

From Victims to Economic Assets: Training Women in an Emerging Digital Society During the Late 1970s to the Mid-1990s

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Abstract

The European Community (EC), afraid of lagging behind the United States and Japan in the technology race, developed a series of strategies in the 1980s and 1990s to enhance their position in the field of information and telecommunication technologies (ICT). One key strategy was the training and retraining of citizens to deal with the shortage of a highly skilled labor force. At the same time, women's issues were being raised as part of the EC's political agenda, with a particular emphasis on the effects of technological change on the employment of women. We claim that despite the advantageous conditions for promoting women's advanced education in ICT, the EC's strategy was to promote only basic computer literacy, following a dis-

course that victimized women, due to their alleged lack of skills and flexibility. Although by the late 1980s, the view of women as constituting potential economic assets in the EC's economy became more prominent, the concrete measures for women's education and training did not substantially change and remained scantily funded and short-sighted throughout the whole period.

THE EUROPEAN COMMUNITY (EC) regarded the advent of new information technologies in the 1970s as an urgent matter, involving complex economic, industrial and technical questions. Concerning the workforce, the EC identified two main challenges: the devaluation of existing qualifications and the shortage of highly-qualified specialists in Information and Communications Technology (ICT).¹ In light of the then-dominant Knowledge-Based Economy (KBE) paradigm that incorporated ideas, such as level of education, skills, and human capital,² the EC redefined education and training to match the demand of transferable and specific skills required in the economy. European policies, following a human capital approach, were framed as a strategy to supply the labor market with an adequate stock of human capital to meet the demands of the KBE.³

In a technological society, as suggested by sociologist Andrew Barry, "technical change [is] the model for political intervention" and "specific technologies dominate our sense of the kinds of problems that government and policies must address, and the solutions that we must adopt."⁴ This explains the emergence of European technology policies in the 1980s, aimed at creating a European system of innovation. Policymakers assumed that technology was related to knowledge and, therefore, depended on a mix of skills and capabilities of people, as well as institutions.

While research institutions and technical facilities were essential,⁵ the development of human capital was equally important. The new economic structure required a pool of individuals ready to undergo training to master the rapidly developing computer technologies.

Concurrently, an international gender equality movement was becoming established.⁶ Equal opportunities in education and work constituted an urgent demand for groups working on women's issues, which led to the development of equality policies in these areas, both at national and European levels.⁷

The timing seemed perfect, and the conditions ripe, for creating suitable educational and training policies that targeted women's inequality and addressed the shortage of highly skilled workers in the area of ICT. According to the human capital paradigm, targeting

¹ Commission of the European Communities, "The Changing Nature of Employment: New Forms, New Areas," *Social Europe* 1 (1988).

² Sami Moisio, *Geopolitics of the Knowledge-Based Economy* (New York: Routledge, 2018), 15.

³ Manfred Wallenborn, "Vocational Education and Training and Human Capital Development: Current Practice and Future Options," *European Journal of Education* 45, no. 2 (2010).

⁴ Andrew Barry, *Political Machines: Governing a Technological Society* (London: Athlone Press, 2001), 2.

⁵ John Peterson and Margaret Sharp, *Technology Policy in the European Union* (London: Macmillan, 1998), 49–50.

⁶ See Angela Glasner, "Gender and Europe: Cultural and Structural Impediments to Change," in *Social Europe*, ed. Joe Bailey (New York: Longman, 1991).

⁷ See Mary Ann Danowitz Sagaria, *Women, Universities, and Change: Gender Equality in the European Union and the United States* (New York: Palgrave Macmillan, 2007).

women's education and training in new technologies might appear to be an unequivocal choice. However, we claim that the EC repeatedly pigeonholed women as a socially-excluded group, particularly prone to unemployment due to their poor qualifications and labor market behavior.

In the early years of the microchip revolution, both women and men faced the consequences of inadequate training in new ICT. However, women often encountered the additional challenge of not being recognized as potential highly skilled workers. This view had far-reaching consequences for the content and scope of education and training initiatives. This historical inconsistency is at the core of this article.

We seek to understand the role that the EC assigned women in building a European technological society and how this role was encouraged through training and education policies. In the following sections, we add nuance to Jacky Brine's assumption that the EC's patriarchal approach trumped its economic rationale.⁸ We show, instead, how in the 1980s and early 1990s, a gendered interpretation of the labor market permeated the EC's policy decisions. This interpretation was based on assumptions regarding women's interests, skills, and capabilities. This EC's bias resulted in education and training measures that endorsed women's subordinated economic role in the advent of the so-called ICT revolution.

This study centers on the era spanning roughly from 1970 onwards, during which Western governments and the EC acknowledged the developmental potential of emerging information technologies. This period also saw a growing emphasis on citizen education and training for effective utilization and innovation of these technologies. The period under study ends with the late 1990s and the dot-com boom, which necessitated novel competencies and enterprise models and thus marked a shift in European strategy towards training and education. This article is based on an analysis of the EC's guidelines, programs, and policies on women's education and training in ICT. The central documents consist of the social policy of the Commission of the European Communities (CEC), including equal opportunities and social action programs, documentation on initiatives, such as IRIS and NOW, and the *Women of Europe Newsletter*. Additionally, we use reports, Council resolutions, conferences, Commission recommendations, EC publications, and archival documents of the EC's Committee on Women's Rights and Technological Change from the Historical Archives of the European Union in Florence.

While none of the action programs and initiatives dealt entirely with education and training in technology for women, they all considered the question to some extent. In all these documents, we anal-

⁸ Jacky Brine, "Equal Opportunities and the European Social Fund: Discourse and Practice," *Gender and Education* 7, no.1 (1995); Jacky Brine, *UnderEducating Women: Globalizing Inequality* (Philadelphia: Open University Press, 1999).

ysed how the problem of women and new technologies was formulated, the vision of the technology society they advocated, and the strategies proposed to achieve this vision. From the series of documents used in this study, the action programs and targeted initiatives (IRIS, NOW) are the most concrete in terms of their stance on the question of women's education and training in ICT, as they present a strategy of action—with varying levels of implementation in the member states. Although these do not constitute binding legislation, they are considered pre-law instruments and agenda setters.⁹

Although the EC is composed of several bodies with various prerogatives and interests, in this article, we treat the EC as a cohesive entity. While we refer to specific actors within the EC, such as the European Social Fund, the EC Commission, or the Centre for the Development of Vocational Training (CEDEFOP), we do not follow specific interest groups and individual behaviour. Our focus is on the policy outcomes—that is, the final programs and policies (whether legally binding or not) that the EC introduced. By analyzing how action programs and EC initiatives present the role of women in a technological society, we aim to bring attention to a paradoxical issue: why, in the age of human capital, the pursuit of efficiency in education and training, as well as the untapped potential of women in the ICT field, seem to have been disregarded.

We draw on Teresa Rees's model of gender equality, both to characterize the EC guidelines and strategies in women's education training in the field of ICT and to periodize them. Rees identifies an equal treatment model during the 1970s, a positive action model in the 1980s, and a third model based on the principle of mainstreaming beginning in the mid-1990s.¹⁰ However, the period covered by our study ends before the mainstreaming model was properly established in education and research policy. Apart from identifying the gender equality approach to which the studied strategies belong, we examine the content of the policies and measures regarding women's training and education in ICT and locate the shifts therein.

State of the Research

While European education and technology policies have been the subject of intense research, gender issues have been largely overlooked.¹¹ Likewise, historical research on European gender policies and gender mainstreaming programs has paid little attention to technological change and the European competitiveness agenda. The present contribution fills this gap by bringing these two perspectives together.

⁹ See Linda Senden, *Soft Law in European Community Law* (Oxford: Hart, 2004), 128.

¹⁰ Teresa Rees, *Mainstreaming Equality in the European Union: Education, Training and Labour Market Policies* (London: Routledge, 1998).

¹¹ Ilkka Kauppinen, "The European Round Table of Industrialists and the Restructuring of European Higher Education," *Globalisation, Societies and Education* 12, no. 4 (2014); Marina Cino Pagliarello, *Ideas and European Education Policy, 1973–2020: Constructing the*

The shift of the Commission of the European Communities towards a new, interventionist technology policy in the mid-1970s has already been studied to a great extent.¹² Historical and comparative research have considered both earlier and more recent action programs.¹³ In this context, Bornschier and Parker have shown how the attempt to cope politically with the advent of the microchip produced a new governance model, which ultimately resulted in a Single Market policy and expanded the competencies of European institutions.¹⁴

The new technology policy was accompanied by numerous initiatives to reform vocational education, further training, and higher education. Comparative research has taken this commitment into account and systematically examined the European Commission's "action program approach" in educational governance.¹⁵ The new European technology policy not only targeted research and development, but also had an increasingly important educational component.¹⁶

However, the attempt to create a highly qualified workforce and thus increase the competitiveness of the member states was only one side of the story. At the same time, digital change brought into focus different groups that were considered especially vulnerable, including women. Jacky Brine has carried out several studies on the history of European gender measures. In relation to new technologies, she claims that the interest of the EC in training women in this field declined from the 1980s onwards. She argues, moreover, that regardless of the form of the initiatives, the hierarchy of male power remained, as women were encouraged into male-dominated professions that were in decline, rather than those of the future.¹⁷

Brine argues repeatedly that the EC had a primarily economic incentive for the creation and implementation of measures to support women's training and retraining.¹⁸ She shows how the EC used a discursive economic rationale when establishing policies or advice related to women's training. However, she finds it surprising that although the economic rationale was predominant, and there were liberal economic reasons to promote women's training, the rigid structure of the EC seems to have prevented an approach that actually benefitted women.¹⁹ The result, for Brine, was that there was a mismatch between the areas lacking a skilled workforce and the areas in which women were encouraged to seek training.²⁰ Thus, the training which women underwent did not lead to employment, despite this being the main purpose of the European Social Fund (ESF) programs.

In this article, we propose a more nuanced perspective to the argument that the inflexible gendered structure of the EC has superseded economic justification. Rather, we suggest that a gendered under-

Europe of Knowledge? (London: Palgrave Macmillan, 2022); Simone Paoli, "The European Community and the Rise of a New Educational Order (1976–1986)," in *Contesting Deregulation: Debates, Practices and Developments in the West since the 1970s*, ed. Knud Andersen and Stefan Müller (Oxford: Berghahn, 2017).

¹² Laurent Warloutzet, *Governing Europe in a Globalizing World: Neoliberalism and its Alternatives Following the 1973 Oil Crisis* (London: Routledge, 2018).

¹³ Laurent Warloutzet, "Towards a European Industrial Policy? The European Economic Community (EEC) Debates, 1957–1975," in *Industrial Policy in Europe after 1945: Wealth, Power and Economic Development in the Cold War*, ed. Christian Grabas and Alexander Nützenadel (London: Palgrave Macmillan, 2014).

¹⁴ Volker Bornschier, "Western Europe's Move toward Political Union," in *State-Building in Europe: The Revitalization of Western European Integration*, ed. Volker Bornschier (Cambridge: Cambridge University Press, 2000); Simon Parker, "Esprit and Technology Corporatism," in *State-Building in Europe: The Revitalization of Western European Integration*, ed. Volker Bornschier (Cambridge: Cambridge University Press, 2000).

¹⁵ Hubert Ertl, *European Union Initiatives in Education and Vocational Training: The Development and Impact of the Programme Approach* (Paderborn: Paderborn University, 2002).

¹⁶ Alan Clarke, "Competitiveness, Technological Innovation and the Challenge to Europe," in *The Learning Society: Challenges and Trends*, ed. Peter Raggatt, Richard Edwards, and Nick Small (London: Routledge, 1996); Anne Corbett, *Universities and the Europe of Knowledge: Ideas, Institutions and Policy Entrepreneurship in European Union Higher Education Policy, 1955–2005* (London: Palgrave Macmillan, 2005).

¹⁷ Jacky Brine, "The European Social Fund and the Vocational Training of Unemployed Women: Questions of Gendering and Re-Gendering," *Gender and Education* 4, no. 1–2 (1992).

¹⁸ Brine, "The European Social Fund"; Jacky Brine, "European Education and Training Policy for Under-Educated Unemployed People," *International Studies in Sociology of Education* 7, no. 2 (1997); Jacky Brine, "The European Union's Discourse of 'Equality' and its Education and Training Policy within the Post-Compulsory Sector," *Journal of Education Policy* 13, no. 1 (1998).

¹⁹ Brine, *UnderEducating*.

²⁰ Brine, "Equal Opportunities."

standing of the workings of the labor market was embedded in the policy-making process. Perceptions of women's inherent abilities, skills, and interests were incorporated into the understanding of the needs of the economy. We argue that in the specific measures proposed to support women's training and education in new technologies, women were earmarked as a useful reserve of low-skilled workers, equipped for and willing to use the technological innovations introduced into traditional workplaces, rather than as potential highly skilled innovators and creators, driving technological development.

The Changing Role of the EC: Background

The EC's initial focus in the 1960s was on trade and increasing prosperity among its member states, but in the 1970s, global changes led to economic crises and a greater need for political cooperation. The 1980s saw a rise in youth unemployment, prompting a new focus on education and training as a strategy for economic recovery.²¹ At the same time, the European Court of Justice, in a series of rulings based on Article 128 of the Treaty of Rome, extended the interpretation of the term "vocational," thereby giving the Commission the prerogative to assume competence in the field of higher and continuing education.²² This enabled EC institutions to adopt legislation in this field that would be legally binding on the member states. The European Court of Justice's rulings based on Article 128 subsequently provided the legal basis for a series of programs launched by the Commission and the Council from the mid-1980s onwards.²³

The decision to achieve an economic convergence, which led to the realization of the Economic and Monetary Union (EMU) in 1988, was preceded by the first enlargement of the EEC to include Denmark, Ireland, and the UK, and to the development of common policies.²⁴ However, limitations on the EU's role in education meant that it was predominantly left in the hands of national actors. The adoption of the Maastricht Treaty in 1992 established the EU and widened the scope of the ESF to include education and vocational training.²⁵ The education aims of the EU were restricted to developing a European dimension, promoting mobility and cooperation between educational establishments, exchanging information, and encouraging distance learning.²⁶ The education of women in technology was affected by this limitation in that there was no framework for supranational cooperation on the issue and no consensus on how to approach it. While some national programs were implemented, there was no broader cooperation on the matter.

²¹ Michel-Pierre Chélini and Laurent Warloutzet, eds., *Calmer les prix* [Slowing down prices] (Paris: Presses de Sciences Po, 2017).

²² Hubert Ertl, "European Union Programmes for Education and Vocational Training: Development and Impact," *SKOPE Research Paper*, no. 42 (2003): 8.

²³ Ertl, "European Union Initiatives," 20.

²⁴ Emmanuel Mourlon-Druol, "The EMS as an External Anchor in Inflation-Prone Countries," in *Calmer les Prix* [Slowing down prices], ed. Michel-Pierre Chélini (Paris: Presses de Sciences Po, 2017), 280.

²⁵ The Maastricht Treaty was signed by Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Portugal, Spain, the Netherlands, and the United Kingdom. Nick Adnett and Stephen Hardy, *The European Social Model: Modernisation or Evolution?* (Cheltenham: Edward Elgar Publishing, 2005), 4.

²⁶ Brad Blitz, "From Monnet to Delors: Educational Cooperation in the European Union," *Contemporary European History* 12, no. 2 (2003): 210.

Women and the New Information and Communications Technologies

The phenomenon that this article examines is related to the gendering of ICT occupations. The ways in which the EC dealt with the training and education of women in computer technology are illustrative of a general tendency that Cynthia Cockburn identified when she studied the gendered nature of technology in the 1980s. Cockburn argues that women have been excluded from technical occupations and judged as technically incompetent.²⁷ In this study, we corroborate this tendency in the overall European strategy of ICT training.

In the early years of computing, women had an active role. The best-known cases are the United Kingdom and the United States, where research has found that women were an integral part of the development of the computer industry, as they engaged in processing and analyzing data, using mechanical calculators initially, and were part of the building and programming of electronic computers at a later stage.²⁸

Some of these women had a college education, and the majority had technical training. However, by the 1960s, women were increasingly regarded as unsuitable for programming work and were not given the opportunities to occupy positions that they would be the most qualified to perform; instead, they were given dead-end jobs with low salaries and little influence over their tasks.²⁹ By the late 1970s and 1980s, when the need for computer education and training for European citizens was raised, the existing expertise and the potential of women were not considered in the development of education and training programs in ICT.

This oversight is surprising since this was a period when gender issues were voiced and discussed worldwide for the first time in history. The International Women's Year and the United Nations Conference in Mexico City in 1975 put gender equality and women's issues on the radar internationally. The period 1975–1985 was subsequently designated as the United Nations Decade for Women, which stimulated policymaking in gender equality worldwide, not least in the EC. The Treaty of Rome in 1957, with its article 119, establishing sex equality, had given the EC the prerogative to deal with issues of gender equality.

Nonetheless, the first European legislation targeting women only came into force in the 1970s, guaranteeing equal pay, equal treatment, and equal welfare.³⁰ The principle of equal treatment for men and women applied to the areas of employment, vocational training, and working conditions.³¹ The first parliamentary body specifically

²⁷ Cynthia Cockburn, "The Material of Male Power," *Feminist Review*, no. 9 (1981).

²⁸ Janet Abbate, "Women and Gender and the History of Computing," *IEEE Annals of the History of Computing* 24, no. 4 (October–December 2003); Paul E. Ceruzzi, "When Computers Were Human," *Annals of the History of Computing* 13, no. 3 (1991); David Alan Grier, "Human Computers: The First Pioneers of the Information Age," *Endeavour* 25, no. 1 (2001); Mar Hicks, *Programmed Inequality: How Britain Discarded Women Technologists and Lost Its Edge in Computing* (Cambridge: MIT Press, 2017); Jennifer S. Light, "When Computers Were Women," *Technology and Culture* 40, no. 3 (July 1999).

²⁹ Hicks, *Programmed Inequality*.

³⁰ Wendy Stokes, *Women in Contemporary Politics* (Cambridge: Polity, 2005), 219.

focused on women was an ad hoc committee, created in 1979, to prepare for a debate on the situation of women. This committee became the Committee of Enquiry into the Situation of Women in Europe, and in 1984, the Committee on Women's Rights. The debate waged in these committees was the basis of the recommendations integrated into the first Community Action Programme for Equal Opportunities in the early 1980s.³²

Two EC bodies were particularly relevant in the promotion of measures in training and education in new technologies targeting women: the ESF and the CEDEFOP. The former was established as an employment policy instrument aimed at supporting EC workers by funding training programs, among other strategies.³³ Women were recognized as an eligible group for assistance in 1971.³⁴ However, it was not until 1978 that the ESF began to fund projects for the education and training of women over twenty-five. In 1980, the ESF funded training programs, based on two priorities: projects to train women in areas where they had been underrepresented and projects to help women become more qualified. The initial priority projects were all funded, amounting to 14 million ECU, but the funds for the second priority projects were cut to 7.1 million ECU. The funded projects benefitted a total of 10,577 women from seven countries.³⁵

The CEDEFOP began operations in 1977 as a decentralized agency in charge of supporting the development and implementation of European vocational education and training policies. The agency's priorities were the training and employment of young people, vocational training for women, the establishment of a documentation and information service, and the creation of a research program.³⁶

The functioning of both the ESF and the CEDEFOP was primarily connected to the member states' government structures. Prior to 1977, the ESF was administered by the EC; however, after the reforms, the member states could integrate ESF-funded training into their employment policies.³⁷

During the 1970s—the era of the gender equality model as identified by Rees—the ESF provided funding for studies on women in employment based on the surveys of programs implemented by certain member states. The studies concluded that, in order to promote equality in the labor market, women required enhanced specialized education and training services and increased guidance; in addition, a change in women's attitudes in relation to taking up a career later in life was also necessary.³⁸ Moreover, the CEDEFOP reviewed programs already implemented within the member states in vocational training and disseminated information regarding these. Unlike the ESF, the CEDEFOP had no funding function, but sought, through cooperation with the member states and other social and institutional

³¹ "Council Directive 76/207/EEC on the Implementation of the Principle of Equal Treatment for Men and Women as Regards Access to Employment, Vocational Training and Promotion, and Working Conditions," *Official Journal of the European Communities* L 39/40 (February 9, 1976).

³² Stokes, *Women in Contemporary Politics*, 217.

³³ Brine, "Equal Opportunities."

³⁴ CEC, "Community Initiatives on Vocational Training for Women," *Social Europe* 1 (1988): 27; Brine, "The European Social Fund."

³⁵ CEC, "The Changing European Communities," *Women of Europe* 17 (November–December 1980): 49.

³⁶ CEC, *Report on the Development of the Social Situation in the Communities in 1977* (Brussels: CEC, 1978), 22.

³⁷ Brine, "The European Social Fund," 153.

³⁸ CEC, "The European Community and Work for Women," *Information Service for Women's Organisations and Press*, no. 584/X/77 (September 1977).

actors, to disseminate an agenda on the diversification of women's occupational choices, training for women in industrial and technical jobs, and the upgrading of traditionally female occupations.³⁹ Both institutions aimed to leverage existing good practices to avoid the cost of developing programs from the ground up.

In 1980, for example, the CEDEFOP organized a seminar in Brussels, in which all member states presented the results of their pilot programs on women's vocational training, with a specific focus on the topic of innovation. The innovative projects encompassed fields such as building techniques, tile-laying, crane-operating, and even the provision of care for the elderly. The CEDEFOP did not report on any project linked to the new technologies in this seminar. One of the main lessons resulting from this event, according to the CEDEFOP, was that an integral element of the success of innovation in women's training depended on women's own motivation.⁴⁰ The view of the woman's role in new technologies was not re-evaluated from a European perspective. As we can observe, the promoted and funded programs mirrored local views and eventually reproduced a national bias on the types of training women were encouraged to undergo. The positive action model that Rees identifies in this period was locally formulated and implemented.

Women's Education and Training in New Technologies as European Social Policy

The European strategy to cope with information technology was manifold. While a critical aspect of the strategy involved fostering industrial growth through initiatives like ESPRIT, RACE, EUREKA, and others,⁴¹ which relied heavily on the availability of a highly skilled workforce, there was also a need to provide flexible labor that could adapt to new skill requirements and embrace innovations, even if they were not capable of contributing to the creation and development of new technologies. At the same time, there was a need to create a large domestic market and a social environment prepared for information technology, for which the training of workers, users, and the general public was essential.⁴² A reorientation of vocational training not only meant the re-training of engineers and scientists, but a professional re-adaptation of the unemployed, by strengthening the links between education, vocational training, and work.⁴³

Thus, preparing for new technologies not only involved educating the highly skilled workforce but also creating a computer-literate workforce that would be more willing to accept technical changes at work and in other areas. Rhetorically, there was never a clear dis-

³⁹ Suzanne Seeland, *Equal Opportunities and Vocational Training—13 Years On: The Results of CEDEFOP's Programme for Women 1977–90* (Berlin: CEDEFOP, 1991), 1.

⁴⁰ CEC, "Women's Employment: How to Innovate," *Women of Europe*, no. 17 (November/December 1980).

⁴¹ See Carmen Flury, Michael Geiss, and Rosalia Guerrero, "Building the Technological European Community through Education: European Mobility and Training Programmes in the 1980s," *European Educational Research Journal* (December 2020); Wayne Sandholtz, *High-Tech Europe: The Politics of International Cooperation* (Los Angeles: University of California Press, 1992).

⁴² CEC, "Europe and the New Information Technology," *European File*, no. 3 (March 1980).

⁴³ CEC, "Micro-Electronics and Employment," *European File*, no. 16 (October 1980).

inction between training in technology for women and men, but in practice, this was the case.

The EC used a discourse that depicted women in the labor market predominantly in a position of victimhood. In a survey published in 1980 on the situation of European women in paid employment, the European Commission's Committee on Women's Rights indicated that 13 percent of employed women had felt discriminated against in matters of pay, recruitment, promotion, and training. These results were the basis of further measures to help working women.⁴⁴ The ESF also reported in 1980 that women continued to be disadvantaged in the area of employment.⁴⁵ Although the Commission stated that the highest priority would be given to projects that enabled women to find jobs in new occupations where they were underrepresented and in sectors where they had been the victims of mass redundancies during the reporting period, the projects funded by the ESF concerned occupations traditionally reserved for men, such as industrial production, construction, metalwork, and woodwork. The report does not mention examples of training for women in new technologies. However, the ESF did fund three pilot project schemes related to technical progress: a training program for firms to adapt to new technologies, training for unemployed mature engineers in computer-aided design and manufacture, and training operators to become instructors for new data-processing professionals. In these projects, women were not specifically mentioned, as the women-focused pilot projects were related to the training of rural women for self-employed agricultural work. This report illustrates the point we seek to make. Women are mentioned as victims of discrimination in the labor market, for which they are given support in the form of training. However, they are not being addressed as potential assets capable of working with new technologies.

While the share of research and development investment in the EC more than tripled, and programs such as the Framework Programmes for Research and Technology (FRAMEWORK) materialized, these had no special provisions for women until the Fourth Framework Programme (1994–1999) that specifically dealt with social exclusion.⁴⁶ Although this problem was overlooked in the higher-level political arena, youth organizations identified this issue early on. In a 1980 forum, youth organizations claimed that women should not be only a marginal labor force, as they currently were, but should be workers in their own right.⁴⁷

A commissioned report by sociologist Jonathan I. Gershuny on technical innovation and women's work in the EEC called for policies that would prevent the situation of women from worsening. The proposal was for women to be part of work-sharing schemes. Such

⁴⁴ CEC, "Survey: European Women in Paid Employment," *Women of Europe*, no. 17 (November–December 1980).

⁴⁵ CEC, *Tenth Report on the Activities of the European Social Fund 1981 Financial Year*, COM (82) 420 (Brussels: CEC, 1982).

⁴⁶ Jong-Tsong Chiang, "From Industry Targeting to Technology Targeting: A Policy Paradigm Shift in the 1980s," *Technology in Society* 15, no. 4 (1993): 346; Kim Junic and Yoo Yaewook, "Science and Technology Policy Research in the EU: From Framework Programme to HORIZON 2020," *Social Sciences* 8, no. 5 (2019); Rees, *Mainstreaming*, 128.

⁴⁷ CEC, "The Youth Forum: Young Women's Employment," *Women of Europe* 17 (November–December 1980).

schemes required specific training that would provide them with a broader mix of skills.⁴⁸ This strategy, deemed the most suitable realm for EC initiatives, involved training women in diverse but less complex roles rather than providing them with specialized training, thereby turning them into interchangeable workers.

The concerns voiced in investigations like these on the effects of new technologies on women were included in the equal opportunities and social action programs from the 1980s, although this topic was not the focus of the programs. The New Community Action Programme on the Promotion of Equal Opportunities for Women and Men (1982–85) highlighted the field of employment, with the objective of achieving equal treatment. The already precarious situation of women, the Commission explained, was affected by the introduction of manpower-saving technologies in secretarial work and retailing. Thus, action in initial and further training, as well as vocational guidance, should aim to encourage women into non-traditional areas and prepare them for new information technologies. The action program invited member states to impose measures at the national level. Apart from a general call to undertake action to improve equal opportunities in education, guidance, and training, the program requested one concrete measure from the member states to promote women's mastering of new technologies: to provide "further training for women in employment within firms, with a view to improving their prospects for promotion . . . other than unskilled jobs, especially those involving new technologies";⁴⁹ on the EC side, the Commission proposed extended action of the ESF and the CEDEFOP.

In this spirit, and after the adoption of the resolution on equality of opportunities in the field of education, a meeting took place between the Ministers of Education in 1985 that led to an action program on equal opportunities for girls and boys in education. One of the four goals of this program was to "encourage girls to participate as much as boys in new and expanding sectors, within both education and vocational training, such as the new information technologies . . ."⁵⁰ The objectives of the action program would be achieved by promoting awareness, offering counselling and disseminating information, but also through more concrete measures, such as introducing new technologies to boys and girls from the end of primary school onwards, opening schools to working life, and making female role models working in non-traditional fields available to pupils.⁵¹ The action program was to be implemented within the constitutional possibilities of each member state, with the funds they had available and to the extent that their respective educational systems allowed. The implementation of this program took place through national projects, without a common European understanding of objectives,

⁴⁸ Jonathan I. Gershuny, *Technical Innovation and Women's Work in the EEC: A Medium-Term Perspective; A Briefing for the EEC* (Sussex: SPRU, 1980).

⁴⁹ CEC, "A New Community Action Programme on the Promotion of Equal Opportunities for Women 1982–85," supplement, *Bulletin of the European Communities* (1982), 21.

⁵⁰ CEC, "Resolution of the Council and of the Ministers of Education, Meeting within the Council of 3 June 1985 Containing an Action Programme for Equal Opportunities for Girls and Boys in Education," *Official Journal of the European Communities* C 166 (1985): 130.

⁵¹ CEC, "Resolution of the Council," 2–3.

target populations, or evaluation methodologies.⁵² While the national projects were funded by each member state, the EC provided assistance through different bodies for the organization of contests among member states, as well as colloquiums, surveys, and research publications.⁵³

The formulation of this program followed an equal treatment approach, promoting girls to match boys in their interest to pursue technical education. Moreover, the assumption behind the program was that gender inequality in technology was due to women's lack of interest and confidence and general prejudices in relation to women's abilities to do certain jobs. Thus, the program was primarily intended to fight gender stereotypes in different target groups, including among girls themselves, as well as in teachers, parents, and teacher trainers, from pre-school to university level.⁵⁴

Since women's work was regarded as particularly affected by ICT, their training in this area was explicitly recognized as a priority.⁵⁵ The EC Commission resorted to a positive action approach when referring to their goal of providing job opportunities to special groups, such as older workers, people with disabilities, and women. Pilot and demonstration actions, already in place locally, would increase the opportunities of groups with specific needs in other member states, if broadly disseminated.⁵⁶ The CEDEFOP also took a positive action approach, stating that the development of vocational training in microelectronics must consider the needs of specific groups of women, including young women without training, women who wished to return to the occupation they were trained for following a career break due to family commitments, and women from ethnic minorities.⁵⁷

In a similar vein, the Medium-Term Social Action Programme, adopted in 1984, proposed measures for the employment of young people and women linked to ICT, which included the acquisition of new skills, basic and continuous training, and information.⁵⁸ The focus of this program was to combat the economic recession and the employment crisis. The high rate of unemployment of young people and women was interpreted as a problem that affected the social balance of the member states. One way to address this problem was to *reconvert* these groups to the new technologies.⁵⁹ Hence, the fight against unemployment and the training of vulnerable groups in ICT went hand in hand. By categorizing the European workforce into different groups and making them the object of specific measures, the EC implemented a positive action model.

A report from the EC Commission, presented at the United Nations World Conference in 1985, summarized the EC work in relation to gender equality. This report stressed that the advent, development, and spread of technology were the main challenges to women's

⁵² Sylvie Osterrieth, abstract of *Equal Opportunities and New Information Technologies, Evaluation on the Projects 1987–1989* (Luxembourg: Office for Official Publications of the European Communities, 1991), 1.

⁵³ See CEC, "Activities of the Commission of the European Communities in the Fields of Education, Training and Youth Policy During 1987," supplement 5, *Social Europe* (1988): 16–17.

⁵⁴ CEC, *Cooperation in Education in the European Union 1976–1994*, (Luxembourg: Office for Official Publications of the European Communities, 1994), 14.

⁵⁵ Felix Rauner, *Women Study Micro-computer Technology* (Berlin: CEDEFOP, 1985), 13.

⁵⁶ CEC, *Vocational Training and New Information Technologies: New Community Initiatives during the Period 1983–1987*, information memo P-29, 1982.

⁵⁷ Rauner, *Women Study Microcomputer Technology*, 7.

⁵⁸ L. Wallyn, "The Social Policy of the Community and Participation of the Social Partners in Decision-Making at European Level," *Social Europe* 1 (1988): 15.

⁵⁹ EC Council, "Conclusions of the Council Concerning a Community Medium-Term Social Action Programme," *Official Journal of the European Communities* C175 (1984): 2 (our emphasis).

work. It highlighted the role of the ESF in financially supporting the diversification of women's occupations, the training of women for occupations using new technologies, and the creation of women's cooperatives in this sector. According to the report, resolutions had been adopted with measures to *help* women deal with new technologies in the field of work. These included basic training in the use of new technologies, information events, and guidance.⁶⁰ By referring to women as a group in need of help and by offering basic training to avoid unemployment, the low-skilled nature of women's work was taken for granted. No specific measures were developed to change the gendered structure of work or to promote women's entry into high-skilled positions.

Moreover, the resource allocation for the developed measures was meagre. By 1988, the total number of programs funded by the ESF and targeting women represented only 1.5 percent of total fund approvals.⁶¹ A positive action model was used to help women cope with technological change and to have the opportunity to retain or secure a job, but not to achieve high-level qualifications or highly skilled employment.

The ESF-funded projects that took place within the member states were formulated within the context of each state's national infrastructure, educational and vocational training systems, and gender regimes. The following examples illustrate how the role of women in the technological society was viewed locally. The Belgian Commission for Women's Work, for instance, stated that women's educational level was insufficient for the new information society, and that it was necessary to invest in education and training programs that would equip them to obtain *highly-qualified* jobs.⁶² In Luxembourg, free computer courses were offered by a technical school to encourage girls into scientific and technical professions.⁶³ In the United Kingdom, the Butcher Report on the situation of ICT experts in the labor market highlighted that ICT companies could not ignore the intellectual resources offered by women. This report addressed not only the question of girls' subject choices at school level but also the situation of women already in employment.⁶⁴ According to British research from 1982, women's retraining in new technologies should be favored to enable them to participate in the new jobs created by technological developments.⁶⁵ A French study displayed a more cautious attitude. The authors warned of the potential consequences of encouraging women to attain higher qualifications. This strategy would not work, according to the study, because of the prevailing gender discrimination in the labor market. Such a strategy would only be successful once a change in power structures had occurred and men were participating to a greater extent in the domestic do-

⁶⁰ CEC, *Communication from the Commission to the Council on the Community Participation in the World Conference to Review and Appraise the Achievements of the United Nations Decade for Women: Equality, Development and Peace*, COM (85) 256 (Brussels: CEC, 1985), 8–9 (our emphasis).

⁶¹ CEC, "Community Initiatives on Vocational Training for Women," *Social Europe* 1 (1988): 27.

⁶² Camille Pichault, *Technologies et Emploi des Femmes*, Proceedings of the Commission Belge du Travail des Femmes, October 15, 1981, FDE-164, Historical Archives of the European Union (our emphasis).

⁶³ CEC, "Country to Country," *Women of Europe Newsletter* 67 (December 1990–January 1991): 26.

⁶⁴ Bill Johnstone, "Women Still Lose Out in the Hi-Tech World," *The Week*, June 10, 1986, 29.

⁶⁵ CEC, "Microelectronics and Women," *Women of Europe* 26 (May–July 1982): 49.

main.⁶⁶ While the study highlighted the futility of training women, it did not offer proposals to change social and economic structures in their favor. In 1987, the conclusion of a French women's association meeting was that women's aptitudes could be useful in the future. Should they acquire the necessary technical skills, their "precision, dexterity, speed and flexibility" could be sought after traits in the firms of the future.⁶⁷ Skills that have traditionally been attached to women and low-status jobs could, in their view, be useful for the new ICT jobs. However, the type of positions for which these skills could be useful were not specified. Women's organizations in the Nordic countries, the Mediterranean countries, Italy, the United Kingdom, and France organized conferences, workshops, and symposiums in 1987 to discuss the role of women in the area of technology; some of these included professional women who discussed the role of women in the field of new technologies in higher education.⁶⁸ These examples show the divergence of positions in relation to the training of women in ICT in the member states. While locally, certain actors noted the need for the education and training of women in highly skilled areas of ICT, others were of the opinion that women were vulnerable participants in the labor market with skills and aptitudes appertaining to their sex.

As a result of a report from an expert network of equal opportunities regarding ICT projects in the member states, the Second Medium Term Community Programme on Equal Opportunities (1986–1990) made education and training a priority.⁶⁹ The network saw the current situation in Europe as "an industrial revolution as important and far reaching in its consequences as the industrial revolution of the 19th and 20th century" and argued that, while women in the past had failed to find a better position for themselves in the new labor market and society, an opportunity existed to avoid such a situation in the current revolution, through education and training in the new technologies.⁷⁰

According to the program, the resources offered by the ESF, hitherto only used to a limited extent, should be put to better use in networking and publicity. New technologies constituted one of the fields of action of the program, which entailed specific provisions on education, training, and employment in this area. The program called for vertical mobility in the specific sectors of the new technologies and encouraged appointing women to positions of responsibility in future-looking industries. The ESF, the program stipulated, should play a major role in the achievement of these objectives.⁷¹ In this context, the CEDEFOP was called upon to work on a network of projects related to training in new technologies with a view to achieving career advancement.⁷² Positive action was recommended in ICT so that

⁶⁶ "Nouvelles Technologies: Deux études controversables sur les femmes parviennent à des conclusions divergentes," *Rapport CREW* 5 (1982), FDE-164, Historical Archives of the European Union, 112.

⁶⁷ CEC, "Country to Country: France," *Women of Europe* 51 (November–December 1987): 14.

⁶⁸ CEC, *Women of Europe* 51 (November–December 1987).

⁶⁹ CEC, "The Community Action Programmes," supplement, *Women of Europe* 25 (October 1986): 90.

⁷⁰ Evelyn Sullerot, *Diversification of Vocational Choices for Women* (Luxembourg: Office for Official Publications of the European Communities, 1987): 7–8.

⁷¹ Odile Quintin, "Equal Opportunities for Women: Medium Term Community Programme 1987–1990," supplement 2, *Social Europe* (1986): 54–62.

women could “respond to the technological challenge on an equal footing.” However, despite the specific focus on training and education in new technologies in this program, no indications were offered as to what kind of training should be given, and full responsibility was given to the member states to decide the content and level of the training. A request to the member states to produce statistics on the proportion of women in the area of ICT and the levels they occupied,⁷³ suggests an acknowledgement of structural inequality in this field, but the measures proposed did not address this issue. The equality of opportunities problem continued to be discussed in terms of underrepresentation in vocational training. The cause was assumed to be that women rarely chose technical training and opted for traditionally feminine occupations. For this reason, help in the form of counselling, information, awareness, and role models was presented as a sufficient and adequate solution. The most concrete measures named in this context were the provision of appropriate guidance (equal opportunities counsellors), studies, seminars, and consciousness-raising campaigns.⁷⁴

Although Brine identifies a break between the first and second action programs on equal opportunities in relation to women’s training in new technologies—with the former emphasizing women’s training specifically in the fields of computers, electronics, and office work and the latter focusing on women’s training in fields in which they were underrepresented⁷⁵—we observe a generally unchanged discourse. These programs presented the new technologies as a phenomenon that threatened women’s positions in the labor market. To prevent women’s social exclusion, these programs promoted the widening of occupational choices for women; equal treatment of women and men with regard to access to education, training, and employment; and the provision of technical subjects for both girls and boys from the early stages of basic education.

When concrete measures were proposed in policies, these often took the form of positive action, targeting specific groups at risk of unemployment. The most striking feature of the programs and initiatives was that they constantly referred to women as a vulnerable group, threatened by the new technologies and requiring support and guidance. Hence, we observe arguments linked to the equal treatment approach co-existing with arguments appealing to the positive action approach. Additionally, although programs and initiatives often mentioned women’s economic role, this role was not based on women’s potential to become part of the skilled workforce to develop the ICT industry, but on the fear that women’s likely unemployment could pose a risk to the EC’s social cohesion.

⁷² CEC, “Equal Opportunities for Women: Medium Term Community Programme 1986–1990,” supplement, *Women of Europe*, no. 23 (December 1985): 9.

⁷³ CEC, “Equal Opportunities for Women,” 12.

⁷⁴ CEC, *Commission Communication on Vocational Training for Women*, COM (87) 155 (Brussels: CEC, 1987).

⁷⁵ Brine, “The European Union’s Discourse of ‘Equality’.”

Women's Education and Training in New Technologies for a New Economic Role

IRIS, a community network on vocational training, was launched in 1988, following the report of an expert group representing the twelve member states, to evaluate the implementation of the Commission recommendation on vocational training for women, adopted in 1987.⁷⁶ This was the first major women-specific initiative of the EC.

IRIS aimed at encouraging women's training and supporting innovation in this area. A function of IRIS was to complement national initiatives on vocational training for women and help spread good examples.⁷⁷ IRIS sought to involve different actors in the goal of improving women's access to employment and vocational training. These included educational authorities, schools, vocational centers, industry representatives, government authorities at different levels and women's organizations.⁷⁸ Out of all the projects supported by the IRIS network, 36 percent involved the training of women in new technologies.⁷⁹ The first seventy-two projects focused on areas in which women had been underrepresented, such as building and electronic and mechanical engineering, but also on certain fields in which women had already made their mark, such as banking and crafts.⁸⁰ Even though IRIS's explicit objective was to develop sustainable strategies and methods for long-term change, the size and scope of the funding did not match this ambition. IRIS was allocated 0.75 million ECU for the period 1988–95, which is significantly lower than the budget of other contemporary programs (see Table 1). COMETT, the initiative created to develop technological skills and increase the community's competitiveness, received 206.6 million ECU during the same period. This reinforces Rees's claim that the positive measures from the 1980s "tended to be precariously funded, short term and piecemeal."⁸¹

⁷⁶ CEC, "IRIS: The New Community Network of Demonstration Projects on Vocational Training for Women," *Social Europe* 2 (1989).

⁷⁷ CEC, "IRIS: The New Community Network."

⁷⁸ CEC, "Commission Communication on Vocational," 10.

⁷⁹ Publications Office of the European Union, *IRIS*, Summaries of EU Legislation, n.d., accessed April 15, 2020.

⁸⁰ CEC, "The Changing European Community," *Women of Europe* 57 (November–December 1988): 4.

⁸¹ Teresa Rees, "Reflections on the Uneven Development of Gender Mainstreaming in Europe," *International Feminist Journal of Politics* 7, no. 4 (2005): 555–74.

Table 1. Budgets for Education and Training Action Programmes⁸²⁸² Rees, *Mainstreaming Equality*, 91.

<i>Programme</i>	<i>Budget ECU (millions)</i>	<i>Description</i>
COMETT (1986–95)	206.6	Cooperation between universities and industry in the field of technology
FORCE (1991–94)	31.3	Development of continuing vocational training
PETRA (1988–94)	79.7	Vocational training of young people
ERASMUS (1987–95)	307.5	Mobility of university students
TEMPUS (1990–94)	197	Trans-European mobility for university students
LINGUA (1990–94)	68.6	Promotion of foreign language competence
EUROTECNET (1990–94)	7	Promotion of innovation in vocational training resulting from technological change
YOUTH FOR EUROPE (1988–94)	32.2	Promotion of youth exchanges
IRIS (1988–95)	0.75	Network of vocational training projects for women

The establishment of IRIS was linked to the completion of the internal market in 1992. The first round of the initiative was planned to run until that year. According to the Commission, the internal Single Market required the community's economies to make the best use of their human resources, regardless of gender.⁸³ The Commission considered IRIS an innovative labor market initiative, which, if successful, would set an example for other areas in the community. It also expected that the grassroots strategies that proved beneficial for

⁸³ CEC, "IRIS: The New Community Network," 51.

the labor market would be disseminated broadly within the community. This means that the objective was not necessarily intended to be ground-breaking and provide women with skills that would elevate their position as workers, but to place them where they were needed in the economy and to assess whether the innovative schemes brought benefits for the European economy.

IRIS supported many ICT projects with a focus on office skills despite not explicitly advocating for technology-related initiatives. However, the training was not provided for highly skilled office positions. An evaluation of IRIS concludes that the funded projects did not lead to changes in training systems nationally, and only 20 percent of the projects adopted innovations obtained through the network.⁸⁴

New arguments concerning women's training began to appear in the late 1980s and became more prominent during the 1990s. Within the context of IRIS's activities, the involvement of a variety of actors in the network offered new perspectives in the debate on women's training. That society needed to integrate women armed with the required qualifications into the modernization process of enterprises emerged as an innovative idea.⁸⁵ This concept was discussed in depth at the Toledo seminar of 1989 on the evaluation of the community policy on equal opportunities, in which representatives of the EC, the member states, women's groups, and industry participated. Women were not referred to as a vulnerable group here but as a potential "crucial element in the workforce over the next few years."⁸⁶ In 1992, a seminar organized by IRIS at the Forum on Women's Vocational Training in Europe, discussed the question of women as a vital resource. In the opening message, the President of the Commission of the European Communities, Jacques Delors, stressed that women represented a source of labor and skills in the establishment of the Single Market. Apart from strengthening enterprises, Delors stated that the training of women was vital in the fight against poverty. In the seminar, the increasing feminization of poverty was noted, as well as the fact that many women required personal development and pre-training elements in their training efforts.⁸⁷ Although there was a shift in the view of the role played by women in the economy, their economic vulnerability continued to be noted, and many of the proposed measures were not considerably different from previous measures: to ensure women's access to new technologies and to develop pedagogical strategies to teach them science and technology. Remarkably, ICT was still viewed as an area free from sexual discrimination and as a potential equalizer. Thus, encouraging women into this area would automatically widen their occupational choices.⁸⁸

⁸⁴ PA Cambridge Economic Consultants, *An Evaluation of the IRIS Network (Final Report)*, Commission of the European Communities (1992), 123.

⁸⁵ CEC, "Seminars," *Women of Europe Newsletter* 11 (June–August 1990).

⁸⁶ CEC, "The Evaluation of Community Policy on Equal Opportunities: Toledo, April 1989," *Social Europe* 3 (1989): 63.

⁸⁷ CEC, "IRIS Fair 1992: Women, a Vital Resource," *Women of Europe Newsletter* 29 (October 1992).

⁸⁸ CEC, "The Evaluation of Community Policy," 64–65.

The initiatives of the 1990s reflected a consolidation of the earlier arguments of equal treatment that prioritized placing women on an equal footing with men, while later initiatives acknowledged women's key role in the emerging digital society, viewing them as an integral part of economic change. In the Third Action Programme on Equal Opportunities (1991–1996), the view of women's training as a mine of potential skills, indispensable for Europe's economic growth, became explicit. This program framed the work carried out by women in both social and economic terms. On the one hand, it stated that working women were beneficial for Europe's social cohesion and called for efforts to counter gender inequality by fighting the underrepresentation of women in certain occupations, and by ensuring that women also benefitted from the economic and technological advantages of the Single Market.⁸⁹ On the other hand, it emphasized that women's skills were valuable assets for the economy and constituted a potential human resource, hitherto underutilized.⁹⁰ However, in contrast to the previous action programs, there was no specific mention of new technologies in this one.⁹¹

As an integral element of the Third Action Programme on Equal Opportunities, the ESF established New Opportunities for Women (NOW) (1991–1995) to promote vocational training and employment for women. With a grant of 120 million ECU for the first three years, which was provided primarily by the ESF,⁹² NOW aimed to increase the participation of women in the labor market, particularly those in long-term unemployment and those with entrepreneurial ambitions. For the period 1994 to 1999, NOW was renewed and granted a budget of 360 million ECU.⁹³

The Council stated that projects in ESF programs, such as NOW, that could anticipate skill needs and promote equal opportunities for men and women in the labor market should receive support. Hence, following the same line as the Action Programme, NOW emphasized the importance of providing women with the appropriate skills for the market, as well as skills that could enhance their economic position, such as entrepreneurial skills. Nevertheless, the promotion of training in new technologies declined noticeably, despite a shift that recognized women as more relevant economic players in the community. According to Brine, the promotion of women's training focused on manual trades more than anything.

However, an example of a NOW project within the ICT area from the late 1990s is the establishment of a telework center in a rural French community. This center employed about twenty people, mostly women, performing secretarial and administrative tasks. The EU regional policy officer mentioned this project as an example of the policy support given to women in the area of employment. The

⁸⁹ CEC, *Commission Proposes Third Action Programme on Equal Opportunities for Men and Women*, press release P/90/76, 1990.

⁹⁰ CEC, "Community Initiative for Women," *Women of Europe Newsletter* 11 (June–August 1990).

⁹¹ Brine, *UnderEducating*, 86.

⁹² CEC, "The Changing European Community," *Women of Europe Newsletter* 68 (February–May 1991): 1.

⁹³ CEC, *Commission Communication on Incorporating Equal Opportunities for Women and Men into all Community Policies and Activities*, COM (96) 67 (Brussels: CEC, 1996), 17.

fact that the commissioner chose this project to exemplify the kind of support given to women is illustrative of the point we are making. Even the projects considered most innovative in supporting women's participation in ICT tended to reinforce traditional gender roles.⁹⁴

The program created to promote innovation in the field of vocational training, resulting from technological change, EUROTECNET (1990–1994), made some provision for equality of opportunities. This program stated that equal opportunities for men and women should be promoted, and particularly the access of women to types of training with significant technological content.⁹⁵ In practice, however, only around 5 percent of the projects addressed women specifically.⁹⁶ Thus, regardless of whether the program particularly targeted women or training in new technologies, substantial resources to support women's training in technology were never provided.

The aforementioned initiatives followed the logic of equal treatment and positive action approaches that Rees identified in the 1970s and 1980s, respectively. However, we observe intertwined arguments following both these logics in the programs launched in the 1980s and 1990s. Additionally, we identify a new argument: Women were not only a vulnerable group and victims of technology but were also assets for the European economy's growth. However, despite the apparent recognition of the significance of women in the labor market and the economy, this was not reflected in the budget dedicated to women's training initiatives or projects. The EC budget for 1990–1992, in relation to objectives 3 and 4 of the ESF,⁹⁷ allocated only 0.4 percent to measures to assist women encountering difficulties in the labor market. Only 7 percent of the entire EC budget was allocated to the ESF,⁹⁸ demonstrating that the proportion allocated to women and to measures regarding women's employment was almost negligible.

Concluding Remarks

With the introduction of the gender mainstreaming principle into EC policy processes, which entailed the integration of a gender perspective into all domains and actions of the EC, the drafting of policy in most areas changed drastically, including education and technology.⁹⁹

From 1999, the FRAMEWORK programs started to include concrete measures to foster gender equality in science and technology. Although the scope and outcomes of this change go beyond the timeframe of this article, we note that it took more than twenty years for the EC to consider the gender dimension of science and technology policy, instead of restricting it to social policy.¹⁰⁰

⁹⁴ CEC, "Regional and Local Policy Opens Way for Women," *Women of Europe* 70 (May 1997): 4.

⁹⁵ Rees, *Mainstreaming Equality*, 132.

⁹⁶ Rees, *Mainstreaming Equality*, 144.

⁹⁷ Related to long-term unemployment and the occupational integration of young people, respectively. Aquille Hannequart, ed., *Economic and Social Cohesion in Europe: A New Objective* (London: Routledge, 1992), xxiv.

⁹⁸ Brine, "The European Social Fund."

⁹⁹ Isabelle Bruno, Sophie Jacquot, and Lou Mandin, "Europeanization through its Instrumentation: Benchmarking, Mainstreaming and the Open Method of Co-ordination . . . Toolbox or Pandora's Box?," *Journal of European Public Policy* 13, no. 4 (2006): 524.

The European Communities developed technology and science policies, as well as vocational training and education programs, as a response to the challenges posed by ICT technologies from the 1970s onwards. These initiatives aimed at improving the competitiveness of European industry and tackling social problems. In the EC's view, a gap had been created in the previous twenty years between their own technological industries and those of the United States and Japan. The objective of the EC's programs was to catch up with these countries, while dealing with the technical, economic, and social consequences of the emergence of new technologies.¹⁰¹ At the same time, gender issues were becoming institutionalized, and instruments were developed to increase gender equality in the EC. While there was concern regarding the effects of new technologies on women, particularly in relation to their labor market position, the measures and initiatives developed in the field of training and education to promote the participation of women in ICT aimed primarily at preventing women's unemployment and creating a pool of computer literate and flexible workers.

The education and training initiatives and measures we have analyzed, reveal the transformation of a view of the role of women in the European labor market and society, within the context of technological change. The gender question was often discussed in relation to unemployment and its social and economic consequences for the community, particularly in the 1970s. For most of this period, the equality model of equal treatment and positive action were intertwined. As women were considered weak players in the labor market, they required special attention, protection, and access to training opportunities, particularly in light of the changes brought about by technological change.

It seems counterintuitive that although the EC needed to increase the pool of skilled workers in new technologies and despite the fact that women had been an unexploited human resource in the 1940s and 1950s and had played a vital role in the development of the computer industry, there was no substantial endeavor to encourage women's full participation in ICT or to promote their role as creators and developers; instead, they were viewed as end users.

Brine identifies a mismatch between the needs of the labor market and the training provided to women within the framework of EC initiatives on vocational education and training.¹⁰² The way in which the question of women's education and training in technology was formulated in the initiatives and other documents in this area, suggests that women were, for a long time, not considered as potential highly skilled workers, and all projects to integrate them into the field of ICT at any level were allocated very limited budgets.

¹⁰⁰ For a discussion on the effects of mainstreaming in research policy, see: Lut Meargert and Emanuela Lombardo, "Resistance to Implementing Gender Mainstreaming in EU Research Policy," in "The Persistent Invisibility of Gender in EU Policy," ed. Elaine Weiner and Heather MacRae, *European Integration Online Papers*, special issue 1, no. 18, article 5 (2014).

¹⁰¹ CEC, *Vocational Training and New Information Technologies*.

¹⁰² Brine, "The European Social Fund."

Targeting underrepresentation has not necessarily meant promoting women's entry into highly skilled occupations, but traditionally has often focused on male-dominated occupations, the importance of which has been in decline in the technological society. The question of representation obscured the fact that the field of ICT required both highly skilled and low-skilled workers, therefore merely encouraging women to learn about computers was not sufficient to promote their full participation in the creation, management, and use of ICT at a high level.

The gender models fostered by the EC in the development of education and training initiatives were limited to *helping* women move from virtually no training to basic literacy in ICT. This was facilitated by *allowing* them to gain access to new technologies at different levels of education and training through short programs with reduced budgets, and by supporting projects that were often driven or administered by actors (women's organizations, trade unions, or firms) that could not ensure the follow-up or institutionalization of the initiatives in official training and educational structures.

However, we identify a shift at the end of the 1980s. The programs and initiatives focused on the economic role of women and recognized the advantages of providing them with skills that could enable their participation in the more strategic areas of the economy, such as the ICT field. The gender equality approaches that we observed in earlier years, based on equal treatment and positive action, were nevertheless intertwined with the new arguments. The shift was, however, only rhetorical, as a significant investment of resources in initiatives targeting women did not take place.

Therefore, we claim that although the challenge of new technologies led the EC to craft a series of measures to meet new skill demands and increase competitiveness, the potential of women was underestimated over a considerable period. By labeling women as victims of technology and emphasizing their vulnerability in the labor market, the EC justified initiatives and measures that merely relieved their weakened position through short-term, underfunded efforts.

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