma)

### ***3.2 Why do so few young women enroll in scientific faculties?***

A second set of questions in the interviews concerned the possible reasons for the disinclination of female students to pursue scientific culture. The question was posed in this way: “In your opinion, why do so few young women enroll in these faculties?” When asked this question, many of the interviewees were silent and pensive, as for a number of them the choice to enroll in engineering, computer science, geology and agronomy was completely natural.

Those who were studying engineering and computer science speculated that the main reason for the lack of enthusiasm for scientific fields on the part of young woman was because *they are viewed as more difficult than humanistic ones*. Some interviewees stated that it was not the case of simple bias, but that this belief was to some extent grounded in reality. Emma and Sofia in fact said that the first phase of their studies was very difficult, characterized by great uncertainty and the temptation to give up:

Engineering is hard. I stumbled on one particular exam, which I took ten times – ten times! (she laughs). It was the exam on Probabilistic Methods. The low point was the two exams on Probabilistic Methods and Mathematical Methods: if you failed one, you couldn’t take the other. So I was faced with the possibility that I might ace one but fail the other, which meant I couldn’t move ahead. Sometimes I thought, “I’m going to look for a job.” But then I said, “No, I’m going on.” In the end I passed the exam in July, and even got full marks! (Emma)

It could be that many young women think that these courses are too difficult, and that in any case they've always been considered male subjects (electronic engineering, etc.). In my opinion, though, if you like math and physics I don't see why you shouldn't choose this program. And even so engineering is certainly a difficult subject. At times I too have had doubts and thought, "Will I make it? I've had enough! I'm giving up!" It's difficult for guys as well, though perhaps on a psychological level a guy is less upset if he fails an exam. They can tolerate failure better: "Alright, I failed. I'll take it again." On the other hand I've noticed that girls get far more upset. (Sofia)

Scientific faculties "scare" students, and women – perhaps because they really are difficult, or perhaps because they are mostly attended by men – fear that they won't succeed:

In my opinion the reason that few women enroll in Engineering depends on the fact that they aren't ready to face a reality like this one. As I said, I don't have any female friends who had the courage to study engineering, because it's difficult, because you're always together with guys, so you have to stand up for yourself ... So girls see it as a field that's too difficult, too male. (Emma)

Another factor behind the lack of women in these fields, according to the interviewees, may be the fact that *scientific studies are perceived as dry, mechanical and less engaging than humanistic ones*. In the face of this widespread idea, Greta, Marta and Emma gave impassioned and enthusiastic responses which emphasized the "thrill" they feel in solving problems, in making hypotheses, and in "discovering theories that show how the world works":

I'm hoping to become a good engineer. And in any case, I could never have chosen a faculty that requires rote learning because I like solving problems... I get such a thrill out of it! When in the end you manage to solve a problem it gives you a feeling of satisfaction! (Greta)

I like physics. I'm pretty good at math and am usually able to understand it, though I can't say I like it: math actually bores me. I much prefer physics because it's more theoretical, requires more thought, makes you think logically to invent or discover theories about how the world works and that sort of thing... (she smiles). (Marta)

It's just a question of bias: everyone thinks that the work of an engineer is extremely practical and pragmatic – I have a problem, I need a solution, and that's it. But it's not at all like that. I think that young women have it wrong: in the content matter of the subjects that I've studied, I've found things that are beyond fascinating. (Emma)

Most of the interviewees agree on the fact that at the base of gender segregation in education lies a broader issue that concerns *cultural biases in our society and our families as well as the tendency from the beginning of childhood to divide subjects and activities into those "suitable" for girls and those "suitable" for boys.*

Well, a lot also depends on specific circumstances, on the type of family you grow up in. I imagine, for example, that if my mother had been a housewife and my father a narrow-minded fundamentalist whose only ambition was to see his daughter married, I probably would have only finished high school and then gone on to become a schoolteacher. (Marta)

From childhood, there's a tendency to say that some things are for boys and others for girls. I'm not sure if this is right or not. For my part, all I can say is that I always hated dolls and that I always played basketball. I've always liked football and I hate cooking, sewing and cleaning. Even if one day I'll need to learn those things! (she laughs). (Margherita)

Among the causes cited by the interviewees for gender segregation in education are *future job prospects*: the fear of working in completely male environments or the idea of pursuing a career that leaves out the dimension of relationships can discourage women from entering certain sectors. Here is what Margherita had to say on this point:

I don't think it's so much about the subjects themselves as about the work that they prepare you for. If a young woman studies hard she can easily handle this program. The problem is imagining what comes next... The idea of going to work in a factory where you might be the only woman, having to work on a team of all men can be intimidating and cause doubt. I also worry about this, that when I find a job I'll be in a closed environment, made up of only men. As you get older you can deal with this fear, but at nineteen, when you have to choose your faculty, this thought might make the difference for some young women. (Margherita)

#### 4. Concluding reflections

As we have seen from the extracts of the interviews given above, the choice on the part of female students to pursue male courses of study is made with determination and enthusiasm and is rarely characterized by doubt or inner conflict. This decision is based on the passion for scientific fields that develops during high school (and in some cases even in middle school), such that the choice to enter technical and scientific faculties is made with confidence. Yet what is the source of this sense of certainty in girls? It probably derives from their educational backgrounds, as in the vast majority of cases these students begin university having achieved top results at school. On the strength of their past academic success, female students are able to feel certain about their choices, even when these involve leaving behind proven areas of interest in order to pursue completely new subjects.

Entering male areas of study is seen by young women as something progressive, a move up the social ladder. At the same time, female students who enroll in these faculties find themselves up against a series of stereotypes that could discourage them: can they handle such “difficult” subjects as math and science? Will they be able to adapt to a male-dominated environment? Once they finish their studies, will they be able to enter the job market on the same level as their male counterparts?

For a young woman, then, the challenge of dealing with gender bias is played out on different levels. Initially, her self-esteem is called into question. Here a woman has to demonstrate – to herself first of all – that she has the abilities that until today have not been acknowledged in the “gentler sex”: math skills and the ability to think analytically, logically and deductively. This is only the first step along an upward path marked by

various hurdles to overcome. Most importantly, women must know how to affirm their professionalism in male working environments and to shatter the glass ceiling, the invisible yet ever present barrier that prevents women with equal skills from reaching top levels and positions of power (Calabrò, 2012).

Gender segregation in education – in STEM fields in particular – is therefore at a crossroads of a multitude of thorny questions that regard the lack of effective equality between men and women in the broader social context. While on one hand schools have always played a conservative role in fueling the uncritical reproduction of traditional gender models (Ulivieri, 1995; Covato, 1991), those same institutions can become the motor of much-needed educational and social change (Biemmi, 2012; Gamberi, Maio and Selmi, 2010; Venera, 2014). Education – and education only – can deconstruct the cultural cages that still today restrict female (and male) ambitions to established molds, thereby offering girls and boys truly equal opportunities to think, live and dream, freed from gender stereotypes.

## Bibliography

- Alicchio, R. & Pezzoli, C. (Eds.). (1988). *Donne di scienza. Esperienze e riflessioni*. Turin: Rosenberg & Sellier.
- Alic, M. (1986). *Hypatias heritage: a history of women in science from antiquity to the late Nineteenth century*. London: The Women's Press (trad. it. *L'eredità di Ipazia*. Roma: Editori Riuniti, 1989).
- Atkinson, R. (1998). *The life story interview*. Thousand Oaks, CA: Sage (trad. it. *L'intervista narrativa. Raccontare la storia di sé nella ricerca formativa, organizzativa e sociale*. Milan, Raffaello: 2002).
- Barone, C. (2011). Some Things Never Change. Gender Segregation in Higher Education Across Eight Nations and Three Decades. *Sociology of Education*, 84 (2), 157-176.
- Bichi, R. (2002). *L'intervista biografica. Una proposta metodologica*. Milan: Vita e Pensiero.
- Demazière, D. & Dubar, C. (1997). *Analyser les entretiens biographiques: l'exemple de recits d'insertion*. Paris: Nathan (trad. it. *Dentro le storie. Analizzare le interviste biografiche*. Milan: Raffaello Cortina, 2000).
- Biemmi, I. (2012). *Educare alla parità. Proposte didattiche per orientare in ottica di genere*. Roma: Edizioni Conoscenza.
- Biemmi, I. (2015). Gender in schools and culture: taking stock of education in Italy. *Gender and Education*, 27 (7), 812-827.
- Biemmi, I. & Leonelli, S. (2016). *Gabbie di genere. Retaggi sessisti e scelte formative*. Turin: Rosenberg & Sellier.
- Bradley, K. (2000). The Incorporation of Women into Higher Education: Paradoxical Outcomes?. *Sociology of Education*, 73 (1), 1-18.
- Calabrò, A. R. (Ed.) (2012). *Oltre il soffitto di cristallo: il difficile cammino delle donne*. Soveria Mannelli: Rubbettino.

- Clair, R. (Ed.). (1995). *La formation scientifique des filles. Un enseignement au-dessus de tout soupçon?* Paris: Editions Liris, Unesco, 1995.
- Di Sarcina F. (Ed.). (2014). *Cultura di genere e politiche di pari opportunità. Il gender mainstreaming alla prova tra UE e Mediterraneo.* Bologna: il Mulino.
- Donini, E. (1991). *Conversazioni con Evelyn Fox Keller.* Milan: Eleuthera.
- Donini, E. (2000). La costruzione culturale delle scienze della natura. Generi, soggetti e fatti sociali. In Serravalle Porzio E. (Ed.), *Saperi e libertà. Maschile e femminile nei libri, nella scuola e nella vita.* Milan: Associazione Italiana Editori.
- Donà, A. (2007). *Genere e politiche pubbliche.* Milan: Bruno Mondadori.
- Erlicher, L. & Mapelli. B. (1991). *Immagini di cristallo. Desideri femminili e immaginario scientifico.* Milan: La Tartaruga.
- Francis, B. (2000). The Gendered Subject: Students' Subject Preferences and Discussions of Gender and Subject Ability. *Oxford Review of Education*, 26 (1), 35-48.
- Francis, B., Hutchings, M., Archer, L. & Amelling, L. (2003). Subject Choice and Occupational Aspirations among Pupils at Girls' Schools. *Pedagogy, Culture & Society*, 11 (3), 425-442.
- Fox Keller, E. (1985). *Reflections on gender and science.* New Haven: Yale University Press (trad. it.: *Sul genere e la scienza.* Milan: Garzanti, 1986).
- Gamberi, C., Maio, M. A. & Selmi, G. (Eds). (2010). *Educare al genere. Riflessioni e strumenti per articolare la complessità.* Roma: Carocci.
- Levi Montalcini, R. (1987). *Elogio dell'imperfezione.* Milan: Garzanti.
- Lopez, A. G. (2009). *Le donne ai margini della scienza: una lettura pedagogica.* Milan: Unicopli.
- Jacobs, J. (1996). Gender Inequality and Higher Education. *Annual Review of Sociology*, 22, 153-185.
- Jonsson, J. (1999). Explaining Sex Differences in Educational Choice. An Empirical Assessment of a Rational Choice Model. *European Sociological Review*, 15 (4): 391-404.



- Mapelli, B., Bozzi Tarizzo, G. & De Marchi, D. (2001). *Orientamento e identità di genere. Crescere donne e uomini*. Florence: La Nuova Italia.
- Merchant, C. (1980), *The Death of Nature: Women, Ecology, and the Scientific Revolution*. San Francisco: Harper Collins Publishers (trad. it. *La morte della natura. Donne, ecologia e Rivoluzione scientifica. Dalla Natura come organismo alla Natura come macchina*. Milan: Garzanti, 1988).
- Passolunghi, M. C., Rueda Ferreira, T. I. & Tomasetto E. C. (2014). Math–gender stereotypes and math-related beliefs in childhood and early adolescence. *Learning and Individual Differences*, 34, 70-76.
- Reimer, D. & Steinmetz, S. (2009). Highly Educated, but in the Wrong Field? Educational Specialization and Labour Market Risks of Men and Women in Spain and Germany. *European Society*, 11 (5), 723-746.
- Ulivieri, S. (1995). *Educare al femminile*. Pisa: Ets.
- Wertheim M. (1995). *Pythagoras trousers. God, physics, and the gender wars*. New York: Times Books/Random House (trad. it. *I pantaloni di Pitagora. Dio, le donne e la matematica*. Turin: Instar libri, 1996).

**Irene Biemmi** is a research fellow in the Department of Education, Languages, Interculture, Literature, and Psychology (FORLILPSI), the University of Florence. Her areas of research concern gender issues in education with particular reference to a critical analysis of teaching materials, teacher training, and orientation. Together with Barbara Poggio and Stefano Ciccone, she directs the “Questioni di genere” collection of scientific studies for the Rosenberg & Sellier Editrice publishing house in Turin.

Contact: [irene.biemmi@unifi.it](mailto:irene.biemmi@unifi.it)