16

Dominant Discourses and Gender Dimensions in the Writing of School Mathematics: the Case of the School Magazine Euclid A

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In the present study, we explore the discourses employed for the writing of school mathematics in the magazine *Euclid A.* Moreover, we relate our analysis to gender dimensions in two ways. On the one hand, we examine whether the way school mathematics is represented in the texts is gender-specific. On the other hand, we study the gender representations built in the magazine.

Dominant discourses in school mathematics

The traditional/progressive dipole reflects two *contrasting,* and at the same time *dominant,* conceptions or 'myths' (Dowling, 1998) about the way school mathematics is (or *is not)* organized. The two discourses differ in the way they shape the relationship between the mathematical and the non-mathematical world ('classification': Bernstein, 1990) as well as in the power roles which are formed between the teacher and his/her students ('framing': Bernstein, 1990).

It has been claimed that traditional discourse results in school failure because it is an access-limiting discourse (e.g. Taylor, 1996) since it treats science as being too difficult and thus being understood only by a few gifted ones (Lemke, 1990). Although progressive discourse is often offered as an alternative option to school mathematics, which attempts to eliminate the social inequalities reproduced by traditional discourse, there are voices supporting the view that both discourses -each one in its own way- perpetuate the myths about mathematics (Apple, 2000; Dowling, 1998; Walkerdine, 1998). In the present study, 'traditional' and 'progressive' constructs are not employed in the sense of evaluating the texts of the school mathematics magazine *Euclid A* as 'good' (using progressive discourse) or 'bad' (using trdditional discourse), but as analytic units for exploring contrasting ways of writing school mathematics.

Writing school mathematics and gender dimensions

Since mathematics is a masculine activity *par excellence-according* to Mendick (2003), doing mathematics equals doing the man-traditional discourse, as the dominant way of representing mathematics, it is regarded as a masculine discourse as well. In contrast, progressive discourse, being an attempt at an alternative way of constructing mathematical knowledge is considered to be a more feminine discourse. Nevertheless, the implication of the gender variable in the use of the two discourses has not been satisfactorily verified by empirical facts. Often the socialization of women in traditionally masculine sectors of activity attenuates gender differences and makes women

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adopt a masculine or genderless identity (e.g. Sorensen, 1992, cited by Mack, 2001). This study will attempt to explore whether female writers of *Euclid A* differ in the way they employ the two discourses, compared to male writers.

On the other hand, the school reproduces traditional gender stereotypes through various practices, including the gender representations built in school textbooks of mathematics. Relevant research (e.g. Northern, 1982; McBride, 1989; Dowling, 1998) shows that women are not frequently depicted in the textbooks, therefore giving the impression that mathematics concerns an exclusively masculine domain of interest. Moreover, the social roles attributed to the two genders follow the patriarchal model. These stereotypical gender depictions cultivate the view that women are not suitable for mathematics. Our analysis of *Euclid A* will also focus on the gender representations within its texts.

Methodological issues

The school mathematics magazine *Euclid A* is an official magazine of the Hellenic Mathematical Society (HMS) and aims to familiarise students in late primary and early secondary school with mathematics. Its editorial board mostly comprises experienced secondary maths teachers who are, at the same time, authors of articles appearing in the magazine.

The theoretical framework of textual analysis is Critical Discourse Analysis (CDA; e.g. Fairclough, 1992; Fairclough & Wodak, 1997). CDA constitutes **a** theoretical nexus that gathers together different approaches under a more or less common view about the way text and talk function in society (Titscher et al., 2000; Van Dijk, 1993). In particular, CDA conceptualizes language as discourse, namely, as a form of social practice. Due to its Western Marxist origins, CDA puts an emphasis on the ideological role of discourse in legitimizing the dominant representations of the world, through which relations of power are maintained and social inequality is perpetuated.

The analytical framework of the study combines a quantitative content analysis of 79 issues of the magazine (1984-2005) and a systemic-functional linguistic analysis (Halliday, 1994) of twelve representative articles of the magazine. In this paper, we will draw on results of both kinds of textual analysis, focusing in particular on findings which unravel the ideological function of the two discourses of school mathematics as well as on the gender dimensions of the analysis (for more details, see Chronaki et ql. 2007).

Results of the analysis

The discourses of school mathematics

Content analysis revealed that the discourse that was mainly drawn upon in *Euclid A* was **the** traditional one. Specifically, there was focus on the texts of methodology and theory, while the activities proposed to the reader mostly concerned problems and exercises. Most of the images accompanying the texts were scientific (i.e. fables, graphs), while the activities proposed to the reader were mainly put in an abstract context (e.g. *'The function f (x) = x^2 + (I + Ij* x + *5 is given. If you know that the point A (1,10} belongs to the graphic representation of the function...').* Looking more closely at the way the activities proposed to the reader were contextualized, it was revealed that even when these activities were put in an everyday context, this was often mathematized (e.g. *A cypress AB with its root BC is 10m. It fell from the snow*

and took the position BD[1]) or presented in a non-realistic way (e.g. *'-Do you have children? -I have three daughters. -How old are they? -The product of their age* ***is 36).***

The systemic-functional linguistic analysis also showed the prevalence of traditional discourse. Specifically, there were linguistic features signalling the pedagogic control over the reader (i.e. use of the second person singular and plural *'you',* speech acts of instructing) as well as linguistic elements typically linked to the dominant academic discourse (i.e. impersonal style, speech acts of asserting). In fact, most of the assertive speech acts were performed with the absence of epistemic modality. Epistemic modality involves the linguistic mechanism through which language users indicate the degree of truth attached to their utterance (Fairclough, 1992). Its absence results in the performance of categorical assertions (Halliday, 1994), assuming a power of knowledge on the part of the speaker/ writer, since they present information as being non-negotiable (Hodge & Kress, 1993). Interestingly, the absence of epistemic modality is not typical of scientific discourse, in which it is used for signalling the scientist's doubt about his/ her claim (Myers, 1992).

School mathematics and gender dimensions

The texts of *Euclid A* were mainly signed by men. Regarding gender representations in the texts, male characters overwhelmingly outnumbered female ones. Men were linked to occupations that offer an obsolete (e.g. fisherman, farmer, hunter) or non-typical (e.g. athlete) social reality. They were also often represented as shop owners and traders, which are the jobs being stereotypically linked to mathematics. Women drew their identity mainly upon their family. There were also cases in which they were depicted without any specific role. No statistically significant differences were detected between male and female writers regarding gender representations. However, particularly stereotypical and traditional feminine roles, such as that of housemaid and nurse were exclusively found in the texts of male writers.

The use of the two discourses of school mathematics was not statistically significantly determined by the gender variable. It is noteworthy, nevertheless, that, as arising from the systemic-functional linguistic analysis, female writers employed linguistic features associated with progressive discourse (e.g. mental and verbal processes, stress on human agency) more frequently.

Conclusions

Both kinds of analysis indicated the prevalence of traditional discourse for the construction of school mathematics in *Euclid A* as well as the reproduction of traditional gender representations. No statistically significant differences between male and female writers were detected, although some elements of progressive discourse were drawn upon more frequently by women. This echoes the view that despite the fact that women seem to differ from men in issues of social inequalities, such as the way school mathematics is written, these gender differences are blunted when they enter traditionally masculine domains and are forced to adopt the dominant masculine discourse. Furthermore, the way traditional and progressive discourses were articulated in the texts is linked to issues of ideology. On the one hand, traditional discourse naturalized

mathematics, representing it as common sense (use of categorical assertions). On the other hand, traditional discourse is so hegemonic **that any attempt at** articulating a 'progressive' discourse was undermined and cancelled, **maintaining** the **established** order of doing and writing school mathematics (everyday life was mathemafized or presented unrealistically).

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