Wo/men in relation to school technology and mathematics: re-reading hegemonic discourses via ‘cyborgs’ and ‘subalterns’

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Abstract

Despite high expectations, technology and mathematics are still peripheral options for most females when they consider further studies or career up growth. The present paper aims to discuss the potential for an alternative theorising of female relation to school technoscience such as technology and mathematics related literacies. Specifically, the paper discusses the distinct cases of Afrodite, Anita and Giorgos who narrate their relation to school mathematics and technology related subjects and reflect on how such experiences have impacted on their career and study choices. Although their cases represent distinct socio-cultural subjectivities they are inscribed within hegemonic discourses that carry a broader negative sense of female relation to technology, mathematics and science –that often is described as non-passionate, marginal and struggling experience. Based on a preliminary analysis of interview data the constructs of ‘cyborg’ and ‘subaltern’ are introduced as ways of disrupting stereotypic readings of a partial relation to technoscience, and thus to school technology and mathematics, as negative, passive or, even, dangerous. These two metaphors, enable us to move beyond a stereotypic interpretation of ‘women as a problem’ to issues of quality/equity in school technoscience. Moreover, the ‘cyborg’ and ‘subaltern’ optics support us to approach a critical question, and specifically to ask why and how women and men sometimes feel the need to either resist or embrace partially technology in their everyday lives and work.

Des femmes et des hommes par rapport à la technologie scolaire et les mathématiques : ré-lire les discours hégémoniques à travers ‘ cyborgs ’ et ‘ subalternes ’

Malgré les hautes espérances, technologie et mathématiques sont encore des options périphériques pour la plupart des femmes quand elles considèrent continuer leurs études ou avancer leur carrière. Le but de ce document est la discussion du potentiel pour une théorie alternative de la relation des femmes face à la techno-science scolaire comme l’alphabétisation technologique et mathématique. Plus spécifiquement, dans ce texte il est question de trois cas, d’Afrodite, d’Anita et de Giorgos qui parlent de leurs relations avec les mathématiques scolaires et les matières relatives à la technologie et réfléchissent comment ces expériences ont eu un impact sur leurs choix de carrière et d’études. Même si leurs cas représentent des subjectivités socio-culturelles distinctes, ils sont inscrits dans les discours hégémoniques portant un sens négatif plus large de la relation des femmes à la technologie, les mathématiques et les sciences – décrite souvent comme une expérience non passionnée, marginale et difficile. Basées sur une analyse préliminaire des donnés des interviews, les constructions de ‘ cyborg ’ et ‘ subalterne ’ sont introduites comme des modes de perturbation des lectures stéréotypés d´une relation partielle avec la technoscience et ainsi la technologie scolaire et les mathématiques comme négative, passive ou, encore, dangereuse. Ces deux métaphores nous permettent de nous déplacer au-delà d’une interprétation stéréotypée de «femmes comme un problème» vers des questions de qualité/impartialité dans la techno-science scolaire. En plus, l’optique de ‘ cyborg ’ et ‘ subalterne ’ nous aide à approcher une question critique et de poser spécifiquement la question pourquoi et comment femmes et hommes ont parfois besoin de soit résister, soit accepter partiellement la technologie dans leur vie et dans leur travail quotidien.

Wo/men and School Technoscience: *Anita, Afrodite and George*

'[M]athematics and technology are unfamiliar fields to women' says Anita, a primary school teacher in her late 30s, whilst Giorgos, a young engineering student, argues that although some female students can cope well with what is required to do with technology during coursework, they lack a passion for it. Coping well with school subjects, including mathematics and technology, creates emotional conflicts for Afrodite, an adolescent Greek Gypsy girl, who senses that she will soon need to abandon school for an early marriage – repeating her parents' story. Education, and specifically mathematics education, provides her with a promise of joining the desired 'modern' ways of imagining, organising and controlling her life. Simultaneously, this very desire soon becomes an unfulfilled promise, creating frustration, pain and feelings of failure. Schooling turns out to be an (almost) impossible path for Afrodite, who, despite being a successful learner, wonders what might be the real value of school for her. Schooling demands a cultural border crossing, and a constant compromise amongst conflicting 'values' related either to community or school formalities. Afrodite becomes 'voiceless', 'hopeless' or a 'subaltern' in Spivak's (1992) words as her struggle for recognition proves futile or un-ending.

Anita remembers being good at mathematics (geometry), but contrary to her family's and companions' belief in her capacities, she chooses not to study mathematics since she feels that 'science' is not really suitable for her as a woman. Despite her choice not to engage in what was perceived as natural for her, she recognises the fact that the 'new' generation has the potential to reverse such stereotypes if, as she argues, access to both resources and expertise is safeguarded. However, Giorgos, a young male who belongs to this 'new' generation, seems to espouse that women's pursuit of science is not out of pure interest or passion but of mere necessity to acquire the skills required in modern society. Lack of passion and 'pure interest' show that women's relation to technology is weak, subordinated and marginal. As such their pursuit of technology is taken as 'different' and becomes 'other'.

Giorgos, like Anita, invests on hegemonic discourses which naturalise young women as non-passionate, non-dedicated participants in techno-scientific practices arguing that they *'get involved [...] out of necessity'*. Taking into account the fact that the discourse of an intrinsic '*passion for science'* is predominant when scientific creativity and innovations are taken into consideration (Turkle, 2008), one easily concludes, as Anita does, that '*women are not really made for the worlds of mathematics and technology'*. In contrast, the case of Afrodite shows that passionate desire alone does not seem to safeguard a continuous participation to education (including mathematics education). Afrodite lives at the borders of two competing discourses; the one depicting school as '*the beginning of a new life'* and the other emphasizing that '*it is a shame for a girl to attend school'*. Schooling represents the risky path towards a 'new', yet 'uncertain', life. In a similar vein, Anita rejects 'uncertainty' and *chooses* a safer area for study and work.

The narratives offered by Anita, Giorgos and Afrodite are inscribed within discourses that carry a 'negative' sense of female experience with technology, mathematics and education. Not only Giorgos, but also Anita and Afrodite seem to be captured within gendered discourses espousing a fixed view of women's relation to technoscience. Their stories are not interpreted in a positive way, but instead perpetuate the projection of stereotypic images. According to Michel Foucault (1972, p.49) discourses function constitutively towards producing 'truths' which '*systematically form the object about which they speak'*. This approach explains how hegemonic discourses serve to reproduce women as having distinct ways of knowing (Belenky et al., 1986) or that technoscience[1] is mainly a masculine route

[1] According to wikipedia '*Technoscience is a concept widely used in the interdisciplinary community of science and technology studies to designate the technological and social context of science. The notion indicates a common recognition that scientific knowledge is not only socially coded and*

towards realising the rational, modern 'self' and developing systemic societal change (Ellul 1964). Within this realm, school mathematics and technology are not seen a 'female' choice since women deal with techno-mathematics in 'different' ways –ways that potentially can work towards 'disrupting' commonly held assumptions and expectations. Women's relation to technoscience can be seen 'disruptive' as they embrace technology and mathematics without revealing a devoted passion. Instead, their engagement seems to be a continuous struggle towards fitting technoscientific materialities in the multiplicities of their everyday working, studying and living. Yet, women's struggling to appropriate technoscientific knowledge is often read as problematic. The issue of 'woman as a problem' has been discussed extensively in relation to technology (Wacjman, 2007), but also in relation to mathematics (Fenemma and Leder, 1990). And, its assumed 'normality' can be oppressive as it does not allow 'other' subjectivities to emerge and does not voice alternative positioning(s).

Female relation to technoscience: re-reading hegemonic discourses

Following Michel Foucault and Judith Butler, the present chapter attempts to re-read hegemonic discourses of female relation to techno-mathematics. Foucault (1972, p.151) observes insightfully how discourse '*obeys that which it hides'* and becomes '*the path from one contradiction to another'*. He argues that *'to analyse discourse is to hide and reveal contradictions; it is to show the play that they set up within it; it is to manifest how it can express them, embody them, or give them a temporary appearance'*. Discourse as contradiction comes close to notions of 'disruption' and 'trouble' as promoted by Butler (1990, 1997) arguing for the need to deconstruct what are often seen as 'normal' or 'natural' assumptions on agency, subjectivity and identification. Along these lines, the present chapter aims to move beyond a negative interpretation of women's relation to technology and mathematics as passive, indifferent or marginal. It argues that female partial and at times marginal positionings could problematise technological determinism (Ellul 1964) and bring forward an alternative reading concerning our understanding of technoscientific practices where the complex incompatibility of using technology and mathematics is not concealed but spoken out and negotiated. It is suggested, here, that an alternative reading might be closely related to disrupting assumed normalities of human-technoscience relation(s) by means of disrupting 'development' as the quality/equity discourse in technology mediated mathematics education.

From this point of view, technology-mediated mathematics education is not merely a tool for better understanding mathematical concepts, but can be seen as a tool for introducing learners to certain standards of 'modern' life – and for some (including women and men who work in marginal positions) this can be a risky, unsafe and uncertain terrain. As explained above, self /society development requires both a quality and equity dimension. Within the confines of imperialist, colonial and patriarchal discourses, development is taken to be equivalent to the construction of a fixed 'rationality' as the ultimate goal for quality. Rational development is also taken to be at the heart of technoscientific practices including mathematics and technology related literacies. Therefore, quality in mathematics education curricula and practices is taken to be a cornerstone for safeguarding quality/equity and minimising exclusion and marginalisation.

However, women often seem to either resist or embrace partially and without passion certain technoscientific practices affecting their daily life or work. Such a standpoint can be stereotypically interpreted as the 'woman as a problem' situation –an interpretation rooted in hegemonic discourses of quality/equity. As previously seen, on the one hand, some mainstream constructivist and mainstream socio-cultural perspectives strive to prescribe quality in mathematics education, and on the other hand, certain mainstream feminist perspectives focus on investigating gender inequity not only at the level of achievement,

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historically situated but sustained and made durable by material (non-human) networks' (http://en.wikipedia.org/wiki/Technoscience).

competences and attitudes but also at the level of access to and participation in mathematics and technology related fields. While constructivist and socio-cultural theorists emphasize quality curricula, feminists identify gender gaps. In simplified terms, it may seem that one's work serves (to sustain) the work of the other. In other words, when a gender gap becomes identified, a quality curriculum will be there to fill the gap. But life is not that easy.

As a way of conclusion

In the realm of the present chapter, it has been argued that hegemonic discourses of quality/equity as means for self/society development need to be approached through alternative perspectives that enable subjects to move beyond a pressurising emphasis to a singular 'perfectionist' relation to technoscience. Hegemonic discourses tend to read women as 'others' by their being considered, perhaps unintentionally, as the passionless and subordinate users of technoscience. By re-reading these stories we come to realise, that involvement in mathematics and technology in school practices is *neither* simply a matter of access to equitable sharing of resources, knowledge and support *nor* an issue of a particularly passionate interest and positive attitude towards the subject. Women and men seem to live in complex localities that require them to simultaneously appropriate not one but a number of discourses that often become competing forces in both personal and school lives. The notion of 'cyborg' induces a renewed vision of quality, as far as the subject's involvement in technoscience is concerned, emphasizing partiality and hybridity. Women as 'cyborgs' can be fragile and fractured amalgams of a human-machine organism and can claim for themselves the right to 'error', to express 'failure', to demand 'connectivity' and to feel confident with 'partiality'. According to Donna Haraway (2006/2009), it is not the 'machine' that women reject but the insecurity that comes as a result of communication breakdown. In other words, it is the fact that they do not seem to have control over the fluid relation which develops between humans and machines that requires a 'holistic' instead of a 'connectivist' relation to technology. The cyborg, thus, has the potential to become a way of thinking and re-working subjectivity as situated, hybrid and partial.

In addition, the notion of 'subaltern', as argued by Gayatri Chakravorty Spivak, offers an alternative optic on issues of difference or otherness as they affect marginalised, oppressed and voiceless subjectivities. She claims that by having limited access to cultural imperialism and by being constructed as 'different' or 'other', the subaltern can signify the 'proletarian' whose voice cannot be heard as it is structurally deleted from the capitalist bourgeois narrative. Furthermore, she objects to the view that since the subaltern cannot speak, an advocate is required to speak for her, arguing: '*Who the hell wants to protect subalternity? Only extremely reactionary, dubious anthropologistic museumizers. No activist wants to keep the subaltern in the space of difference [..] You don't give the subaltern voice. You work for the bloody subaltern, you work against subalternity'* (Spivak 1992, p.46). The burden created by the organisation of 'collective' or 'mediated' voices for subalterns constitutes, according to Spivak, a rehearsal of a political domination of 'voice' via neo-colonial exploitation that ultimately exacerbates 'epistemic violence'. Instead, she voices the need to seriously consider clearing the way for the subaltern to speak.

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