



Meta-analysis of gender and science research

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Country report Turkey

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1. Introduction

The critical voice of the women's movement and a rich volume of publication in women's issues have constantly supported demands for social change and action in Turkey. The developments and the shifts in the research on women's issues can be summarized as follows: In the first period (1920s and 1930s) main emphasis was on the Kemalist reforms. In 1940s and 1950s women's status and problems were among the concerns of the village monographies. Under the influence of modernization theories empirical research beginning with studies of fertility or family planning and later embracing many different aspects of women's lives gained impetus in 1960s and 1970s. Starting with 1980s and in close association with the rising feminist movements in the aftermath of the 1980 coup d'etat feminist theorizing and research bloomed and prospered (Arat, 2006; Özbay,1990). At this last stage, paralleled with the increasing institutionalization of feminist studies within the universities in western societies, gender focus gained relevance and closer attention to feminist approaches began to develop among the social scientists (Arat, 2006). It is worth noting that the topic of gender and science is not indicated as a major interest area in the classifications of the feminist research in this period. A closer look has revealed that existing publications regarding the issue have been considered as constituting a subarea of education.

One of the most important developments in 1980s was Turkey's signing of "The Convention of the Elimination of All Forms of Discrimination Against Women-CEDAW" in 1985. Following this, institutionalization at academic (women studies departments and research centers in the academies), non-governmental (NGO's) and governmental (Directorate General on the Status and Problems of Women and commissions) levels accelerated. The period since 1997 is marked by milestone legal reforms that eliminate fundamental discriminatory provisions against women as well as other initiatives that contribute towards expanding the boundaries of equality and human rights of women.

Although there are no Equality Observatories at the universities, long term academic interest in the field is now organized under two types of Women's Studies entities in order to carry out studies about gender equality and development of action plans. In the first category are the Centers of Research and Implementation for Women's Issues the first of which was established in 1989. These centers aim to provide gender sensitive education to professionals, generate knowledge on status of women and gender relations, mainstream a gender perspective within academia, contribute to policy formation, organize training workshops and seminars for public and private actors involved in women's issues, such as the security forces, legal personnel, members of non-governmental organizations among others, and through advocacy raise consciousness in society about women's human rights and equality. The second category consists of the Women's Studies Departments offering postgraduate courses and seminars about gender issues from a multidisciplinary perspective since 1990..

2. Analysis by topics

Analysis of the material specified for the Meta Analysis of Gender and Science has revealed the fact that most of the research in this respect concentrated in the area of education. Education has been one of the most sought after objectives of the women's movements ever since the Ottoman period. It has been and is still considered as the "magic wand" for women's empowerment and emancipation. The realization of this demand for the large segments of the female population, however, was made possible under the Republican governments since early 1920ies. The first rights granted to women during the Republican period were those that guaranteed equal rights in the spheres of education and the right to enter the civil service. As regards education of girls and women some of the achievements of the Republic can be stated as follows: Gender equality is accepted as a state policy. Secular laws support gender equality in education. The principle of anti-discrimination is enshrined in the Constitution and upheld in several laws.

Reforms on education have had positive impact on educational attainment. Rates of literacy, schooling and higher education for women have been increased. Considerable progress is recorded in girls' compulsory education the length of which was finally raised from 5 to 8 years in 1997. Direct relationship is observed between increased levels of education and women's retention. Co-education is maintained at all levels. Corresponding rates of female teachers and students have been obtained at primary, secondary and tertiary levels. Almost one in every 3 full professors working for the state universities is a woman. (TUSIAD-KAGIDER,2008)

Nevertheless, obstacles and contradictions remain. The proportion of illiterates among women (almost 20%) is similar to the female enrolment rate (19%) at the tertiary level. Participation in higher education remains low by international standards. (TUSIAD-KAGIDER,2008)There are disparities with respect to schooling rates among girls/women living in urban and rural areas or belonging to different age groups. Thus a great proportion of the research activity has been devoted to the contradictions between the high visibility of women in academia and the problems of access to education on the part of girls and women in the country.

2.1. Horizontal and vertical segregation

Research questions

In spite of the gains made in the process, the relationships between the educational system and the other institutions are complex and the educational opportunities and school experiences of women, as stated above, reflect the gender disparities of the patriarchal culture and economic disparities of the social structure. Although the employment rates of women with higher education is higher than the others participation by women in the labour force is low and on a decreasing trend (Ecevit, 2003). Political

representation of women, at both national and regional levels, is also very low (see TUSIAD-KAGIDER, 2008). And women still have to face challenges in terms of both access to and reproduction in education. Thus, it is of small wonder that education has been a much emphasized focus of interest on the research agenda of gender and science. Some of the main issues that have been considered are:

- Gender composition of the main areas of higher education as well as the participation patterns of women in metropolitan and provincial universities.
- Feminization of teaching and certain departments in the academy.
- Concentration of women in certain branches of medical specialization
- Glass ceiling and lack of power in administrative positions of educational and professional institutions.

Research approaches

- Although the position of women in the academia has been the focus of research in many studies since late 1970ies, an important event in this respect is the symposium held in Ankara in 1994. The contributors in the symposium which was titled *Women in Academic Life* were from the universities in Germany and Turkey presenting academic women's experiences in the different social, historical, political and cultural contexts of these countries. This symposium is considered as an important contribution since it reflected the critical approaches towards the women's place in the academy, as well as providing an effective means of communication and interaction between feminist scientists from Germany and Turkey. (Çoşkun, 1996)
- Another important project in this respect was a recent undertaking called *Beyond the Glass Ceiling. University Career of Female Academics in Engineering, Technology and Life Sciences*, designed to carry out an innovative survey to enhance existing knowledge on career patterns of female scientists at universities. The project of which Istanbul Technical University (Turkey) was one of the 7 partner universities in 6 countries of Europe focused on gender differences in research careers, critical areas where women are underrepresented, leading university positions, access to funding, mobility and work-life balance. (see Sağlamer, et.al. 2007)
- TUSIAD (Turkish Industrialists' and Businessmen's Association) the most important non governmental organization formed by business enterprise sector in Turkey, was among the institutions which have promoted and updated large scale reports by academicians on gender inequality with a special emphasis on the presence of women in education, working life and politics in Turkey. Gender disparity has

also been analyzed in reports of NGOs, professional associations and teacher unions like Eğitim Sen.

- Most of the research on horizontal and vertical segregation aimed at the compilation of data particularly about the gender composition and trends of change in educational institutions or academia. In a few others qualitative data were produced concerning the opinions and perceptions of teacher candidates, professionals and scientists about gender discrimination. In a number of studies feminist theorizing and methodology guided the research.

Findings

The situation in Turkey in relation to horizontal and vertical segregation in science can be summarized as follows:

- The proportion of women among university students has reached 45% and positive changes have been recorded in all areas of tertiary education. Recent UNICAFÉ comparisons using the She Figures have indicated that Turkey has a higher rate of female representation in natural sciences, engineering, and technology than such countries as Austria, Estonia or Hungary (Sağlamer, et.al. 2007). The representation of women is 50% in the undergraduate studies of mathematics and natural sciences, 49% in law and 45% among the highly prestigious medical specializations. Nevertheless highest female participation rates are in linguistics, literature and health sciences and lowest rates in technical sciences . Among the total body of graduates of the departments of engineering, construction and industrial sciences belonging in this category women's share of 24 % is close to the figures calculated in the OECD countries (see TUSIAD-KAGIDER, 2008).
- Vertical segregation in teaching careers continues to be prominent. Female teachers' participation rates are lower at the secondary level (41.3%) compared to pre-school (96 %) and primary education (% 48). Although there is no legal obstacle before women's appointment and promotion as administrators, males dominate at the central and provincial management positions of the educational system (TUSIAD-KAGIDER, 2008) .
- On the positive side, women account for 47% of the graduate degree holders indicating the fact that gender parity has almost been reached among those university graduates who choose to do research. This is especially worth noting since the representation of women among graduate students is higher than the proportion of women (45%) among the university graduates. Between the years of 2000 and 2007 the greatest increase of women's participation among the higher education levels has been recorded in post graduate education. (TUSIAD- KAGIDER, 2008)

- One of the very first observations about women in Turkish academia is their high rates of participation. This is best explained by reference to the political, social, and economic forces at work in Turkish history since 1920s. The proportion of women academics have reached 40 % at the present. The pattern of horizontal segregation, however, which is mentioned above with respect to the students also applies to the academia. Academic women also cluster in the gendered specialization fields, i.e. linguistics, literature, art and health sciences. (Acar, 1998; TUSIAD-KAGIDER, 2008; Aykaç, Bildirici, Anafarta, 2003).
- Research on the participation of women in academia today, agree on the following major problems: increasing numbers of women at the lower levels, dead end jobs and less commendable positions; absence of widespread socio structural mechanisms to provide for the redefinitions of women's family roles; vertical segregation in promotion to administrative positions. (see Acar, 1991; Günlük Şenesen, 1994; Aykaç, Bildirici & Anafarta 2003; Ural, 2001; Özkanlı & Korkmaz 2000)

Gaps

The analysis is centred on educational institutions and academia. There are hardly any publications about gender and science in the private sector.

- Need of improvement for data required to document, assess and analyse the characteristics of the obstacles as well as the dimensions of change and developments in the field.
- Absence of regular, official surveys of university graduates or researchers working in different research institutes and fields of science which make longitudinal analysis possible.
- No research aiming at the development of the gender indicators.

2.2. Pay and funding

Research questions

Research focusing specifically on the gender gap in the pay and funding of scientists hardly exists in Turkey. Whatever information that makes an indirect reference to the topic can be inferred from the more general studies about earnings inequalities or labour force participation of men and women. The main questions addressed are:

- Wage discrimination in professions, management and some sectors of business enterprise, i.e. banking.(See Dayıođlu & Kasnakođlu 1997; Ergeneli 2004; Bekata Mardin et al, 2000)
- Earning levels of academic personnel

Research approaches

- Economic inequalities between women and men have been among the main topics of research on gender in Turkey. In many of the studies falling under this category gender based wage differentials in professions and academia have been included.
- Research on women in professional or academic occupations has emphasized the pay and income aspects of the discrimination.
- Studies focusing on gender gap in the labour force participation of men and women have also analyzed the scope and the factors of pay gap.
- This line of research appear to have used a wide range of methods such as prohibit analysis, determination scales, analyses of legal framework or national machinery, interviews and organisational approaches.

Findings

According to Labour Law nr. 48577 (article 5) differential remuneration for similar jobs or for work of equal value is not permissible. Neither in the state nor the private universities in Turkey there are wage differentials between the persons holding similar positions at the same rank. The representation of women among the lower paying ranks of the academia in the private universities, however, is higher than the state universities which can be attributed to gender discrimination.

- In research about women academics and professionals the impediments of promotion to higher paying management positions or accepting jobs of extra pay have often been attributed to their family responsibilities. It was also argued that even if the women themselves did not consider family responsibilities as impediments the employers used them as “rationalizations” to discriminate against female employees in providing mechanisms, i.e. in-service education, scholarships, grants, etc. for promotions or higher earnings.

A limited number of the female academics stated that even though there is no explicit discrimination policy at the institution, they live discrimination emerging from the top administration in the form of directing the works which have

pecuniary return to the male colleagues or being more tolerant to the male academics who have extra work away from the university. The same tolerance was felt not to be extended to the female academics with children. (see Özkanlı & Korkmaz, 2000; Sağlamer et.al. 2007; Acar,1998)

- Most of the interviewees from Istanbul Technical University stated that they have no difficulty reaching necessary resources for their academic activities. There is however, still extensive need for external research funding. Complicated procedures and bureaucracy are expressed as the more problematic aspects of this issue. Limited administrative personnel force academicians to spend more time on official works causing loss of energy. Such problems can also be considered as more serious deterrents by women than men in the applications for funding. (Sağlamer et.al. 2007)

Gaps

- There are no comprehensive intersectional or longitudinal studies that analyse gender inequality in the pay or the access to funding among scientists in either public or the private sector.
- Existing data refer to the women academicians or professionals in metropolitan contexts. There are no studies about the pay or income gap among the provincial scientists.
- No research is available on the income differentials by gender in science rising from low level, dead end jobs where women are concentrated especially in the private universities.
- The fiscal implications of the distribution of works of extra pay and managerial posts still waits to be investigated.
- No explicit research on funding or distribution of grants have been conducted.

2.3. Stereotypes and identity

Most of the publications in gender and science in Turkey are clustered under this topic.

Research questions

Research on the social construction of science mainly questioned:

- The masculine ethos of science and scientific methodology
- History and its gender biases
- Masculine character of technical fields and technology
- Gendering of disciplines and professions

- Attitudes of students or teacher candidates towards various scientific areas Analysis of the mechanisms of reproduction of the gender stereotypes throughout various stages of education and their impact on the carrier paths

Research on the social construction of identity was focused on:

- High levels of female participation in academic and professional occupations
- The construction of women's identity in the early Republican Period
- Construction of identity and the perceptions of academic and professional women about their traditional gender roles
- Cognitive abilities of male and female students

Research approaches

Although researchers from many disciplines have been interested in the subject, education is the area where the majority of empirical research originated. Conceptual contributions on the objectivity and the methodology of science came from a multidisciplinary perspective including history, philosophy, sociology and economics.

The social construction of science

Conceptual issues within epistemological and methodological standpoint, scientific claims to neutrality, the contextuality and the relativity of science/knowledge were discussed, and new approaches and methodologies were emphasized:

- Different types of gender bias and the main features of the feminist approaches that question the patriarchal and sexist assumptions of the mainstream philosophy come into focus. (See Durakbaşı, 1997; Serdaroglu, 2008; Karaduman, 2006; Atasü, 1996)
- Whole general history writing is critically analyzed from a gender viewpoint for giving primary attention to the dominant power relations and ignoring the ordinary life of the ordinary people. Gender blindness and the invisibility of women in the history are discussed. The essentialist suggestions of traditional history are also criticized. (See İlyasoğlu, 2006)
- The role of oral history in democratization of history as well as the democratization of the production of historical knowledge or history writing is emphasized. A significant number of feminist oral history studies were launched contributing to the history of women in Turkey. (See Şahin & Ağduk Gevrek, 1998)

- Other sources of feminist history writing such as letters, diaries, autobiographies, memorabilia, photographs were also utilized in the search for the discovery of women's past. (See Durakbaşa, 1995)
- Quantitative methods are more often preferred in the studies concerned with the attitudes of students or teacher candidates towards various scientific areas or the role of educational institutions in the reproduction of gender stereotypes. (see Yilmaz, 2006; Asan, 2002; Bilgin, & Geban, 2004; Alci & Erden 2006.)
- Gendering of disciplines and professions are brought into focus in both conceptual and empirical research. (see Bayrakceken Tüzel, 2004; Dale Gencher, 2002) Masculine character of technical fields and technology is also discussed (Ciravoğlu, 2004; Binark, 1999; Zengin, 2000; Genc Kuzuca, 2007; Şenyüz, 1999; Alparslan, 1997). Research about the gendering of disciplines and professions often chose qualitative techniques like interviews or case studies.

The social construction of identity

Socialization process and the role of education on the construction of identity came into focus in a significant number of publications.

- Historical roots and cultural factors behind the decision to pursue scientific activity as well as the upbringing and determinants of success of the female scientist or professional are among the subjects of inquiry. The life stories of well-known women scientists or pioneers in different fields of science, especially in the traditionally male areas, i.e. astrophysics, medicine, natural sciences or experimental sciences are studied.(Akoğlu, 1997; Gümüšoğlu, 1995; Ataman, 1999)
- The most important line of research in this area was on the pioneer women scientists and professionals educated in the early Republican period. (see Oralalp, 1995; Gümüšoğlu, 1998; Akoğlu, 1997) The interest towards these women was in a way linked to the efforts to understand the process of modernization in Turkey of which women were an essential part. The basic mission of the period was the construction of a new identity, detached from the Ottoman past, pending on the more theological and Middle Eastern culture whereas the roots of the modern, Republican Turkish identity was deposited in the process of Westernisation and secularism. Oral history interviews were conducted with women over 70 years old who have lived in the Early Republican Period in order to reveal the spirit of the period and different experiences of women from different social and economic backgrounds. Pilot Project of Women's Oral History in Turkey during 1994-1995 was one of the first attempts in this respect (See İlyasoğlu, 2006). The aim of this Project was to go beyond the repeated identity pattern created by the Republican women discourse

and record the real experiences and lives of real women. In another way, however it was deeply connected with the feminist academicians' wider concerns about writing a history of women, supporting theoretical concerns, enhancing female role models and placing women in the focus of their studies.

- Many of the other selected studies are found to be concerned with gender and the attitudes of students or teacher candidates toward science, technology and science education or the role of educational institutions in the reproduction of gender roles and formation of such attitudes. Stereotypes concerning science and scientists among pupils, as well as the teaching practices and teaching material are brought into focus. (see Ceyhan, 2004; Işık, Yaman, & Soran, 2005; Canca, 2005)
- A large part of the research effort concerned with the cognitive abilities of students or teacher candidates and the role of educational institutions in the reproduction of gender stereotypes is quantitatively oriented. Biographical and/or autobiographical material as well as in-depth interviews and focus groups were preferred in order to reach a comprehensive understanding of how academic or professional women constructed their academic or professional identity. In several of these studies oral history was used to obtain narratives.
- Research on women economists' gendered identity in the Turkish universities examine how the masculine ethos of economics has been internalized even by women academicians working in the field of economics (Serdaroglu & Özkaplan 2001).

Findings

High rates of women's participation in non-traditional fields of higher education and professions were the foci of interest from where a large number of studies were launched.

- Research concluded that the choices, priorities and experiences as well as organization of daily life of professional women are influenced by specific historical, social, and cultural structures in the Turkish society.
- Kemalism and the reforms of the Kemalist state, created a positive and supportive environment for professional women in Turkey. The historical-biographical studies about women in science in the early Republican or Kemalist era attribute their success in scientific careers mainly to their socialization in a time of revolutionary spirit. These women have considered themselves very fortunate to be given the chance to receive the same education as their male counterparts. They were socialized to believe that women were not inferior to men

and could be successful in any field they chose to study. (see Bayrakçeken Tüzel, 2004; Öncü, 1982)

- They were also the members of the generation that was devoted to the Republican ideals and felt the responsibility of building the nation. According to the same generation science was the guide and motor of the modernization and advancement of society. After all, the most famous saying of Kemal Atatürk was, “the truest guide in life is science” and to pursue scientific work for these women was the best way to serve their country. They were the true followers of Atatürk.
- The above discourse was, however, not left unquestioned. Feminist research asked if education was a means of liberation or a means of patriarchal socialization for women. It was also argued that women were not only oriented by the Republican spirit and Kemalist discourse but also the discourse of professionalism and that their position is a complex phenomenon constructed by the interactions between professionalism, Kemalism and patriarchy. (see Bayrakçeken Tüzel; 2004)
- The influence of Comtean positivism and its consequent authoritarian politics of society on the making of the modernization ideology in Republican Turkey was found to be meaningful from the Feminist perspective. The series of pedagogical dialogues between the positivist priest of Comte and ‘woman’ was resembled to a scene of a paternalist reformer functioning as a socializing agent of ‘woman’ functioning as a student in the dialogue (Durakbaşa, 1997).
- It was observed in many studies that gender-based occupational segregation is an ideological operation owing to patriarchy. Horizontal segregation resulting in girls’ estrangement from technological studies is largely explained by the internalization of gender expectations starting in family and continuing in school. Gender based occupational segregation is also attributed to the ideology of familial constraints influencing women’s full access to the advancement and training opportunities. (see Arat, 1998; Bayrakçeken Tüzel, 2004)
- Research about the professional women in such areas as health and education pointed out that traditional motherhood oriented gender role of woman is still quite strong. Yet there are differences in perception of this role among different professions. Although nurses and teachers are from different sectors, they share similar and strong traditional gender role orientations; whereas women academicians and doctors are less traditional gender role oriented. The reason for this can be traced in acceptance of modern value patterns which originate from different educational and socio-economic levels (Tarihçi Delice, 2008; Demir, 2004)
- Although nurses and female doctors come from the same sector, nursing is perceived as a continuation of a female gender role(caring)

whereas the profession of medical doctors is seen as a continuation of a male gender role (knowledge and authority). Nurses, because of the discrimination associated with gender roles, are suppressed and generally exploited in the context of daily working conditions. The same analysis can be made for female teachers and academicians. Teaching represents a child caring female role while academic activity refers to knowledge and authority oriented male gender role. (Tarihci Delice, 2008)

- Gender distribution in the specialization areas of medicine concluded that female physicians are not preferred in some specialization areas and some specialization areas are not preferred by female physicians. In the twelve -mainly consisting of surgical- of the twenty eight areas of specialization, the rate of the female physicians is below 33%, the critical threshold. (Bekata Mardin, et al, 2000; Gediz Gelegen, 2002)
- Other studies pointed out to the different manifestations of gender ideology in different professional contexts. Research on the ways in which roles and relations are constituted, represented, transformed and modified in communications and cyberspace showed that gender is still the primary category of identity. A limited number of female academicians stated that in the case when both marital partners are academics in the same institution, assessing and thinking of the woman with her husband and not as an individual prevailed. (Sağlamer et al. 2007)
- Research emphasized social construction of technology and mutual relationships between technology and patriarchal system..It was argued that the relationship between masculinity and technology is a part of the process which leaves women out of the realm of power, by keeping them out of the realm of technology. Women's isolation from the design process of technology was found to be related to the gender-segregated labour market and the consumer identity that is determined by gender. Technology, on the other hand strengthened the male dominance in society by increasing the power for a small group of male labour that has the capacity to affect the design process of technology over other groups of labour and specifically women. Research also confirmed that information technologies played a critical role in reproduction of gender identities and computer usage patterns of male and female workers differed significantly. (See Erol, 2003; Binark, 1999; Alparslan, 1997)
- Empirical research revealed the students' misconceptions and traditional views on the nature of science, definition of the science, fundamental assumptions of science; characteristics of scientist and social factors concerning science and technology. In addition, there were significant differences between students' views on the nature of science by geographical region, school types and gender. (See Gülçür, 2006; Cürebal, 1980; Soyulu, 2006; Göğebakan, 2003)

- The pattern of horizontal segregation is still being reproduced in secondary school where students are required to make their choices between the branches of mathematics, science, languages or social studies. The high school girls or female teacher candidates, in several studies are reported to have less interest in technical subjects and a more distant relationship with technology. Female students were, however, more successful when their teachers had strong positive attitude towards mathematics. A considerable number of teachers are reported to hold stereotyped beliefs in terms of gender roles. Accordingly, the most significant implication of these studies is the need for the re-evaluation of teacher training and education programs. (see Uzel & Emine 2008; Alci & Erden, 2006; Işıksal, & Askar, 2003; Namlu Gürcan, 2002)

Gaps

- Although epistemological debates spread across many disciplines there are fields of research left almost untouched by the methodological and conceptual concerns of gender perspectives. Agriculture and veterinary are two examples of such research fields. Even in the areas where a gender perspective was consolidated research in this line is fragmentary and mostly confined to the works of a small number of academicians.
- In spite of the abundance of studies in education concerned with gender and cognitive abilities or the attitudes of students and teacher candidates toward science not all include a through gender analysis in terms of focusing on epistemological concerns. ..

2.4. Science as a labour activity

Research questions

The main aspects of science as a labour activity addressed were:

- Gender and labor force participation by level of education
- Reconciliation of work with marital status and family responsibilities or work-life balance
- Discrimination in the workplace and power strategies

Research approaches

The above questions were approached in the context of following studies:

- Compilation of statistics on the rates of labour force participation by gender for the purpose of examining to what extent educational

assets of men and women are “rewarded” by employment policies and practices

- The wider research aiming to understand and analyse main features, attitudes and problems of women academics, professionals and teachers.
- Qualitative research focused on the experiences of women scientists and professionals in traditionally male areas.

Findings

- Labour force participation of women with higher education has started to decline even though women are more successful at the university and graduate with better records. This is found to be an alarming development by the women’s movement for the participation rates for this category have regularly been higher than the other women in Turkey.
- Empirical research on working time and work/life balance have produced data about the different coping strategies of women working in different positions in the same organization. Women working in low-status jobs still continue to combine work and family responsibilities by retaining almost sole responsibility for domestic tasks, and thus define themselves primarily as mothers and home workers. In comparison, women working in high-status occupations do not exactly fit into the traditional family patterns in terms of their marital status and roles at home. Some women in this group opt to remain single. Those who are married employ various strategies to overcome the role conflict they experience. Hiring paid help is the common strategy. Some choose to work from home. Others seek the benefit of informal support structure consisting of mother’s and mother-in-law’s offering childcare together with the availability of affordable domestic labour,. For female academics, even when husbands share all the other responsibilities childcare is women’s responsibility along with professional or family support.(Ecevit, 2002; Sağlam, et.al. 2007; Giray & Ergin 2006; Usluer, 2000)
- Research about women professionals in some traditionally male dominated areas and staff relations between such gendered professions as nursing and medical practice in the same institution have pointed to the power strategies men employed to keep women colleagues under control during the execution of services (see Demir, 2004). Assignment of women engineers to “passive” jobs in the forestry organization, for example, was among such strategies (see Arslantas,. 2006). It was observed that there were informal barriers for women employees to climb career paths.. The experiences of women who have been working in male dominated fields as engineers or technicians indicated the relationships between social

and economic background and the survival strategies in the career path. Only a few women engineers filled intermediate managerial positions in defence industry and those women challenged their organizations in varied ways to cope with those barriers.

Gaps

- Empirical studies about the organization of scientific work, the uses of time or the work/life balance are conducted mainly on the women professionals or academicians. There is almost no research using a gender analysis on the same topics to convey the different experiences and strategies of male and female scientists

2.5. Scientific excellence

Research questions

There are hardly any studies which specifically address gender bias in this area. The following questions were dealt with in the context of research related to other issues:

- Achievements and awards or prizes won by exceptional women scientists
- Distribution of scholarships among the university students

Research approaches

The publications on the exceptional or pioneer women academics and professionals with such intentions as paying homage, making their contributions visible, providing female role models.. The outstanding contributions of the women scientists and professionals are emphasized together with the international and national awards and prizes they received.

- The representation of women among the recipients of government scholarships was examined in one study aimed at the examination of gender based limitations in the context of existing educational assistance mechanisms

Findings

Many of the women scientists with international achievements in astrophysics, mathematics, chemistry, astronomy and pathology were praised not only for the awards they received but also for their efforts to spread interest towards the scientific area they worked in. Professional women tried hard to prove their occupational competencies to challenge the existing prejudices and the

stereotypes (see Akoğlu, 1997; Gümüšoğlu, 1998, İlyasoğlu, 1998, Oralalp, 1995)

- It was reported that men outnumber the women among those who receive a scholarship from the Ministry of National Education to study abroad in undergraduate and graduate degree programs. (TUSIAD-KAGIDER, 2008)

Gaps

- Absence of studies about the scientific productivity of men and women at the same professional level or by field of science.
- Absence of studies that question to what extent and by which mechanisms i.e. male informal networks, homosociability, gate keeping gender bias is reproduced in the evaluation of scientific excellence.
- Absence of research on the selection procedures and access of women into such male dominated, upper level scientific organizations as TUBA (Turkish Academy of Sciences), TUBITAK (Scientific and Technological Research Council of Turkey) or YOK (Higher Education Council)
- Absence of cross sectional and longitudinal bibliometric studies that analyze the scientific productivity of men and women by field of study in academic and non academic research institutions.
- Absence of research on the scientific production of men and women in business enterprise.
- No studies on the publications of male and female scientists' in the international refereed journals (articles in ISI, SCI, SSCI, AHCI journals), conference papers, invited papers. Distribution of pre- and post- doctoral or publication awards by gender has not been examined either.

2.6 Gender in research contents

Research questions

Following questions were considered in the contents of both conceptual and empirical research:

- Women's rights within the context of Republican reforms
- Women's status and problems

- Scientific contributions made by women
- Gender as a primary category of research
- Gender bias in scientific knowledge
- The relationship between gender and various aspects of science education and technology, gender difference in determining attitudes towards science (primarily for teacher candidates and students)

Research approaches

- Historical approach had two main interests: women's rights to education, work, etc. within the context of Republican reforms of the Kemalist era and the contributions made by women to various scientific areas.
- Women's status and problems came into focus first in the village monographies and later in the compilation of data and empirical studies conducted within the context of modernization studies.
- Together with the feminist movement and following the introduction of the feminist conceptualizations i.e. gender and patriarchy, feminist academicians began to introduce gender perspective in the scientific areas they worked in. They had a two fold purpose of a critical analysis of the gender bias and the dissemination of new concepts and methods in their area of science.
- The analysis of the relationship between gender and various variables related to science was mainly in the focus of the micro data produced by the researchers in the faculties of education. Although there is an abundance of research in this line not all of them deal with the gender dimension from an epistemological viewpoint. Their main contribution can be seen in the highlighting of the prevalence of the stereotypes by the family and school socialization of the boys and girls.

Findings

Introduction of the gender perspective have contributed to many areas of research in various sciences.

- Most of the former historical research aimed to emphasize the role of the reforms in the emancipation of women and the women's response by their contributions in various scientific areas. As pointed out above same topics were, however, more critically analyzed by the feminist researchers in the following decades.
- In the village monographies and the modernization studies the gender inequalities resulting from the social, cultural and political factors were highlighted. The rural or regional differences as well as the specifics of the female populations which did and did not enjoy the benefits of the reforms were compared.

- In many of the specific scientific areas i.e. life/health sciences; engineering, ICT, there were a variety of contributions focusing on gender and gender bias (see Genc Kuzuca, 2007; Ecevit, et al 2002; Alparslan, 1997; Zengin, 2000) . Although an increasing number of women participated in such male dominant professions, this participation could not change the masculine ethos prevailing there. In fact women in male dominated professions appeared to bear masculine attitudes. Women medical doctors concentrated in certain branches of medicine. Women in male dominated branches often behaved like a man.
- Feminist lawyers questioned the traditional approaches to equality and difference and discussed critical responses of feminist legal theorists. This line of research also contributed to the legal issues concerning equal rights and treatment of women and the consequent adaptations in the laws i.e. the Turkish Civil Code and the Penal Code. (see Çağlar,2002)
- Feminist economists sought to identify and change the practices that lead to exclusion of feminist concerns from the production of scientific knowledge. A gender perspective was conceived to be possible within the approach which criticizes the mainstream modernist and positivist approaches of the economics. (see Serdaroglu, 2008;)
- In architecture the relationships between gender and the creativity, creative process, design and styles were discussed. It was argued that the built environment as a social system has historically functioned to contain, control, or exclude women.(see Akgün, 2002; Ciravoğlu, 2004)
- Within the borders of different feminist approaches the epistemological and methodological issues were debated. New interpretations provided for conceptualising the contextual features of patriarchy without being lost or dispersed in the contextuality of the patriarchal operations. (Bayrakçeken Tüzel, 2004)

Gaps

- Although gender is a widely utilized variable in research in many areas gender bias in science often goes unexplored. Gender mainstreaming in that sense is far from being accomplished yet.
- There are no cross sectional or longitudinal studies about the proliferation of interest as measured by the number of publications on gender. It is therefore not possible to discuss for example, if the rising proportions of women in a specific area is accompanied by increased interest in gender issues.

2.7 Policies towards gender equality in science

Research questions

The topic has been approached mainly from two perspectives:

- In the larger context of gender mainstreaming practices
- In the context of education and teaching of gender at the university level.

Research approaches

- Five main regulations in Turkey concerning reproduction health policies were examined and the gender perspective of these regulations were discussed. Modes of application of the health policies were studied using semi-structured interviews with the key position holders related with women's health policies.
- In 2007 a conference was organized on gender mainstreaming in Turkey with the aim of both the evaluation of the situation and discussing the possible means for gender mainstreaming in different areas including education and working life.
- At least three publications appeared on the evaluation by the participants of their attempts to introduce feminist perspective in undergraduate education . Two of these were about the experiences of a team of feminist instructors who were engaged in designing and collectively teaching an undergraduate course on gender to prospective teachers.
- In one article the latest Primary Education Curriculum was evaluated from the gender perspective and the implications of its positive emphasis on girls and science were analyzed.

Findings

- During the Gender Mainstreaming in Turkey Conference participants concluded that the documents and programs that design the primary goals, essential policies and priorities of education or the syllabi and textbooks seemed to have failed on a wide scale to materialize the "gender mainstreaming". (Tan Göğüs, 2007)
- In a general overview of the development of Women's Studies in Turkey the achievements and neglected areas and limitations were evaluated. Main subjects or problems of the research, gender of the researchers, theoretical and methodological problems faced, the lack of interaction between researchers, difficulties encountered in field

research, inadequacy and the inconsistency of statistics were acknowledged (Ecevit, 1996). This evaluation was however, dated 1994 and no updating research were encountered.

- The content analysis of the latest Primary Education Curriculum was found commendable in the way it gave put special emphasis on the orientation of girls towards science (Severege, 1998). This emphasis was however not repeated in the other sections of the curriculum. In the subsections concerning such areas as the mathematics, history or literature neither the women's contributions were made visible nor the gender bias was taken into account.
- The evaluations of the courses on Gender and Education pointed to the opportunities as well as the risks of consolidating the theoretical concerns and the pedagogical intentions of feminist teaching at the university. Designed to increase the gender sensitivity of the teacher candidates as well as empowering them in order to abolish sexism both in school and in other social areas feminist classroom was the locus of many possibilities including conscientization, resistance and conflict (see Tan Gögüs, Yamaner & Şahin 2001).
- The establishment of Women's Commissions in various organizations, i.e. Chamber of Electrical Engineers (<http://www.emo.org.tr/subeler/komisyenlar.php?kod=398&sube=14>), have been taken as a positive sign of encouragement and the tasks and expectations linked to such commissions were delineated. The main tasks of such commissions are listed to be developing a profile of women members, study and report on the problems experienced by this group and work on the possible solutions to such problems.
- Gender mainstreaming in academia was found to be related to women's solidarity and networking (Tekeli, 1996). Not only the members of the Women's Studies departments but also the women academics within different areas were urged to act together against the patriarchal structure of the universities. In this context, the importance of conscientization about the existing male tradition of the academy was emphasized.

Gaps

- Although women's studies are organized in research centers and degree programs for over a decade there are no overall evaluations of the implementations and impact of these entities. Whatever reference exists is fragmentary and incidental.
- Gender courses have long been included in the syllabi of universities. Yet there is no large scale research on the evaluation or the development of such courses in the academic curriculum of diverse specialties

- There is no evaluation or assessment research about the impact of Women's Commissions which have proliferated in the public organizations, unions, business sector, etc.

3. Conclusions

The search for the publications on gender and science gives the impression that this does not appear to be one of the most prolific topics of the feminist literature in Turkey. Not a very large number of detailed studies have been carried out in major institutions other than the universities. Using the specified key words we reached a large amount of publications concerning, for example, working women or women in the labor force. In social science, a significant research effort has been allocated to such topics as paid and unpaid work, informal work, flexibility, unionization, work-home balance, home based work, domestic work and care work. We initially thought that such general topics could have references to women in the scientific fields. In the Preliminary Report dated 31 July 2008 on the coverage of the GSD the estimated number for the 2nd selection of documents was, therefore, indicated as 464. As we selected from among these only the research related to academia and professions the total number of entries,, had to be reduced once more.

The reason behind the observed trend was understandable. We, in Turkey rather had the impression that academic women are "lucky". In a country where one of every five women are illiterate, women constituted 30 % of full professors. The head of TUBITAK (Scientific and Technological Research Council of Turkey) is a women. Women have long been present in all scientific areas including the traditionally male ones. The representation of women among graduate students (47%) is higher than the proportion of women (45%) among the university graduates.

Notable examples of high-level presence of women in Turkish society in academia and professions have usually been attributed to the equal rights in education provided by the Republican Reforms. Education has therefore been the area where most of the publications on gender and science accumulated. Research initially was interested in compiling sex-disaggregated data and providing descriptive evidence about the gender composition of higher education areas and professions. The contradictions between the high visibility of academic and professional women and the problems of access to education on the part of the girls and women in the country were among the main concerns of such studies. With the introduction of gender perspectives, however, disparities in scientific fields and administrative positions started to be more critically analyzed. The reasons for these disparities are generally attributed to the patriarchal ideology dominating all spheres of life. Such a problem appears to be the major reason because in the Turkish society, the family relations (especially in terms of mothering) remains to be traditional/ least modernized parts of women's lives.

The introduction of the gender perspective gave rise to new issues and methods of research in almost all scientific areas and constituted a significant contribution if not very large in numbers. Not only conceptual studies critically analyzing the social construction of science and the gender bias but also field work following new approaches were undertaken. From law to engineering and from cyberspace to architecture research in this line helped to contribute to the development of knowledge and methods by asking different types of questions and looking at different directions. Whole general history writing was questioned from a gender viewpoint. Using alternative methods like oral history and narratives, the experiences of women academics and professionals were brought into focus. The analysis of the social construction of identity through the process of modernization thus evolved into one of the most insightful areas of research in this respect.

But the effort is still an individual and fragmentary activity far from being mainstreamed into any of the scientific areas. Mainstreaming a gender perspective to all policies, plans and programmes in Turkey is an ongoing endeavour to eliminate prejudices and practices that sustain negative gender stereotyping; however, the process is still in its initial stage. And research on gender and science contain the following gaps:

- Lack of research aiming at the development of the gender indicators.
- Need of improvement for data required to document, assess and analyse the characteristics of the obstacles as well as the dimensions of change and developments in the field.
- Research focusing specifically on the gender gap in the pay and funding of scientists hardly exists
- Absence of studies that question to what extent and by which mechanisms gender bias is reproduced in the evaluation of scientific excellence.
- No research on informal mechanisms blocking women's access to administrative posts of the academia from the selection of candidates to the appointment process.
- Scarcity of longitudinal studies
- Scarcity of research on scientists in the private sector

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