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Learning and the development of social identities in the subjects Care and Technology

Monique Volman[a]; Geert ten Dam[b]

[a] Vrije Universiteit Amsterdam, The Netherlands [b] Universiteit van Amsterdam, The Netherlands

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Monique Volman[*][a] and Geert ten Dam[b]
[a]*Vrije Universiteit Amsterdam, The Netherlands;* [b]*Universiteit van Amsterdam, The Netherlands*

This article discusses the way in which social identities structure the learning processes of students in two subjects in the Dutch secondary school curriculum—Care and Technology. It analyses interviews with 23 students and their teachers with a view to explaining the disappointing results in these subjects in terms of breaking through gender and class-related preferences and learning outcomes. The subjects Care and Technology refer to social practices with which groups of students identify in different ways. On the other hand, students also appear to make active use of these subjects in their identity development. The authors argue for explicitly combining the notion that learning is peripheral participation in social practices with analyses of the power relationships that structure those practices. Also, the question should be addressed of how the relative autonomy of the school can be used for organizing learning experiences in such a way that the constraints of social position and identity are reduced, and the restrictive character of social identities is challenged.

1. Introduction

Many publications on sociocultural theory at the end of the twentieth century elaborated on the notion of learning as a form of participation in communities of practice and emphasized that learning not only implies the acquisition of knowledge and skills but also includes identity development (Rogoff, 1990; Lave & Wenger, 1991). Much less attention has been paid to the fact that the identities students construct in the course of their development may also inhibit participation in certain

*Corresponding author. Department of Education and Curriculum, Vrije Universiteit Amsterdam, Van der Boechorststraat 1, 1081 BT Amsterdam, The Netherlands. Email: mll.volman@psy.vu.nl

practices and kinds of learning: 'I am not that kind of person …', or, 'I don't want to be someone who …' Nevertheless, this phenomenon has already been described several times in the educational literature. The most famous example dates from more than a quarter of a century ago. Willis (1977) described lower-class 'lads' in England who, with their anti-school identities, 'learned how to labour'. In feminist variations of this analysis, McRobbie (1978) and Spender and Sarah (1980) showed how girls from the lower classes 'learned to lose' at school. More recently, Kohl (1994) described how lower-class black students choose not to learn at all because their perception of school as an institution does not contribute to the goals that are important to them. Goodnow (1990) gives an autobiographical example, relating how she did not succeed in learning to type, not because she lacked the necessary ability, but because she did not want to be 'a person who can type'. De Abreu (2002) has done research on the education of Brazilian farmers' children. She observed that relating mathematical practices to their everyday lives does not work. At school these children do not want to have anything to do with these practices as they associate them with the hard, poverty-stricken existence of their parents.

Examples like this do not simply reflect chance individual preferences, even though the learners concerned may sometimes experience them as such. *Social* identities are the issue in all the examples above: 'our kind of people cannot do/do not do/do not want to do that', or rather, 'I do not want to become what I'm expected to become'. Willis, Kohl and De Abreu have written about youngsters from families at the bottom of the social ladder. Both gender and class identities seem to play a role in Goodnow's situation; being able to type would have identified her with a group of girls with whom she did not want to be identified. The positions these young people adopt towards 'learning' are linked to the proximity or distance they experience or explicitly want to create between their social identity and the social positions that exist in the communities of practice to which learning refers (Holland *et al.*, 1998) and that are represented at school in a particular way (ten Dam *et al.*, 2004).

In this article we use this perspective to analyse the way in which social identities structure the learning processes of students in two subjects in the Dutch common curriculum. The subjects Care and Technology became compulsory subjects for all 12–15-year-olds in 1993, when a common curriculum or 'basic education' was introduced into the first stage of Dutch secondary education. Arguments for including Care and Technology in the common curriculum mainly referred to social class. These 'practical' subjects, which were intended to integrate head, heart and hands, were seen to provide a counterbalance to the predominantly cognitive nature of basic secondary education. As such, they were considered important for students who, prior to the introduction of the common curriculum, would have been directed into vocational education and who mainly come from families with a lower socio-economic status. But arguments were also based on emancipatory considerations (see ten Dam & Volman, 1998). By introducing girls to technology they were supposed to be able to develop a more positive technological attitude and be encouraged to consider a career in technology. The inclusion of the subject Care in

basic secondary education was seen as an expression of social recognition of the knowledge and skills traditionally associated with women. At an individual level it was expected that boys would learn to appreciate this domain and would become more willing to carry out caring tasks if they knew more about them. In other words, the differential (class and gender related) way in which people participate in the cultural practices of 'technology' and 'care' were explicitly addressed by introducing students at school to those practices which they would not participate in as a matter of course.

In a study in which we interviewed 12–15-year-old girls and boys and their teachers on how they experienced the subjects Care and Technology, we found data that suggested that the introduction of these subjects has not resulted in the intended identification with, and appreciation of, these domains. Girls are considerably less interested in Technology than boys and both boys and girls do not appreciate the subject Care very much. Students at schools of a higher level (pre-professional education and pre-university) hardly develop any affinity at all with the learning domains of Care and Technology. These results are in line with other research results which show that girls achieve noticably poorer results in Technology than boys in the Netherlands (Kuhlemeier *et al.*, 1997). In this article we develop a sociocultural theoretical framework, using the concepts 'learning as participation in communities of practice' (Lave & Wenger, 1991), 'positional identity—social position' (Holland *et al.*, 1998), and 'identity as action/construction' (Penuel & Wertsch, 1995) to shed light on the disappointing results in Care and Technology. Our research questions focus firstly on clarifying the way in which social identities structure the learning processes of students in the two subjects in question. We also want to show how theories concerning 'learning to participate' could pay more attention to the meaning of social-identification processes.

This article is structured as follows. First, we will give a description of the subjects Care and Technology in schools in the Netherlands, and discuss what is already known about students' experiences and achievements in these subjects. We then analyse what questions from the perspective of 'learning to participate in communities of practice' and identity formation can be asked about the learning processes of students in these subjects. Then the structure and approach of the study which this article is based on is explained. In the second part of the article we analyse the interviews with students from the perspective of how social identities influence the learning processes of students. Lastly, we explore the place we think social differences should have in the theories on 'learning to participate' and what could be a pedagogical answer to the processes described.

2. The subjects Care and Technology in the Dutch common curriculum

In the Netherlands full-time education is compulsory from the age of 5 until the age of 16. Dutch children enter secondary education at the age of 12. During the first phase, children aged 12–15 years are taught a common curriculum of 15 subjects at four different levels. The different levels are usually taught in separate schools for

pre-vocational education (the lower levels) and for general education (the upper levels). After this, children choose one of three levels of examination. The preparation for this final examination varies from one to three years. Each level has consequences for admission to vocational and higher education. Although it is theoretically possible for students to transfer to a different level, in practice there is a divide between pre-vocational secondary education on the one hand and general secondary education on the other. In comparison to many other countries, this divide begins early, namely, on leaving primary school at the age of 12.

The subjects Care and Technology both originated in vocational education, prior to the introduction of the common curriculum. Until the 1960s, several narrow, vocationally oriented technical and care subjects were taught in lower vocational education in the Netherlands. These subjects prepared students for work in a specific sector of the labour market and, in the case of Care, in the family. The technical subjects included woodwork, metalwork, electrical engineering, painting, etc. The care subjects included taking care of the home, nutrition, clothing, health care, and child care and upbringing. In the course of the 1960s the content of these subjects underwent a major change. The vocationally oriented elements became less important than more general elements. From the middle of the 1970s the common curriculum being planned by the Dutch Government increasingly determined the discussion on the further development of Care and Technology. Inclusion of Care and Technology in the intended common curriculum fitted in well with the ideal of a 'broadening of the curriculum, including head, heart and hands' for all students (Wardekker *et al.*, 2003).

It was decided that Technology deserved a place in the common curriculum. A curriculum proposal was developed, paying attention to the acquisition of technical, practical and problem-solving skills, to the technical knowledge necessary to acquire these skills, and to how technology affects people and society. There was a lot more opposition, however, to the introduction of the subject Care in the common curriculum (see ten Dam & Volman, 1998). It was only in 1993, the year in which the common curriculum was officially implemented, that the final decision was made to introduce a 'broad' subject, Care. In addition to traditional home economics themes like nutrition and clothing, topics in the field of sexuality, relationships, consumer affairs, the environment, leisure time and work in and outside the home were to be included in this subject. In Care, students were to acquire practical knowledge and skills that would develop their problem-solving abilities in everyday life.

To give an impression of what is currently covered in Care and Technology in Dutch secondary education, we provide the attainment targets of both subjects. For the subject Care, these fall into three domains: 'health and well-being', 'consumer behavior' and 'basic necessities of life'.[1] The attainment targets for technology also fall into three domains: 'technology and society', 'products of technology', 'making a technical model'.[2]

Although the introduction of a common curriculum in the Netherlands meant a change in *what* is learnt in the first stage of secondary education (grade 7, 8, 9, for

12–15-year-old students), it did not challenge the *structure* of the school system. This means that the common curriculum is offered by a range of schools (or departments within larger schools offering different types of secondary education): pre-vocational schools, schools for general secondary education and schools preparing students for university entrance.

The evaluation of the common curriculum by the Education Inspectorate (1999a) revealed that Care and Technology had not developed into 'subjects for everyone'. The Education Inspectorate (1999a) found that there was a substantial difference between pre-vocational education and the other types of secondary education in the way some topics were dealt with in Technology. In pre-vocational schools the emphasis was on handling the materials and tools and, in particular, on students doing assignments themselves. 'Less attention is paid to thinking about the possible consequences of technological developments in present-day society and to tackling problems independently, which makes demands on students' resourcefulness.' Objectives requiring considerable knowledge and insight were paid little attention in pre-vocational education (see also Eijkelhof *et al.*, 1998, and Volman & ten Dam, 2000). In addition to a difference at school level, there is a striking difference at student level, i.e. in the individual experiences of students. The Education Inspectorate ascertained that 'girls generally manifest a worrying disinterest in the subject' (1999a, p. 21). Whilst on average two-thirds of students like Technology, girls' interest was 'well below this' (p. 9). This is valid for all types of schools. Data compiled by the Dutch Institute for Test Development (CITO) show that not only girls' interest in this subject is conspicuously lower than that of boys in all types of schools, there are also consistent differences between girls and boys in their achievements in the end-of-course written test for Technology (comparable to the differences in mathematics and physics/chemistry) (Kuhlemeier *et al.*, 1997).

The subject Care is slightly less popular with students than Technology, with 60% saying that they like the latter. What is striking is that there are also large differences between schools in this respect. According to the Inspectorate, 'students' opinions … are somewhat colored by their appreciation of the teacher giving the subject. Subjects like Care are far more susceptible to this than subjects with a more traditional status' (Education Inspectorate, 1999b, p. 21). Students' test results for Care are disappointing, particularly for the theoretical parts. The Education Inspectorate attributes this to students in general secondary education under-estimating the complexity and depth of the subject. Unlike Technology, differences in achievement in Care between girls and boys are uncommon. Only in senior general secondary education and pre-university education is there a slight difference in girls' favour (Kuhlemeier *et al.*, 1997).

Our conclusion is that the expectation that the subjects Care and Technology would develop into broad subjects paying attention to head, heart and hands, which would appeal to all students, irrespective of level and gender, has not been realized. Because of the evaluations discussed above, the curtain has now been brought down on both of them. A recommendation by the Educational Council was published in 2001 that proposed a restructuring of the common curriculum. It differentiates

between a core curriculum and a differential curriculum. The core curriculum includes 'those knowledge domains which seem indispensable for all children for further training and work and which belong to the desired broad education' (p. 48). In the differential curriculum, subjects can be included which are based on the preferences and needs of students. Schools have a great deal of freedom in what they include in the differential curriculum. The Educational Council proposes to integrate technology into a broader compulsory subject, Science, and to include Care in the differential curriculum. The Ministry of Education, Culture & Science has accepted the Education Council's proposal and a new curriculum was introduced in August 2006.

3. Theoretical framework

We think that a sociocultural approach can help explain what has happened to boys and girls in these subjects and what impediments have prevented the emancipatory expectations regarding the subjects from being realized. One of the reasons for introducing Care and Technology was that girls and boys would acquire knowledge, skills and attitudes that they do not encounter at home. In this approach students are more or less seen as passive 'receivers' of neutral information about which they will draw their own conclusions in a rational way. A cognitive psychological approach to learning processes is implicit here, in which thinking is considered to be a purely mental process that occurs in the human brain (Greeno, 1989). In contrast, a sociocultural approach to learning focuses attention on both the broader social context and the active role of learners themselves. Students are not seen as 'passive receivers' of information in this perspective but as active interpreters of social meanings, and the subject matter is not seen as 'neutral information' but as a product that itself is the result of the processes of social negotiations.

Accounts of learning as participation in communities of practice, which emphasize that learning is not only a question of acquiring knowledge and skills, but a process that includes identity development (Lave & Wenger, 1991), are a particularly helpful means of gaining insight into the learning processes at work here. Knowledge and skills are part of broader systems of relationships which are related differentially to social communities. Learning implies participating in these communities in new ways, or 'becoming a different person with respect to the possibilities enabled by these systems of relations' (Lave & Wenger, 1991, p. 53). Learning is seen here as being able to participate increasingly more adequately in the social and cultural practices that are considered to be important in society: education, profession, family, neighbourhood, politics, etc. The learner develops from a peripheral participant into a central participant. Learning is thus irrevocably linked to identity development, as becoming a more central participant implies becoming a member of a community of practice. This means that students must start to see themselves as members and from that position take responsibility for their own agency (including the use of knowledge and skills). The learning process thus implies a change in personal identity (Wardekker & Meijers, 2007). Wells (2000) even defines learning

as identity development. Learning is 'the transformation that continuously takes place in an individual's identity and ways of participation through his or her engagement in particular instances of social activities with others' (p. 56).

In the sociocultural literature, learning and participating are often described in socially neutral terms and communities of practice are implicitly presented as homogeneous social units. The issue of social differences as an intrinsic feature of 'learning to participate' is not often taken into account. Recently, sociocultural accounts have focused more on the social structure of communities of practice and on the implications of such structures for the processes of identification of learners with communities of practice or positions within those communities (Holland *et al.*, 1998; ten Dam *et al.*, 2004). Social practices do not admit everybody in the same way to these communities; nearly all provide different roles and positions for participants. Most practices restrict admission to certain roles and positions, and/or admission to central participation in them, to persons with specific qualities, and often also to persons with a certain background or heritage. Often, the reasons for selection are historical or ideological rather than rational, but they have become accepted as a matter of course. They are often connected to social differences: ethnicity, gender, class, social status. The social practices of care and technology are both strongly linked to gender; care is predominantly a practice in which women are the central participants and technology is a 'masculine' practice (see, for example, Wajcman, 1991; Tronto, 1993). Class and sometimes ethnicity, however, also play a role. Care mainly falls into the category of unpaid work but also of lowly paid work, which is increasingly performed by immigrant women (e.g. Anderson, 2000). Although there are no official conditions for admission to or exclusion from these gender, class and ethnicity related practices, the divisions are acknowledged and accepted.

Holland *et al.* (1998) differentiate between attributed social positions and social (positional) identities. They analyse how social positions are gradually changed into social identities:

> The development of social position into a positional identity—into dispositions to voice opinions or to silence oneself, to enter into activities or to refrain and self-censor, depending on the social situation—comes over the long term, in the course of social interaction. (pp. 176–177)

Girls and boys, and children with highly and less well-educated parents, will already relate differently to the social practices of care and technology before they have completed a single lesson. Their desire to become a member of a community of practice in which care or technology is central will differ. In the learning processes associated with these practices, the identification with the social positions available in the practice in question will be different for different groups of students.

In the introduction we pointed out that when knowledge and skills have a social connotation that students cannot identify with, there is a high chance that they will not be integrated into the identity of the student and will not result in the student using them. This may apply to how students relate to learning at school in general (see Willis, 1977, and Kohl, 1994), but also to how they relate to specific curriculum

subjects. This is apparent in differential enrolment, success rates, and in differential attitudes. According to Litowitz, 'areas of knowledge and skill are differentially linked to one's social identity, and … the linkings can help account for acceptance and resistance to learning' (Litowitz, 1993, p. 282). As considerable effort has been made in the subjects Care and Technology to keep the relationship between the school subject and social practices visible to students, differential attitudes may be particularly strong. From this point of view, the differences we encounter between students in the subjects Care and Technology can be analysed in terms of how the knowledge, skills and identities that students are supposed to acquire at school fit in or conflict with the identities they have already developed, and in which their social positions are reflected.

It is also emphasized from a sociocultural perspective that identity is not so much a question of what you 'are' but is something that you 'do'. Penuel and Wertsch (1995) suggest approaching identity as 'a form of action that is first and foremost rhetorical, concerned with persuading others (and oneself) about who one is and what one values' (p. 91). Cultural and historical resources are drawn on in this process. Penuel and Wertsch therefore suggest examining these cultural and historical resources as empowering and constraining tools for identity formation, emphasizing that cultural and historical resources do not constitute a single, undifferentiated whole. This perspective is quite similar to the way in which gender identity and its development is understood in postmodernist feminist research and gender studies. Gender identity develops in a process in which girls and boys give active meaning to a world where gender is an important category. They learn what it is to be a woman or man by taking up feminine or masculine positions available in society (Davies, 1989a; Lloyd & Duveen, 1992). The way in which scholars like Connell (2000) explain how femininity and masculinity are actively produced using the resources and strategies available in different school settings very much resembles Penuel and Wertsch's explanation of identity formation. From a postmodernist gender studies perspective, however, tensions and contradictions within identities have been theorized more thoroughly. The socially constructed categories of femininity and masculinity interact in complex ways with other categories, such as ethnicity, class and age (e.g. Brah, 1994). In different settings different femininities and masculinities can be produced (Swain, 2004). At the level of individual identities this approach implies that girls and boys have to develop and present their sense of self in relation to different discursive practices. As the cultural resources from which the meaning of femininities and masculinities are derived may comprise contradictory elements, this also creates room for change (Volman & ten Dam, 1998). Another merit of gender studies is that they have exposed that the binary dichotomy man/masculinity and woman/femininity in our society has long taken the form of binary and hierarchical oppositions in the sense of better–worse, superior–inferior, etc. (Davies, 1989b).

The conceptualization of identity as a form of social action can also shed light on our research material. Penuel and Wertsch (1995) argue strongly for research on identity in local activity settings where participants are actively engaged in forming

Table 1. Teachers interviewed by subject, type of education and gender

Type of education/subject	Technology	Care	Total
General secondary education	7 (1 woman)	7 (3 men)	14
Pre-vocational education	5 (1 woman)	3	8
Total	12	10	22

their identities. Secondary school classrooms are such places. In terms of gender, Kessler *et al.* (1985) have introduced the idea of gender regime, which highlights that schools provide different possibilities to perform different types of femininity and masculinity. Socio-economic class is an important factor determining these possibilities. We wanted to analyse how students convince themselves and others in Care and Technology lessons who they are and how they use these two subjects as resources in the development of their identity.

Below we will analyse the interviews with students and teachers in the light of sociocultural theory. We were interested in the following research questions:

- To what extent can the learning experiences of students in Care and Technology lessons be explained by their identification with the social practices that are represented in these subjects?
- To what extent can the learning experiences of students in Care and Technology lessons be explained by their desire to present a certain social identity in the classroom?

4. Method

We held semi-structured interviews with 22 teachers of Care and Technology and 23 students from 11 schools. (Tables 1 and 2 show the distribution by type of school and gender.) Students were either in the first or second year of secondary education (depending on which year the subjects Care and Technology were timetabled in their school) and were hence between 12 and 14 years of age.

In the interviews with teachers we talked about the curriculum, their teaching methods and pedagogical approach, about their students' behaviour and study results, and about differences they observed between girls and boys in relation to the curriculum. We asked students about their experiences with Care and Technology: whether and why they liked these subjects, found them interesting, useful and

Table 2. Students interviewed by type of education and gender

Type of education/gender	Girls	Boys	Total
General secondary education	8	5	13
Pre-vocational education	5	5	8
Total	13	10	23

difficult/easy. In addition, we asked about their own and their classmates' behaviour in the lessons and why they behaved in these ways. Finally, we asked students to what extent and why they considered Care and Technology to be typically girls' or boys' subjects.

Classroom observations were also made in five schools. The notes made during these observations were used for the interpretation of the interviews. If the observation had taken place before the interview, questions about incidents in the classroom were also asked in the interview. Transcriptions were made of the interviews so that they could be used for content analysis. The process of content analysis comprises, according to Huberman and Miles (1994), three interrelated sub-processes.

The first sub-process is data reduction. In this phase the transcripts are reduced to relevant information. This involves going through the interviews and globally coding the relevant fragments by research question. The second sub-process is 'data display'. Huberman and Miles (1994) define this as 'an organized, compressed assembly of information that permits conclusion drawing and/or action taking'. Two researchers formulated hypotheses in this phase on the categories and patterns manifested in teachers' and students' answers. The interview fragments were then sorted into the categories and patterns that had been identified. During the third sub-process, 'conclusion drawing and verification', conclusions were drawn on the research questions on the basis of the material already categorized. Both researchers then went through the transcripts of the interviews again to verify the interpretations (hypotheses) and conclusions. This included actively searching for counter-examples. The whole procedure was carried out separately for the interviews with teachers and for the interviews with students.

In the sections below we present our interpretations illustrated with data collected from teachers and students.[3] We have not tried to be representative but to generate hypotheses on the way in which social identities structure the learning processes of students in Care and Technology. We took a number of measures to guarantee the quality of the research (reliability and validity). This included the use of triangulation by collecting different types of data (interviews with teachers, interviews with students, and observations in a number of different schools). In addition, we tried to make clear how the research was structured, how material was collected, and what interpretations have been made (Janesick, 1994; Kelchtermans, 1994). By placing our analysis in an explicit theoretical framework, we have endeavoured to make the guiding factors in the collection and interpretation of material transparent to others.

5. Results: the views of girls and boys in general education and pre-vocational education on Care and Technology

In this section we will show how learning in the subjects Care and Technology is linked to the development of students' identity. First, we will discuss the extent to which the learning experiences of students can be understood from the perspective

of their identification with social positions within the social practices that are presented in the subjects Care and Technology (the first research question). We pay particular attention to gender-related social positions and, in so far as we found indications of this, the positions and identifications linked to the social background of students. We then examine to what extent the learning experiences of students can be understood on the basis of their need to present/construct a social identity in the classroom (the second research question). This involves paying attention to how students make meanings from and make use of the cultural resources they encounter in Care and Technology lessons.

The experience of Care and Technology as school subjects

The subjects Care and Technology explicitly refer to social practices. This was one of the reasons educational policy makers included them in the core curriculum. Students, however, see Care and Technology first and foremost as school subjects. Just like other subjects, they become meaningful to students in terms of being difficult/easy, enjoyable/boring, useful/useless. When students appreciate Care and Technology, it is mainly because of the practical elements that differentiate them from other subjects.

> *Ali* (boy, pre-vocational education): In Technology you're actually doing something. In other subjects you're sitting down just reading or writing. Here you're actually using tools.

> *Vera* (girl, general education): In Care and Technology you can enjoy yourself a bit. You're allowed to talk to someone and get on with things. Not looking at a book or exercise book and reading and writing, here you've got something to do.

Technology and Care teachers also point out that students, both in pre-vocational and general secondary education, really enjoy working with their hands. Students are enthusiastic about both cooking and technical assignments.

> *Mrs Janssen* (Care, pre-vocational education): They really want to do practical things. Students are already saying, 'We don't cook very often'. They think it's terrific. At the beginning of the year, they ask, 'Cooking, when are we going to do that?' They really, really like it.

> *Mr Prins* (Technology, general education): Students really want to work with their hands whilst Technology should really comprise two-thirds theory. They love doing assignments … When they have a double period, they quickly ask, 'Are we going to do the assignment now?'

Care and Technology are not only defined by students as different to other subjects, they are also different to each other. Both girls and boys assess the subject Care as easy. Learning there is seen as a matter of just 'knowing how to do things'. Students think that it is mostly about 'things you already know'. The subject Technology, on the other hand, tends to be associated with 'understanding' and 'gaining insight'. Students find it more difficult.

Nina (girl, general education): Care is about how you should wash your clothes and that kind of simple things.

Rosemarijn (girl, pre-vocational education): Some things in Care, you already know anyway, at least I do. They're things you already do.

Simon (boy, general education): When I've read something about Care, then I know it ever so quickly, but in Technology you really have to understand it. When you do an assignment, for example, you have to follow each step otherwise later you won't have a clue what you're doing.

Students generally find Technology more useful than Care.

Nathalie (girl, pre-vocational education): Technology is more useful really, because you use it much more later on, I think. Care is more about your whole life, how it fits together, about food, your body, etc. You know that at a certain point. But perhaps you'll need Technology more often.

Isabel (girl, general education): In Technology it's useful to know, for example, how a lamp works. And how a vacuum cleaner works and how you should use tools and something about safety. If you use this later, you really need to know what you're doing. Not that that's so difficult but you do need to know it.

Boys and girls differ in their assessment of the subjects. Students who say that they think Care is a useful subject, for example, are nearly all girls. Boys are unanimous in their rejection of Care.

Elise (girl, general education): I prefer Care to Technology because you need to know more things about it [Care]. It's important, about your appearance and for your health. … They're just things you already know about. But in Care they get you to really think about it, about what you do.

Nathalie (girl, pre-vocational education): Sex education is of course important. And the healthier you can eat, well yeah, I've really been eating badly lately … and that you shouldn't think negatively about yourself and about your appearance, I agree with that really.

Girls say more often that they find Technology more difficult and in particular that they are not good at Technology themselves.

Nathalie (girl, pre-vocational education): Technology … I don't understand a thing about it, I'm not technical at all and I really just can't do it, what can I do about it? But Care, I find that so easy, I only need one lesson and I understand everything, so that's not so difficult.

Girls think the subject Technology is useful but at the same time feel that it is a subject that boys enjoy and are good at.

Lisa (girl, general education): If you don't want to do anything with Technology later, then it's not much use to you. Then you have to learn all those things off by heart for nothing. … All those tools and things. You might just as well ring the plumber if something doesn't work. So you don't really need to learn those things off by heart, what PVC is and things.

From a sociocultural perspective it is emphasized that perceiving yourself as a potential participant in a community of practice is an important stimulus to learning. Although gender appears to be an important factor in this, it is not the only factor. Social class and level of education also play a role. Technology and Care constitute different kinds of resources for identity construction in pre-vocational and general secondary education. The exclusive identification of boys with Technology and girls with Care is strongest in pre-vocational education. For these students, the subjects have strong references to occupational practice. This is partly due to the content the subjects are given in pre-vocational education but also, for example, to the fact that the upper years of these schools often have departments that are called Care and Technology. Boys in pre-vocational education in particular seem to associate the subject Technology with a valued social practice. For them technology represents a realistic perspective in relation to future employment, as Carlos's answer to the question whether he likes Technology illustrates: 'Yes, I want to be an electrician later'. The subject Technology also partly represents a social practice in which they already participate outside school. They are already part of a technical culture through their fathers, brothers and friends. Dennis, whose father sells engines, told us:

> Sometimes he gives me an outboard motor that's not working. I find it a challenge to get it going again. I've made a scooter with a small engine. That's when I also learned how to weld. Sometimes when my father had to weld something, he let me watch. Then, at a certain moment, you want to try it yourself. First we tried together, but after a while you want to do it on your own, and so on. Then you start constructing entire things on your own. I think I may be going to make a cross-country bike soon.

Such a story can easily be interpreted as an instance of 'peripheral participation'. While helping, boys observe and imitate not only the skills their fathers (or brothers or friends) use to deal with technical problems, but also the self-representational aspects of these technical practices (cf. De Haan, 1999). In addition to technical knowledge and skills, boys acquire a technical identity. To put it differently, technology functions here as a resource for constructing a specific type of (class-related) masculinity. Dennis knows how to talk in a confident way about technical jobs, and feels that technology suits him. Many boys in lower vocational education want to become technicians. Even a carpentry assignment, which has nothing to do, for instance, with wanting to become an electrician, refers to a cultural practice that is not alien to them. Thus, they are able to experience the technology assignments as peripheral participation, and feel comfortable within it.

The way in which Care is usually structured (plenty of time to reflect on relationships, health, etc.) appeals far less to an occupational perspective, even in pre-vocational education. Only one girl linked assignments in Care to a social practice which she considered to be an occupational practice and one in which she could claim a position. During the same conversation she expressed her pride in her qualities of being able to get on with people and help them with their problems. As a future career, she said she wants to open her own beauty farm:

> *Kim* (girl, pre-vocational education): Cooking went fine and setting the table attractively, all of that wasn't a problem. … Mostly I follow the rules, so things are

done as they should be. My mother uses lots of herbs when she's cooking, so I do too, making everything taste better.

In general secondary education neither of the subjects Care and Technology clearly refer to occupational practice. In general education Care is a subject that is about the world you live in, dealing with housekeeping tips, talking about yourself and relationships. Technology is a combination of applied physics and tinkering with things. Students' identifications (positive or negative) are much less strong.

> *Simon* (boy, general education): When you get into a good conversation in Care, it's good, trying to convince someone with your own opinions, I really find that interesting.

> *Ali* (boy, pre-vocational education): H'm, cooking, what's that got to do with boys. In a kitchen, I mean. But it'll be useful when I get my own place, yeah, then I'll be able to use it. Cooking or first aid, all household things. You need to learn them, otherwise you won't manage later.

Students themselves certainly do not think of the subjects Care and Technology as being unequivocally girls' or boys' subjects. On the one hand, girls do associate Technology with boys and masculinity and, in turn, boys link Care with girls and femininity. On the other hand, the liberal ideology that everyone can choose for themselves and the emancipated norm that men and women are equal discourage students from explicitly mentioning a relationship between the subject and gender (see also, for example, David *et al.*, 1996). Students take exception to the analysis that Care and Technology are girls' and boys' subjects. The latter is especially apparent when youngsters talk about themselves and each other in terms of gender, i.e. when gender as a theme is under discussion. They then particularly emphasize that women and men are equal (ten Dam & Rijkschroeff, 1996; Volman & ten Dam, 1998). In the interviews we encountered circuitous and sometimes contradictory reasoning and arguments:

> *Dennis* (boy, pre-vocational education): I do think that boys go for Technology more than girls. But Technology is definitely not a boys' subject, it seems to me. There are girls who know a lot about it too, not in our class though.

> *Lisa* (girl, general education): I think that they [boys] themselves think that Technology is more for boys and that's why they work hard at it.

There are also students, although not many, who actually break through the stereotypical division; some boys are interested in Care and some girls in Technology. Vera, a girl in general education, for example, is keen on Technology because she likes working with her hands. She enjoys making things at home and is making a bird box at the moment. She also enthusiastically explains in detail how she made a construction with plastic, wood, lights and a battery in a recent technology assignment. Jasper, a boy in pre-vocational education, on the contrary, does not like this kind of 'fiddly work' at all. There were also other boys who did not particularly like Technology. But Jasper, who wants to become a keeper at a zoo, was the only boy who talked about the Care lessons without disdain and who spontaneously related his own experiences with caring tasks at home, like looking after his little sister, cleaning and cooking.

To summarize, the analysis of the interviews and observations shows that students' social positions (gender and class) partly define how they make sense of the subjects Care and Technology. This, in turn, has an effect on how they behave in the classroom and what and how they learn about these subjects. Gender, in particular, is a decisive factor in the learning experiences of students. Most girls find Technology difficult and uninteresting and do not feel it is 'their thing'. Girls, on the other hand, consider Care to be easy and moderately interesting. Boys think of Technology as difficult and interesting, whereas they dismiss Care as easy and dull. The socio-economic background of students also plays a role. For boys in pre-vocational education, in particular, the subject Technology seems to refer to a social practice with which they are familiar and identify. Thus, the learning experiences of students in Care and Technology lessons can partly be understood from the perspective of their identification with the social positions within the social practices that are represented in the subjects Care and Technology. However, the social positions of the students and the extent to which they identify with both subjects do not correlate. We also found exceptions to this and some students themselves resisting such unequivocal couplings.

Constructing identity in Care and Technology classrooms

> *Nathalie* (girl, pre-vocational education): We had to repair a puncture. I knew how to do it, but I'd never actually done it myself. Well, that was obvious, it was really terrible. Couldn't get the inner tube in again, really awful, I'm never going to do it again. At home my father does the punctures, I won't do it myself. It was just terrible, I was messing around for two hours. My friend's even clumsier than me, and we had to work together. She really demolished everything, took the whole wheel off and broke it into pieces, which made it even worse. It was just really awful, I'm never gonna do it again. At home when I've got a flat tyre, I just say, 'Dad, you do it for me, I hate doing it'. And he does it, because it takes me three days to get it done but my Dad's finished it in less than an hour. My friend knocked over the whole bucket of water, there was water everywhere, it was awful.

The reactions of boys to Care and of girls to Technology were not just dismissive, sometimes they were very vehement indeed. The explanation that they cannot identify with the social practice to which the subjects refer is therefore not conclusive. The fact that students react to the subjects in a more stereotypical way than one would expect points to another explanation. School is the place where students spend a lot of time with youngsters of the same age. They are there to learn but are also to 'discover who they are', or rather 'construct who they are', building up their own identity. Although we saw that students will not define school subjects, behaviours or social positions in terms of gender, constructing a gender identity (as a social identity) is an important part of what they are doing at school. Jackson and Warin (2000) have shown that identity construction is particularly salient at moments of transition in the school career. Students find it important to emphasize their femininity and masculinity to each other at school anyway. They use clothes, taste in music and sport (cf. Swain, 2004) to do this, but school subjects with a

gender connotation are also very suitable resources. This possibly explains why girls and boys adopt different positions regarding Care and Technology with so much verve. Nathalie's story can be seen as an example of an 'outsider's discourse' (Volman, 1997) that girls use about the subject Technology to make it clear that it does not fit in with their identity. The 'outsider's discourse' is not restricted exclusively to technical assignments that may be 'scary' or 'difficult', such as welding or drilling. Many girls also present themselves as incompetent in more ordinary activities in technology:

> *Nathalie* (girl, pre-vocational education): I found that saw really scary. I always had someone else do it for me: 'Will you do it for me? I have to go somewhere for a minute', or, 'I hurt my hand yesterday, I cannot do much with it now'.

The opposite to the outsider's repertory of the girls is the expert's repertory which boys use. When asked what his favourite subject is, Dennis answers without hesitation, 'Technology'. His reason is, 'because you do more technical things'. When the interviewer asks what he means by that, he uses the expert's repertory with ease:

> *Dennis* (boy, pre-vocational education): Yeah, you have to do a bit of designing. You're given a particular assignment and then you have to work out how to solve the problems yourself. Because it has to work of course ... The things in technology are more difficult than in handicrafts. It also involves how you do things and how you finish them off. And when I'm going to make something, I think it through first, of course. But if it's something really difficult then I draw it. ... Well, you start with a sketch of course. I want it to be about so. And then if that's working out, I add more detail. Note down the measurements ... Check if it really is how you want it. And if it is, then you make it. ... You can also just get on with it and keep solving problems and changing it. But it's about using as few materials as possible to build a construction that's as strong as possible. That's the art of designing.

We interpret the use of these discourses as presenting/constructing an identity. The expert's repertory certainly does not always reflect actual knowledge and skills but is often a matter of bravado:

> *Carlos* (boy, pre-vocational education): I just stick the scissors in and see if you get a shock. Give it a try. If they say the safeguards are so safe, then it should be okay.

What is so significant in these statements is the way boys identify with Technology as a matter of course and present themselves as technical. Nathalie's story shows the other side of the coin: if you are not technical, then you will never master the subject. Throughout the whole interview Nathalie kept saying that she is not at all technical, that she cannot do Technology and cannot do anything about it. One could say that instead of participating peripherally in a technical culture, Nathalie does practise participation in this culture as it is represented at school from a different position, namely, an outsider's position. By taking up different positions within the social practice of the classroom and of the activity Technology, boys and girls are literally doing different things. In this sense the classroom not only functions as a community of learning in which subject-related knowledge and skills are acquired (Brown & Campione, 1990), it is also a community of learning of social roles. In relation to

technology, many girls take the role of 'members' of the community that ask others for help.

> *Marcella* (girl, pre-vocational education): At a certain moment I just go and watch somebody else working. I always ask one of the boys. They usually finish my assignment, I never do it myself. I ask, 'Can you help me?', and they do, and then I say, 'I still don't understand' and then they carry on with it.

'Helping' features in this way in the gender-specific repertories of girls and boys. By continually putting on an act of 'helplessness', girls emphasize that they are not technically inclined. Their behaviour contributes to the development of the technical identity of the boys, who by helping the girls demonstrate their participation or potential participation in a 'technological community of practice'. Hence, girls and boys participate in Technology lessons in very different ways. They are involved in different activities and have different learning experiences. Not only classmates unintentionally contribute to this, teachers sometimes do too:

> *Interviewer*: How do you set about using the electric drill?
>
> *Marcella*: I get the boys to do it.
>
> *Interviewer*: And if Mr Brown sees that, does he get cross?
>
> *Marcella*: Yes, then I explain to him that I'm scared of using the drill. He understands that but not the other things.
>
> *Interviewer*: And if you say that, do you not have to do it? And what was Mr Morris's reaction last year?
>
> *Marcella*: He always did it for me. If you didn't understand, he always said, 'this is how you do it', and then he made it and I thought, good, he's making it and I don't have to do anything. Then I was always the furthest ahead in the class because he'd made it.

There are also other ways that students find elements in Care and Technology lessons to present themselves as girls or boys. Technical symbols such as protective goggles or an overall are particularly appropriate for this. Just like real building workers, many boys try to avoid using protective goggles during practical lessons. Girls also ignore the safety regulations. In their case the reason is that 'you look so awful' wearing the goggles. Marcella told us in detail about her fight with the teacher about wearing an overall.

> *Interviewer*: An overall is useful. Otherwise you get all that dust on you clothes.
>
> *Marcella*: Yes, that's true. But we don't take any notice of that because we always leave it open.
>
> *Interviewer*: Doesn't it bother you, all that dust on your clothes?
>
> *Marcella*: No.
>
> *Interviewer*: It seems to me like a good idea to do up the overall, don't you think?

Marcella: Yes, but it doesn't work like that.

Until now it would seem that there is a parallel situation with boys building their masculine identity by identifying with Technology and rejecting Care and girls doing precisely the opposite. The situation is, however, not symmetrical, but seems to be subsumed under the hierarchical relationship that masculine/feminine dichotomies often form in our society. The subject Technology represents a worthwhile social practice with which boys can identify. From a social perspective Care offers far less resources with which girls can identify positively. One of the boys expresses this very well in his answer to the question why he thinks Technology suits him better than Care.

> *Ali* (boy, pre-vocational education): The name itself says it. It's really difficult to explain. Care sounds a bit softer and technology a bit more important.

The difference between the social status of the subjects Care and Technology is also valid at school. Technology is considered to be difficult, Care (disparaging) easy. You have to 'get' Technology whereas 'it's just the way it is' in Care. We did not hear any 'oh help stories' regarding Care. Not only girls but boys too can learn Care, at least … if they want to. But it is not really something they want to do. Many girls think that they are not good at Technology but they consider the subject to be 'generally useful'.

To summarize, we saw that learning experiences in the subjects Care and Technology are not only related to the extent to which students identify—from a gender and class related social position—with the social practices to which the subjects refer. Students also actively use these subjects to construct a social identity that fits their perceived social position. This also contributes to their learning experiences; girls and boys experience different things in the lessons. The difference in the social status of the domains of care and technology makes it possible for boys to identify negatively with Care and positively with Technology, whereas for girls it is mainly a negative identification with Technology that contributes to their identity. Their relationship with Care is ambivalent.

6. Discussion: learning and identity, the pedagogical space of the school

In this article we have shown how a sociocultural perspective on identity helps us understand why the emancipatory objectives of the introduction of the subjects Care and Technology in the Dutch common curriculum were not realized. Although gender differences are hardly apparent any more in educational achievement, huge gender differences continue to exist in subject choices, and school and professional careers. We think that an analysis in terms of gender identity contributes to the understanding of the tenacity of such social inequalities, and may offer a lead for developing strategies for change.

Care and Technology are subjects in which the connection with the cultural practices from which they are derived is more visible than in most other school subjects, which was considered favourable for students in pre-vocational education

who were expected to easily identify with the subject matter (Volman & ten Dam, 2000). However, representing social practices in the school also provides a point of entry for social differences. Since the social practices of care and technology are historically gendered, offering knowledge and skills from these domains in an unproblematized way at school has the effect that girls and boys identify with these knowledge and skills differently. Boys, especially those in pre-vocational education, already see themselves as technologically expert, whereas girls persist in seeing themselves as outsiders, regardless of the knowledge and skills they acquire in the lessons. The interviews are thus an illustration of how students not only acquire knowledge and skills but also develop identities in learning processes, and how identification with certain positions in social practices can enhance or inhibit learning. The interviews, however, also show how students actively use the school subjects Care and Technology as resources to draw on in their identity development, from the awareness, conscious or unconscious, that these subjects are of a gender and class-related character. Paradoxically, this often happens in a way that reinforces existing social relationships rather than breaking through them. This is an additional mechanism through which the inhibitive functioning of social identities in learning processes occurs.

We argue strongly for explicitly combining the notion in sociocultural analyses that learning is 'peripheral participation with the intention of becoming a more centrally situated participant in social practices' (Lave & Wenger, 1991) with analyses of the power relationships that structure those practices. On the one hand, the social practices that are represented in schools are neither homogeneous nor neutral. All learning content refers to social positions and has particular cultural meanings. On the other hand, learners themselves belong to different social groups. As a consequence, they relate differently to learning content and to learning itself. Research should therefore focus on the character of the identities developed in 'learning through participation in social practices'. It should focus on the extent to which *social* identities are being developed, and try to find ways to avoid the reproduction of existing power relationships in such learning arrangements.

Our analysis leads us to a second issue we want to address. Schools are not islands where a reality can be created separately from the cultural practices outside the school. At the same time, however, school is able to put cultural practices at a distance. Like no other institution, school is capable of stimulating young people to reflect. At school, children can look at the world in which they live and at their own actions from a distance. They can discuss them and explore different perspectives, without the pervasive influence of daily routines and without being confronted with the direct consequences of their explorations. In the past, gender studies have yielded examples of this. Davies (1993), for example, showed how school children can be given access to discourses which enable them to reflect on traditional gender discourses and to deconstruct dominant storylines about gender.

From a sociocultural perspective the concept of 'second-generation apprentice-ship system' has been proposed to indicate a type of learning in which the advantages of learning through direct participation in cultural practices are combined with the

advantages of distance and reflection (Wardekker, 2004; see also ten Dam *et al.*, 2004). Taking distance and reflection are necessary to learn not only to participate adequately in society, but also to be able to criticize and change it. How this 'pedagogical space' of the school can be used is a question that also needs more attention in theories on learning and participation. Sociocultural theory should offer teachers guidelines on utilizing the school's potential for reflection. The ways in which students make sense of the learning content, of their classmates and of themselves are constructed to a large extent in classroom interaction. This also implies that possibilities for change can be found in the classroom. Research should focus on the question how to use this relative autonomy of the school for organizing learning experiences, in which social positions and identities are not inhibitive, and for challenging identities that are related to social positions in a restrictive way.

Notes

1. The 'health and well-being' category comprises the sub-domains personal hygiene, contact with others, use of stimulants, promotion of health, and time management. The 'consumer-behaviour' domain includes the sub-domains position as a consumer, budget management and consumption and environment. An example of an attainment target is, 'Students know the rights and obligations of consumers'. Lastly, the 'basic necessities of life' domain comprises the sub-domains nutrition, clothing and housing. One of the attainment targets is, 'Students are able to assess the composition, nutritional value, packaging information, quality and price of food'.
2. The first domain, 'technology and society', covers the sub-domains daily life, the business community, and occupations and the environment. One of the attainment targets in this category is, 'Students are able to give a global description, based on their own observations, of a manufacturing company, indicating the type of industry, phases in the production process, working conditions and the division of labor between men and women'. The second domain, 'products of technology', comprises the sub-domains operational principles, technical systems, control technology and using technical products. An example of an attainment target is, 'Students are able to explain mechanical movements and transmissions in a concrete situation'. Lastly, the third domain, 'making a technical model', comprises the five sub-domains: preparation and planning, design, drawing and reading plans, working with and processing materials, and product control. An attainment target in this domain is, 'Students are able to take the necessary measurements and transfer information from technical drawings to materials when making a technical model'.
3. The names of those interviewed have been changed to safeguard their anonymity.

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