Construction of gendered technological identities in the school space

Núria Vallès Peris

CIREM Foundation
Travessera de les Corts, 39-43, lat. 2a pl
Barcelona, 08028 SPAIN
nuria.valles@cirem.org

Maria Caprile Elola-Olaso

CIREM Foundation
Travessera de les Corts, 39-43, lat. 2a pl
Barcelona, 08028 SPAIN
maria.caprile@cirem.org

ABSTRACT

With the objective of understanding what the dynamics are that explain girls selecting less scientific-technical fields, the present paper is focused on analysing the mechanisms that contribute to the reproduction of horizontal segregation in the choice of fields of study among students during compulsory secondary education (ESO). The analysis uses the assumption that the social construction of gender identities distances girls from fields of study connected with scientific-technological disciplines. The empirical work in this study was based on observations in schools, the analysis of mathematics and technology textbooks and in-depth interviews of both boys and girls.

Keywords

Scientific-technical identity, hidden curriculum, mathematics and technology lessons, compulsory secondary education, more and less regulated spaces.

INTRODUCTION

During a two-year period (from February 2007 to October 2008), the CIREM Foundation carried out the THEANO Project ('Gender bias in the education system: its impact on math and technology areas in compulsory secondary education (ESO)') for the Women's Institute. The main objectives of the study were:

1) To investigate the dynamics that appear in the school setting during ESO that could help us understand why girls select scientific-technical studies less than boys.

2) To propose a series of recommendations with the objective of obtaining greater equality between boys and girls in fields of study, specifically achieving a greater presence of females in scientific-technical studies.

The scarcity of women in scientific-technical studies and professions is an enduring tendency, despite important advances of women in economic and social areas in recent decades. The growing proportion of women in higher education and in highly-qualified jobs has been one of the greatest structural changes in the job market and in society. However, this has not translated into a substantial participation of women in those fields that are traditionally male-dominated, such as physics, computer science and engineering (Meulders et al., 2003). Men's and women's fields of study are different and some disciplines continue to be associated with the traditional construction of what is masculine and what is feminine, which translates, for example, into a very low presence of women in engineering studies and a very low presence of men in studies as humanities, education, health and life sciences.

There is a drastic separation by gender in post-compulsory secondary education, in vocational training and in university studies as well, despite advances that have taken place in the last 15 years. In the case of Spain, women represent 54% of students enrolled in higher studies, but only 19% in computer science, 22% in engineering and similar professions and 37% in architecture and construction.

If women can theoretically freely choose, the so-called 'voluntary renunciation', why do they continue selecting professions that are traditionally considered 'feminine' and undertake technical studies much less than men? The causes of horizontal segregation in selecting fields of study are multiple and varied.

In the study 'Widening Women's Work in Information and Communication Technology' (WWW-ICT) (Vendramin et al, 2003), these causes are broken down into five areas: society and culture; family and the domestic area; education; labour market and; organisational area / structure of organisations.

The present study focuses on analysing the educational area, with the understanding that what happens at school is a reflection of their social setting. The mechanisms that contribute to replicating gender segregation in selecting fields of study are analysed in student bodies during compulsory secondary education. The study starts from the central focus of the process of identity construction in the selection of fields of study. From this viewpoint, its aim is to ascertain how the construction of gender identity distances girls from study programmes related to scientific-technological disciplines.

More concretely, the objective of this study is to enquire into those dynamics that appear in the school setting during ESO that could help us understand why girls select scientific-technical studies to a lesser degree than boys. In light of this general objective, the following issues have been analysed in depth:

- Transmission methods for the subjects of mathematics and technology, with the objectives of: a) Ascertaining the knowledge transfer models from a gender perspective; and b) Discovering how different stereotypes, expectations and motivations are conveyed to boys and girls.
- Models for career guidance and selecting fields of study, with the objectives to: a) Find out how dynamics that are produced at school contribute to selecting one field of study or another that are distinct for boys and girls; and b) Discovering what the elements are that explain the choice of a specific field of study, for boys and for girls.

GENDER SEGREGATION IN SELECTING SCIENTIFIC-TECHNICAL FIELDS OF STUDY

The life plan that young boys and girls trace is one of the pillars of youth identity (González-Anleo, 2001). The field of study comprises part of this life plan and the selection of scientific-technical studies is related to what Hughes (2001) calls scientific identity. We have expanded Hughes' concept to 'scientific-technological identity', because our analysis is centred on the differences between boys and girls in selecting scientific-technological areas of study. The student body takes on a scientific-technical identity by expressing interest in studying scientific-technological disciplines and adopting the decision to undertake a professional career related to science and technology.

The underlying idea in the study is that the choice between selecting scientific-technological or other fields has to do with the process of constructing their own identities, the affirmation/negation of a system of values, rules, expectations, etc. Precisely because we define the selection of fields of study as processes that are constitutive of identity itself, we believe that this selection goes much beyond the rational-instrumental. From this perspective, the central hypothesis of the study is that the construction of sexual and gender identity has a highly-significant weight in the construction of scientific-technological identity. If the selection of a area of study comprises part of the identity construction process during adolescence, then gender identity construction cannot be dissociated from the construction of the scientific-technological identity. Adolescence is a vital time with particular importance with respect to gender identity construction. Polarisation between genders is the principal characteristic of social relationships during adolescence (Rovira, 1998), the stage of sexual awakening and of consolidation of assimilation/transgression of traditional gender roles.

Masculinity and femininity are constructed relationally through the socialisation process (Berga, 2007). Exercising any social role is linked to a certain identity that is socially conferred, socially maintained and socially transformed (Berger, 1995). Traditional gender roles assign 'masculine' and 'feminine' social attributes and establish a set of behavioural expectations that are different for men and women. These prescriptive criteria combined with others related to social class and ethnic origin articulates the whole of collective identities (Tomé and Rambla, 2001). Gender identity construction is not a linear process, but is instead contradictory and conflictive, where traditional gender roles are assimilated or transgressed: the definition of femininity and masculinity that is learnt in the family can contradict the definition learnt in school or in peer groups and boys and girls learn to negotiate their gender identity in multiple and varied settings.

Starting from the relational nature of gender, the study analyses both masculine and feminine identities of adolescents, with the understanding that what happens to girls is related to what happens to boys and vice-versa. In the same way that we understand gender identities as relational categories, the educational pathways of boys and girls must also be understood as relational. In other words, the low presence of women in scientific-technical studies is also related to the low presence of men in studies more closely related to the humanities and caretaking.

Family, school and leisure are the basic coordinates that are considered core to adolescent and youth identity construction processes. When youths construct identities, these coordinates are not airtight compartments, but rather identities emerging from each one of the spaces (conceptual) that are linked to other spaces that interact with each other. Included in these spaces are distancing-proximity processes. In the same way that different youth cultures pervade schools, friendships, relationships, emotions, rationalities, conflicts, etc. are also constructed at school, factors that determine youth leisure times and spaces (Bonal et al, 2003).

Understanding that the process of selecting an area of study comprises part of the process of identity construction and that family, school and leisure are the main coordinates in the process of youth identity construction, in this paper we centre on those dynamics that appear in the school space and manage and construct gender identity and scientific-technological identity.

Currently, school starts from the idea of educational equality between boys and girls. However, we can consider the low presence of women in scientific-technological studies (and of men in humanistic studies or health sciences) as a reflection that gender bias continues to exist in the socialisation of male and female youth. Despite the fact that the educational system is not the only socialising instance and that it must be understood in its social context, the education system has an effect on the construction of gender stereotypes and replicates gender behavioural models adapted to the model of masculinity and femininity that are considered socially correct (Bonal et al, 2004). Institutionalised methods of this discrimination are invisible and must be analysed by taking into account such concepts as the traditional sexual division of the workplace and the social and cultural construction of gender.

Recent research about gender inequalities in the educational system stress the importance of the hidden curriculum as a factor explaining the persistence of different forms of sexism in teaching and its consequences on the educational and employment paths of women and men. The lower presence of women in scientific-technological studies is not justified by their academic performance in related subjects (mathematics and technology in our study), but must be analysed by taking into account a model of scientific-technological transfer that distances girls from these options. As Fernández Enguita (1997) points out, women have rates of retention, access and promotion that are higher than male rates in all education levels, although they do not access the same branches and specialisations.

Women and mathematics and technology

In the present day, there is nothing that theoretically justifies women having a lower capacity in mathematics or scientific-technical disciplines. Moreover, differences in academic performance of boys and girls cannot be generalised. PISA results (2003) show that in some countries boys' performance is higher than that of girls', while in other countries there are no significant differences. This fact makes it clear that unequal performance in mathematics is not an inevitable consequence of natural differences between the sexes, but rather that some countries offer learning environments that benefit both genders and others do not (PISA, 2003).

During the 70s and 80s, the Anglo-Saxon world performed numerous studies that sought an explanation for the worse academic results of girls in mathematics. Out of the topics set forth in these studies as factors explaining the differences in academic performance (Boaler, 2002), as well as the different feminist approaches that tried to explain the relationship of women with technology, one could roughly speak of two different theoretical approaches that have historically been present in feminist studies (Castaño, 2005): On the one hand, there is a viewpoint that starts from the premise that girls do not 'adapt' well and need to become masculinised in order to better adapt and, on the other hand, a perspective that stresses the need to transform the learning environments so that they are more inclusive of girls.

These types of approaches originate from the objective of gender equality and fairness, but they have contributed in some way to employing essentialism and homogenising characteristics attributed to boys and girls. The starting point is that girls and boys have the same ability in mathematics but, nonetheless, they explicitly or implicitly resort to a type of 'social and educative essentialism' that breaks down learning properties and skills using dichotomic categories, some of which are associated with boys and others with girls. In this way, these types of approaches have contributed to creating a series of gender stereotypes that are in place between the student body, the teaching staff and families (Mendick, 2005).

For example, these stereotypes assume that women are less clever than men in mathematics and cleverer than men in languages, or that women have more difficulty than men with spatial orientation and greater talents in social relations and communications in general. Similarly, they also speak of pedagogies or learning methods that favour greater motivation among girls towards mathematics and technologies, always connected to cooperative work methods or ones centred on specific knowledge applications. These types of interpretations that believe in creating more-feminised learning styles explicitly or implicitly once again resort to dichotomic stereotypes according to which girls are better in social relationships than boys, as well as that girls have difficulties in dealing with abstract knowledge (Mendick, 2005).

Seeking to go beyond this utilisation of 'gender' and integrating the hidden curriculum approach into the analysis, there are a series of tasks on learning environments related to the study of the low participation of women in scientific-technical studies, analysing the ways in which disciplines connected to these types of studies are transmitted (especially the study of mathematics) during compulsory education. The fruit of the analysis done using this approach was two significant elements that could help define what some authors refer to as an alternative outlook (Norton, 2004):

1) Firstly, the need to understand gender as a theoretical analytical instrument that is not linked to a series of fixed characteristics attributed to girls due to the mere fact of being women (or boys simply for being men). On the contrary, the proposal is to understand gender as a negotiation process that emerges in specific situations and differently depending on the setting (in the family, the workplace, in school…). In this way, gender as an analytical concept is placed with relationships and interactions and not with individual features (Boaler, 2002).
2) Secondly, the need to connect gender perspective in the study of knowledge transmission methods to power

relationships and different forms of inequality. This involves not constructing girls as an homogenous group, but viewing gender as a legitimisation method and the construction of inequalities that cannot be dissociated from other types of inequality (like those that occur due to class and ethnicity). According to this type of approach, the objective of analysing the transmission methods of learning contents and contexts is not to 'feminise' pedagogies and knowledge transmission styles, but rather to introduce pedagogies and learning environments that are more inclusive, capable of overcoming power relationships and social inequalities in the classroom (Norton, 2004; Paechter, 2003).

Mathematics and technology in the classroom

In literature that tries to explain why girls select fewer scientific studies than boys, there is a line of research that analyses pedagogies and interactions in the classroom between the teaching staff and the student body.

People have specific objectives about how women and men are and how they behave. Both male and female teaching staff live in a social environment in which they assume that some disciplines are more feminine and others are more masculine (Vendramin et al, 2003). Teachers treat boys and girls differently, unconsciously projecting their expectations onto the students. Boys are congratulated when they do well and criticised when they don't work. Conversely, girls are congratulated for their hard work when their marks are successful in mathematics and when they are not, they are told that the subject is difficult for them (Gutbezahl, 1995).

According to the meta-analysis performed by Blickestaff (2005), some research demonstrates that girls often receive less attention in class than boys; that boys are asked more questions about content and girls about matters of form and, despite girls participating more in the classroom, the teaching staff pays less attention to them than to the boys. With respect to Spain, the work entitled *Rosa y Azul (Pink and Blue)* by Subirats and Brullet (1988) also centres on analysing classroom interactions and reaches the conclusion that girls receive less attention than boys and, furthermore, that attitudes considered feminine are undervalued. Despite different research studies providing empirical proof about these matters for different age brackets and different subjects, some research shows that this is more pronounced during science and mathematics lessons (Sadker and Sadker, 1994).

Nonetheless, there is a certain methodological debate about these types of studies. Hacker (1991) proposes the need to introduce a stricter observation methodology with the aim of eliminating the bias effect on the observer of the observation of gender bias, which tends to exaggerate the perception of gender bias in the classroom. In his analysis on interactions between teachers and students in physics classes, using observers who did not know the objective of the study and video recordings, the conclusion was reached that the differences between boys and girls were minimal.

Other study types, more focused on student expectations, analyse how boys and girls have different perceptions of their academic performance and success in subjects like technology, physics and mathematics. Thirty years of studies speaking of low performance levels of girls in mathematics and the subtle daily differences in their interactions with the teachers with respect to boys has had the result of girls having less confidence in their math and technology skills (Vendramin et al, 2003). Even when girls' academic results in mathematics and technology are equal or even better than boys' results, girls tend to undervalue their abilities. In general, girls have lower expectations with regard to their intellectual potential (Pearl et al, 1990). With the same skills as boys, girls are less confident and less positive with respect to academic performance in mathematics (Zappert and Stansbury, 1984).

METHODOLOGY

The empirical work for the study has included the following tasks:

- Observation at compulsory secondary schools (ESO)
- Analysis of textbook contents
- Interviews of adolescents

Observations

Classes were observed in the 2nd and 4th years of ESO. The selection of these two school years did not follow any specific objective; we simply wanted to cover two different periods of ESO. The specific objectives that have guided the carrying out of observations are:

- Discover how stereotypes, expectations and motivations are transmitted differently to boys and girls.
- Find out how school dynamics contribute to the selection of one field of study or another and are distinct for boys and girls.
- Discover what elements explain the selection of a specific field of study for boys and girls.

Identify those dynamics that contribute to overcoming traditional gender segregation in selecting areas of study, especially with respect to motivating a greater presence of girls in scientific-technological studies.

Three ESO schools were selected for the performance of the observations:

- *School 1*: A public ESO school with five classes per school year in Toledo, located in a neighbourhood with a lower-middle class socio-economic level.

- *School 2*: A subsidised ESO school with two classes per school year in Barcelona, located in a neighbourhood with a middle class socio-economic level.
- *School 3*: A public ESO school with four classes per school year in Barcelona, located in a neighbourhood with an upper-middle class socio-economic level.

Three different types of observations were done at the selected schools:

1) *Observations in the classroom while mathematics and technology were being taught*

   24 observations were done during math and technology classes in the 2nd and 4th year of ESO at three schools. There were 2 observations of mathematics and 2 observations of technology in 2nd and 4th years of ESO at each of the three schools (8 observations at each school).

2) *Observations of a class group throughout the day*

   4 classes were monitored throughout the school day at two schools (1 group of 2nd year of ESO and 1 group of 4th year of ESO at each school). At both schools, all subjects and all break times were attended for two entire school days, except for those where the teacher explicitly did not want the observer to be present (2 subjects at School 1).

3) *Observations during free time*

   Observations were performed outside the classroom, during recess, during breaks between classes and coming and going from school during the times in which observers were present at the schools.

Content analysis

Textbook content was analysed for the 2nd and 4th years of ESO in mathematics and technology. The specific objectives that guided the analysis of content were the following:

- Investigate the knowledge transmission methods from a gender perspective.
- Find out how stereotypes, expectations and motivations are conveyed differently to boys and girls.

In total, 12 textbooks were analysed:

- 3 mathematics textbooks from 2nd year of ESO
- 3 mathematics textbooks from 4th year of ESO
- 3 technology textbooks from 2nd year of ESO
- 3 technology textbooks from 4th year of ESO

Interviews

In-depth interviews were performed with 12 adolescents between 16 and 17 years of age, who were in the 4th year of ESO during the 2007-2008 school year and selected different post-compulsory secondary education options. The specific objectives that guided the carrying out of the interviews are the following:

- Find out how the dynamics produced at school contribute to the selection of one field of study or another and how it is different for boys and girls.
- Find out what the elements that explain the selection of a specific field of study for boys and girls are.

Selection criteria were gender and the higher-secondary school options that were chosen. Six girls and six boys were interviewed. Out of the people interviewed of each gender, 3 chose a higher-secondary option that was scientific-technical and 3 chose a higher-secondary option that was artistic or focused on social sciences.

CONCLUSIONS

Starting from the current segregation by gender in the selection of areas of study, in particular the low presence of women who pick scientific-technological fields of study, the THEANO project was centred on analysing the mechanisms that contribute to replicating this horizontal segregation in the selection of fields of study among male and female students during compulsory secondary education. With the objective of understanding which are the dynamics that explain the choice of a specific area of study among boys and girls and, particularly, which are the dynamics that explain why girls select fewer scientific-technological areas of study, we performed an in-depth analysis of:

- Transmission methods of the subjects of mathematics and technology and,
- Models of vocational guidance and selection of fields of study

As explained and justified in the theoretical and conceptual framework of the study, the analysis was done starting from the central feature of the gender identity construction process in selecting areas of study. Specifically, the study started by using the assumption that the social construction of gender identities distances girls from fields of study related to scientific-technological disciplines.

The analysis of the transmission methods of the subjects of mathematics and technology was done through a series of school observations and an analysis of the content of mathematics and technology textbooks. The analysis of models for vocational guidance and areas of study was done via observations at the schools and in-depth interviews of both boys and girls in the 4th year of ESO. As explained, this analysis was done from a perspective centred on the construction of gender identities, on how knowledge transfer methods and vocational guidance models that are produced and emerge in the school environment reproduce, construct and manage a specific gender identity that distances girls from the fields of study linked to scientific-technological disciplines.

Through this analysis, a series of processes have been identified that can help us understand gender segregation in areas of study and the lower presence of girls in scientific-technological studies:

Distinction between what is formal and what is informal

In the analysis of the emergence and reproduction of gender bias in the construction of identities, we must distinguish between formal and informal in three different settings: in dynamics at schools, in textbooks and in the discourse of boys and girls:

In school dynamics

The distinction between spaces that are more and less regulated lets us understand dynamics in the construction and emergence of gender bias at ESO. The more regulated spaces are those times and areas in which school dynamics have greater rules and guidelines and are more predictable. Conversely, less regulated spaces are those areas and times that are more informal and relaxed during which students are interacting with each other. These two spaces are not closed and mutually exclusive areas, but rather represent a time-space interpretation method of school dynamics. The more and less regulated spaces overlap and we can find highly-regulated spaces with dynamics that are very regulated by the school at which we could also observe less enforced times that are more unpredictable and informal. Thus, starting from the free time that students have during the school day (break and time between classes), specific times have been identified that, despite theoretically being spaces with regulated interaction, actually function as spaces that tend to have non-regulated interaction. We are referring, for example, to times in which a video or film is shown during the lesson, when they have a while to do exercises, when the class moves to a different classroom than the normal one (like computer labs, physic or chemistry laboratories, science labs) or when they are given class time to study for an exam. During these types of moments, a series of dynamics emerges between students and between students-teachers that is different than that observed in more regulated spaces.

In more-regulated spaces, the visibility of boys and girls is similar and also the relationship of the teachers with the students of both sexes. It is in the less-regulated spaces where differences appear in the visibility of boys and girls and in their power relationships. It is also in these same spaces where the traditional construction of what is masculine and what is feminine emerges and the sexual division of roles. In less-regulated spaces, the visibility methods of boys are clearer and more obvious than the visibility forms of girls. Similarly, the traditional construction appears of boys as active subjects and girls as passive subjects.

In textbooks

Through the analysis of mathematics and technology textbooks, a significant effort is seen towards the usage of non-sexist language and towards an inclusive perspective at a subject level, with important diversity in the referenced subjects, without a predomination of subjects that are traditionally understood as masculine, letting subjects be associated with different types of applications and knowledge.

Nonetheless, gender bias subtly and constantly persists in the construction of masculine and feminine roles, strengthening the association of disciplines with men to whom a role was assigned that is traditionally masculine. In the textbooks analysed, the visibility of men that are renowned in the subject matter is much higher than that of women, which is zero. In associating subjects with masculine roles, this process is much more subtle and invisible. As explained, in the analysed textbooks the diversity of subject matter is significant and the association of subjects with masculine roles is very subtle. There are very few occurrences in each textbook, but when it does appear, the rule is similar: the reference to men-subjects or to women-subjects is minimum and roles are almost never assigned, but whenever a role appears that is traditionally viewed as masculine, it is always assigned to a man.

In the discourse of boys and girls

The formally-learned discourse of boys and girls reproduces a politically correct vision, completely egalitarian between boys and girls. Boys and girls both understand that both genders have equal intellectual and cognitive abilities, in the same way that they do not associate different disciplines or fields of study with gender stereotypes.

However, the differences between boys and girls emerge in daily practices, relational methods, behaviour, leisure activities, relationships with families… and reinforce polarised gender identities. Boys and girls relate with each other differently, their daily practices are extremely polarised and the selecting or renunciation with respect to success and professional and social prestige have a clear gender bias.

The replication of gender bias in selecting fields of study and professions

The reproduction of gender bias in the selection of specific fieds of study is a process that is related to informal environments. Conversely, in the more formal setting, positive results are seen for a coeducation strategy in the school setting.

Reproduction and construction of gender bias in an informal environment

Gender identity construction, power relationships between boys and girls and the replication of stereotypes related to what is feminine and what is masculine occur, above all, in more informal environments, through the non-intervention of the teaching staff in the less-regulated spaces of the school, the construction of the computer lab and the science lab as spaces that are not very regulated and the hierarchical organisation of the different post-compulsory secondary education areas of study.

– *Non-intervention of the teaching staff in less regulated spaces of the school*

In these spaces there is a strong appearance of the traditional construction of 'what is masculine' and 'what is feminine', as well as the power relationships between both. The distinction between highly-regulated and less-regulated spaces (not only with respect to breaks and the time between classes) organises the educative intervention of the teaching staff at the school. Teacher intervention only in the highly-regulated spaces reproduces a logic that focuses educative intervention during ESO on the more formal aspects of knowledge transmission.

As established in the Organic Law of Education, one of the aims of introducing basic competences in the ESO curriculum is to integrate both formal and informal learning. The radical distinction in teacher intervention between the more and less regulated spaces makes this integration more difficult. The emergence of traditional gender roles occurs in those spaces in which the teachers do not intervene. Consequently, during ESO, there is no daily educative intervention in everything related to informal learning for the construction of gender identities, which contributes to replicating the traditional construction of the feminine and the masculine and horizontal segregation in the selection of areas of study and careers between boys and girls.

– *The computer and science laboratories as unregulated spaces*

Similarly, the knowledge and skills that boys acquire with new technologies at home and during leisure time appear in the school and are reproduced in the computer laboratory, without teaching staff managing to correct the disadvantage (informal) for the rest of the student body.

Technology-related lab time executed in science and computer laboratories is characterised by having few rules, with the dynamics that characterise these spaces explained above. Teachers do not interfere in the different forms of visibility of boys and girls or in the power relationships between genders that appear during these sessions. Different knowledge sets, attitudes and skills that boys and girls generally have with respect to technology and sciences, fruit of differentiated gender socialisation, are not balanced out through the formal learning done during the most regulated times.

– *Gender bias in the hierarchical organisation of different post-compulsory secondary education programmes*

Students have to choose their educational pathway without having fully developed their life and career plans. The factors that explain the choice of one education pathway over another has more to do with their self-perception of academic performance or fantasies about lifestyles and social prestige than rational decisions about their future careers.

The hierarchical organisation of different post-compulsory secondary schools and their association with a specific status of privilege and difficulty (in which technology studies are viewed as having the greatest difficulty and prestige, followed by science studies) are present among the students, the teachers and families. Selecting a specific post-compulsory secondary study is closely related to the stereotypes of academic and social success associated with this hierarchical organisation.

Teaching staff does not participate when the hierarchisation of the different fields of study and their relationship to gender bias is constructed, but rather completely the opposite. Indeed, teachers reproduce the idea that students with high academic performance levels are the most suitable ones to continue with scientific-technical areas of study, which lead to the professions with the greatest social prestige. Although the hierarchisation of study programmes are supposedly neutral from a gender perspective, it is intermixed with the power relationships between genders and the pre-eminence of the masculine over the feminine, without teaching staff counterbalancing these perceptions in any way.

Positive results of a pedagogic coeducation strategy

On the other hand, in the same way that a series of dynamics have been identified that arise in the most informal environments that reproduce the transmission of gender bias and the traditional construction of what is feminine and what is masculine, it is also important to highlight that this does not occur in the more formal environments. In the more regulated school spaces, in the use of language and the subject-matter diversity in textbooks and in the politically correct discourses of boys and girls, a series of dynamics are identified that can be viewed as positive results of coeducation. Despite the fact that these positive results do not comprise part of the explicit or formal purpose of coeducation, we still believe that they are the result of a co-educative teaching strategy in secondary education and their positive results merit mention.

Although issues identified in the more informal setting contribute to reproducing gender bias in the selection of fields of study, there are also a series of elements identified in the formal environment that demonstrate the positive results of a co-educative teaching strategy at ESO schools:

– Girls appear as active and as participative as boys in formal learning settings.

– Although there is always some reference to a boy who is excellent in computer studies, many boys and girls use their computers at home in similar ways, just with different contents.

– The politically correct discourse of boys and girls originates in gender equality, equal intellectual capacities and equal professional possibilities.

- Both boys and girls link their future desires with a successful career and with having a family.

Uncertainty and indecision in the selection of fields of study

Technological skills or the dynamics that occur during mathematics and technology lessons have not given us elements that would explain the differences between boys and girls when selecting study programmes connected to scientific-technological fields of study. Similarly, neither does the concept of the construction of a scientific-technological identity offer us elements that are informative in this regard. Male and female students do not have a clear idea of what educational or professional branch to select or what type of educational or career pathway they would like to follow. The decision about what type of area of study to select takes place during a time with a significant level of uncertainty, with great indecision of what to select for both boys and girls, while the options they consider are often radically disparate.

In the study done, no determining factors have been identified in the selection of a specific field of study. For this reason, the fact that choices must be made at a particularly sexed time of their lives and in which relationships and acceptance by their peers are particularly relevant intensifies the fact that decisions do reproduce the traditional construction of what is feminine and what is masculine. Issues such as what their male and female friends are going to do, what type of pathways boys and girls select who are the leaders of the group, what the most-masculine boys and most-feminine girls are doing… are particularly relevant in the selection of one field of study or another during adolescence.

Beyond the formal and detailed assessment about the selection of one post-compulsory secondary study programme or another, the lack of formal intervention of teaching staff during ESO in the construction of gender identities strengthens the weight of the traditional construction of what is feminine and what is masculine in a decision that students must take from a position of indecision and uncertainty.

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