

School governance, culture, and student achievement

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This paper examines the influence of different social contexts of schooling on the effectiveness of schools, and is based on the premise that higher organizational levels influence all that takes place in the levels below them. This research depicts the core levels of school governance, school community, classroom culture, and their impact on student learning, and specifically studies the influence of the administrative and governance structures of public and private schools on the underlying level of the community of these schools. In turn, it is expected that the school community influences the educational culture of the primary learning process of pupils in classrooms. The results of multilevel analyses show that the differences in the maths achievement of pupils can be explained, in part, by these social contexts of learning. Furthermore, the findings show that coherence between school governors, school leaders, teachers and the school community (parents) produces a sense of community that, in turn, shapes conditions in schools that have a positive effect on pupil achievement. Differential effects of schooling in public and private education are mediated by the school governance characteristics of these schools, especially the differences in influences of the school community (parents) on the policy of the school board.

Introduction

Predictors of school effectiveness differ among countries, regions, school types, school populations, and school sectors. This paper focuses on the influence of the governance structure on the effectiveness of public and private schools. It addresses school governance in a limited way, as it does not relate to the role of central government. The study emphasizes administrative autonomy and the dynamics of school governors and teachers on the one hand, and parents and community on the other. However, the focus is not so much on formal governance structures but more on how the dynamics of local decision-making influence the way teachers teach and pupils learn.

Several international studies suggest that pupils attending private primary schools achieve higher academic levels than pupils attending

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public schools (Coleman *et al.* 1982, Willms 1984, Chubb and Moe 1990, Chrispeels 1992, Dijkstra and Peschar, 1996, Gamoran 1996, Hofman *et al.* 1996). This phenomenon appears typical for the USA, the UK and Australia, and also fits the situation in Dutch primary and secondary schools.

Internationally, there has been substantial research on the effectiveness of public and private education systems. In the *International Handbook of School Effectiveness Research*, Teddlie and Reynolds (2000) state that school effects tend to be more substantial in school systems making use of governance structures that allow individual schools more autonomy. This paper presents the results of multilevel analyses aimed at explaining the differences in effectiveness of types of school, and takes into account the contextual differences, especially the governance structure, that contribute to school and classroom effectiveness.

Lately, theories to explain the sector effect of schooling have stressed the influence of the organizational setting in which schooling in public and private schools takes place (Bryk *et al.* 1993). A recently highlighted explanation of the sector effect uses elements of community theory, and seems to be a useful approach to a more satisfactory, empirically supported explanation for the better outcomes of private schools. Bryk *et al.* (1993) and Scott and Meyer (1994), for example, tried to explain the differential sector effect of schooling by environmental differences and by the differences present in the internal social system of public and private schools. That kind of research compares school sectors by integrating the outcomes of research on effective schools and organizational effectiveness. In an earlier study, Hofman *et al.* (1996) addressed this approach. Their findings indicated a relationship between the governance features of schools and the influence of the surrounding school community on school effectiveness. Some empirical evidence is available from school-level data from a survey of 125 primary schools in the San Francisco Bay Area (James and Levin 1988). The authors cautiously concluded that, in general, the organizational conditions of public schools seem to inhibit effective school features, while conditions in the private sector facilitate them. Two factors appeared at the core of their study: emphasis on school climate and parental involvement.

We have used these findings in our approach to an explanation of the difference in outcomes between public and private education. In our explanatory research model, we have taken into account relevant factors from research on effective schools and on effective classrooms. In line with Creemers and Reezigt (1996), we have taken into account that teaching and learning take place primarily in the classroom. However, we regard the administrative climate as an important factor that has influence on the effectiveness of private and public schools. Based on the above-mentioned research perspectives, we have worked from a broader perspective in which governance and school characteristics are conditional to the pupils' primary learning process (Murphy 1991). Our purpose is to contribute to the explanation of the sector effect by focusing on the relative influence of differences in the governance structure and in school and classroom characteristics. Our central research question is: Can the sector effect, i.e.

the differential effect of schooling in public and private schools, be explained in terms of differences in the governance structure, the schools' educational culture and the educational climate of the classroom?

Governance, schools, and classrooms

We assume that the sector effect is a result of the effectiveness of the governance structure of the school, and that this structure influences the processes within the school and classroom. Accordingly, the differential effect of public and private schooling will be examined first using an outline of recent findings on the possible impact of different school governance structures on the effectiveness of schools. Thereafter, we shall discuss the possible impact of school and classroom factors on the effectiveness of public and private schools.

Impact of governance structures

As the study of Chubb and Moe (1990) demonstrated, there has long been an intense debate going on about the best possible form of school government, especially for public schools. Internationally, there is growing interest in research into governance in schooling as a possible explanation of the often-found sector effect. Research shows that the public and private sectors of education vary strongly in the locus of control and the delegation of decision-making to the school (Coleman and Hoffer 1987, Bryk *et al.* 1993, Hofman *et al.* 1996, 2001). Moreover, several authors have pointed to differences in the administrative climate of public and private schools resulting from differences in the influence of various groups around the school on goals, curriculum, budget, personnel, and organizational arrangements (Hannaway 1991, Hofman *et al.* 1996, 2001).

Scott and Meyer (1988, 1994) explained how the local and institutional environments of public and private schools differ from each other, while Murphy (1991) stated that the administrative governance structure for the two sectors is considerably different. Accordingly, the influence of the surrounding social network on a school's goals, curriculum, budget, personnel, and organization greatly differs between public and private schools (Hannaway 1991, R. H. Hofman 1995). Comparisons of public and private schools in the USA point to basic organizational differences between the two sectors. A study by Bryk *et al.* (1993) concluded that effective Catholic high schools function better because of, among other factors, a decentralized governance structure. Regarding this, compulsory student selection is seen as a manifestation of government control on public education, and a heterogeneous pupil population may have negative effects on a public school's internal processes and climate (Talbert 1988). Talbert also stated that public schools must accommodate competing mandates for academic excellence on the one hand and educational equality on the other. Her study shows that there are significant differences between public and religious primary schools, for instance, in the emphasis on climate and on

explicit goals and hierarchical control. Research by Scott and Meyer (1988, 1994) showed that public schools demonstrate more complex higher level administrative structures, less goal coherence and less autonomy among school staff in decision-taking. Hannaway (1991) compared public and Catholic high schools in the USA, and concluded that differences in the autonomy exercised by public and private principals is significant, even after possible explanations for these differences, such as socio-economic status (SES), student test performance, school and district size, principal experience, and salary, were taken into account.

Impact of school effectiveness factors

The effectiveness of schools is viewed as related closely to the educational culture of the school. School effectiveness represents factors such as the teachers' expectations of the highest achievement level possible for its pupils, the degree of academic pressure on pupils, and the emphasis on basic skills. Many theories and models state that the use of evaluation procedures is an essential prerequisite for an effective school (Teddlie and Reynolds 2000). The assessment of pupils' progress and the way teachers function are often found to be pillars of educational leadership (Walberg 1984, Scheerens 1992).

Brookover and Lezotte (1979) took the social structure and social climate of schools into account as intervening variables between the inputs and outputs of the school as a social system. Social structure is operationalized, for example, in terms of teacher satisfaction, and the percentage of teachers that spend the work day teaching. Social climate is, among other things, indicated by characteristics such as the teachers' inclination towards improving educational achievement, and their expectations for pupil achievement. Hofman *et al.* (1999) investigated the relationship between school climate and pupils' perception of school, and concluded that teachers' positive perception of school relates positively to pupils' perception of school. A study by Hoy and Hannum (1997) used a health metaphor to conceptualize and measure school climate. It examined relationships between school health and student achievement in a sample of secondary schools. They showed that organizational health dimensions were significantly related to student achievement.

Community participation is a highly relevant factor regarding school culture (Sammons *et al.* 1995, Goldring and Shapiro 1996), referring to the extent to which the local community, particularly parents, is stimulated to become involved in the school programme. When educators involve minority parents as partners in their children's education, these parents appear to develop a sense of efficacy that communicates itself to the children and leads to positive academic results (Brookover and Lezotte 1979, Tizard *et al.* 1982, Hofman 1994). A study by Ogawa and Dutton (1997) on parent involvement and school choice revealed that parents who are more likely to participate in intradistrict options invest more in educational quality. Based on Bourdieu's work, Smrekar (1996) argued that schools draw unevenly on the social and cultural resources of members of

the society, and that these cultural properties acquired at home affect students' adjustment to school differentially. Smrekar extended the organizational focus on community, and used case studies to provide information on the intersection of school organization and family capital and on the character and content of family-school interactions. Based on primary and secondary school research, Sammons *et al.* (1995) concluded that parental involvement in school matters correlates positively with academic performances (see also Mortimore (1991, 1996)).

Impact of classroom effectiveness factors

Carroll's (1963) model of school learning has been highlighted in current research projects (W.H.A. Hofman 1995, Creemers and Reezigt 1996). In Carroll's original educational model, academic learning time (ALT) in the class setting constitutes the crucial factor of effectiveness. The distinction between available and effective learning time is an important issue. Teacher management behaviour affects effective learning time, as do the grouping systems and instructional methods used. Bloom (1976) stated that the key to successful learning lies within the following notions: motivation of the pupil, teacher support at crucial learning moments, and teacher feedback. Emphasis is on the individual learning process, for which four essential components are conducive: analysis of competent performance, description of the learner's initial state, the transformation process between the initial state and a state of competence, and assessment of the effects of instruction.

Reviews of effective school research led us to conclude that certain instruction factors have a strong impact on school performance (Levine and Lezotte 1990, Scheerens 1992, Stringfield and Slavin 1992, Creemers 1994, Sammons *et al.* 1995): reinforcement or rewards for correct responses or performance, remedial teaching on reading, cooperative learning, and individual counselling. Moderate associations with student performance were found in teacher expectations, individual instruction and in the use of 'advance organizers'. Instruction time shows strong correlation with student achievement and seems to be a prerequisite, although not a sufficient condition, for optimal student performance.

The anticipated relationships between relevant indicators of governance structure, school and classroom factors, and their relationships with pupil achievement are presented in the conceptual research model (Figure 1).

Frequently, differences in pupil achievement in public and private education are explained by the variation in the pupil populations of these schools (Willms 1984, Gamoran 1996). Research on school effectiveness has shown that differences in pupil achievement are due mainly to differences in pupils and their backgrounds (Teddlie and Reynolds 2000). Hence, a fair comparison of denominational schools requires adequate control for differences in school population. Therefore, individual pupil characteristics that possibly would interfere with the outcome measures will be accounted for in our study of the differential effectiveness of public and private schools. The next section addresses this so-called 'selection effect'.

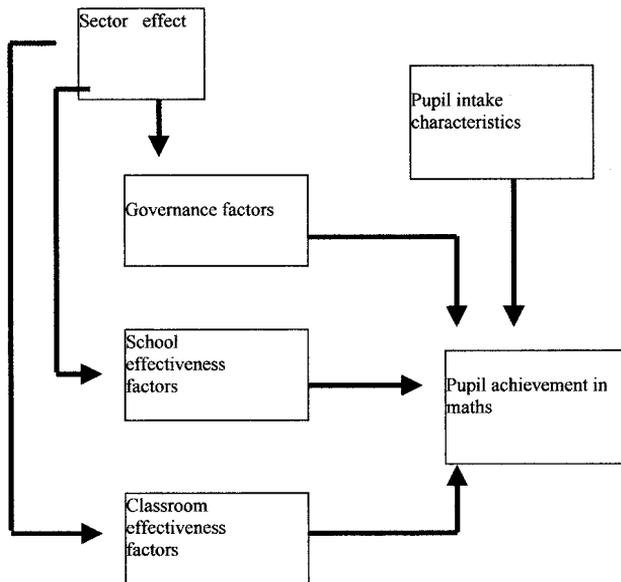


Figure 1. Relationships between sector, governance factors, school and classroom effectiveness factors, and pupil achievement.

Addressing the selection effect

Research has shown that pupils attending private schools attain higher achievement levels than pupils at public schools, and this phenomenon is common in Western education systems. Other than in The Netherlands (Hofman and Hofman 2001), it has been reported in the USA (Coleman and Hoffer 1987, Chubb and Moe 1990, Bryk *et al.* 1993), the UK and Ireland (Willms 1984, Willms and Echols 1992, Daly 1995) and in Australia and New Zealand (Wylie 1995). Although several studies have suggested that private schools, especially Catholic schools, have a positive effect on academic achievement (R. H. Hofman 1995), critical remarks have been made on the empirical status of these findings. One of the most serious criticisms is that it is possible that individual characteristics of students' home environments interact with school results (Gamoran 1996). Private schools can select the students they enroll and dismiss students who misbehave or have learning problems with which the schools cannot or will not deal. Thus, favourable private school effects could be a result of selection rather than causation. This is often called the effect of 'self-selection' (Sander and Krautmann 1995, Gamora 1996). This is an important issue in itself, but it is also important because some researchers use the differential effect of public and private schooling as an argument in their solution to the problems in various school systems. These reformers perceive parental choice for private schools as an answer to the problems in public education in big cities. Therefore it is important to investigate the differential effect of public and private schooling thoroughly while taking into account the

possible effects of self-selection through private school choice (Schneider *et al.* 1996).

It is necessary to take into account the differences in student population using variables like socio-economic background, ethnicity, and intelligence. Sander and Krautman (1995) and Hofman and Hofman (2001), taking into account the different socio-economic background of student populations, concluded that although the sector effect is getting weaker, private schools still seem to be more effective in facilitating certain types of student achievement than public ones. Sander and Krautmann (1995), in their study of the Catholic school sector, concluded that, after adjusting for self-selection, Catholic high schools still have favourable effects on the dropout rate. They added that, after taking other background factors into account, senior students in Catholic schools are not likely to acquire more schooling than seniors in public schools. Gamoran (1996) also addressed the influence of selection effects on achievement in schools. His results suggest that the positive effect of attending Catholic schools on test scores in mathematics could not be explained by selection bias. On the contrary, the coefficients appear even larger in the so-called selection-biased model, where the differences in pupil intake into the schools are accounted for.

An explanation for the varying effectiveness of private and public schools has been sought at different levels. Some authors claim that private schools are more effective in attaining higher student achievement levels than public ones, not as a result of differences in quality but as a result of the exceptional motivation of the predominantly non-Catholic parents of students in urban Catholic schools, and because many Catholic schools are single-sexed (e.g. Hawley (1995)). Although this might be the case in some countries, the situation in The Netherlands is different. First, all Dutch primary schools are coeducational and, second, in The Netherlands, all schools are equally supported by the Government, so that parents do not have to make sacrifices for a private education for their children. However, at the same time, Dutch researchers still find higher levels of academic achievement in private schools (mostly, but not only, in Catholic schools), just like researchers in the USA (Dijkstra and Peschar 1996). Hofman and Hofman (2001), taking into account the different socio-economic backgrounds of the student population, concluded that private schools in The Netherlands still seem to be more effective in facilitating higher student achievement levels than public schools. A recent Dutch study into the relationship between religious background and student achievement showed a significant, though limited, effect of the involvement of parents in church activities, whether Catholic or Protestant (Bosker and Dijkstra 2000).

Features of Dutch education

For a clear understanding of the research presented here, and of its relevance for researchers and policy-makers in other countries, it is useful to provide an insight into Dutch education in general and into its administrative system in particular. Education is continually evolving, and this process is reflected in the structure and content of education. The

educational system of The Netherlands was shaped into its present form during the first decades of this century. Dutch education underwent a longstanding conflict through the struggle of religious groups to found their own denominational schools and receive funding equal to the public schools (Dronkers 1995). In 1917, the so-called *Schoolstrijd* (school struggle) led to the full governmental support of Dutch denominational schools, and they were placed on the same footing as public schools.

The Dutch example combines free parental school choice with equal subsidizing and treatment of public and private schools by the State. Research in the USA (Chubb and Moe 1990) and in the UK (Echols and Willms 1995) has shown the importance of factors such as governance structures, school climate, and social atmosphere on parental school choice. The Dutch case is especially interesting because the governance structure of Dutch schools, which is different in public and private schools, is comparable with that in countries like the UK and the USA. Various authors point out that The Netherlands has developed a unique system in which education and most other services are financed by the Government; however, generally they are operated by private non-profit organizations, and are often religious in nature (Dronkers 1995, Dijkstra and Peschar 1996). The balance between freedom of school choice and aims of national educational policy makes the Dutch case interesting for educators all over the world. However, The Netherlands manifests an interesting paradox. International comparison shows that The Netherlands is among the strongest secularized countries of Western society: it has an extensive number of private schools (approximately 75% of all primary schools are private schools). This indicates that Dutch religious schools, as is the case in many other countries, function in a less religious society. This large private sector is composed of denominational schools, for the most part Catholic and Protestant. The Netherlands has a balanced primary education system which, according to the most recent figures (1997), includes 31% public, 27% Protestant, 36% Catholic and 6% private neutral (secular) schools. Because of the equal subsidizing of schools, The Netherlands does not have a prestigious elite of schools outside the State subsidized sector, as is the case in most other countries. The effectiveness of some primary schools is not biased by the skimming off of the most able students, the financial possibilities of parents, or by geographical constraints on parental choice (Dronkers 1995). Hence, The Netherlands offers a fruitful case for the international research community to explore the sector effects from the viewpoint of school governance structures and the educational culture in these schools.

Dutch educational administration

Although the Dutch education system includes a private and a public sector, the difference between these sectors refers to a distinction caused by religious affiliation and is a result of the evolution of Dutch society. The State finances both the public and the private sectors equally, as provided for by the law in 1917. Alongside this financially egalitarian policy towards both sectors, the

government has an identical policy concerning these schools. In fact, all Dutch schools, public and private, are subject to national governmental control of equal examinations, salary, school buildings, capital investment and so forth (R. H. Hofman 1995). The central government strengthened its control over the actual content of education by introducing a national curriculum in 1993 (Teelken 1998). Dutch government expenditure on education depends on the number of pupils and students, and thus it is adjusted according to the number of enrolled students every year.

The Dutch constitution lays specific demands on the educational administration of public and private education. Private schools are governed by local autonomous school boards (a foundation or an association), while the public counterparts are governed by local authorities (or an appointed institution). The effect of this is that public education depends on the policy of the local government, while private education can function more autonomously. The distinction between public and private Dutch school boards reveals an administrative context that resembles that of other countries (cf. Goldring (1991)). Private schools (Protestant, Catholic, and neutral) have school boards consisting of individual members (mainly parents), as opposed to public schools which are managed by members of the local government. School board members in private education are lay persons, very often solely parents with children attending the school they govern, and they serve as representatives for all the parents. They are volunteers and do not get paid. Public schools are governed by local authorities, and we note that their employees do not necessarily have children in the schools they govern and board members are paid by and elected from the local district authorities. This difference in the bureaucratic features of public and private Dutch schools influences the nature of the contact between school community and school governance. Private schools show more mutual contact between staff and parents, and are more able to develop a common educational basis. Furthermore, local authorities influence public schooling in a political way, because they promote educational experiments for policy reasons (not necessarily bad ones). Boards of private schools are strong representatives of the parents and are able to abstain from this kind of local political control (Dronkers 1995). Public schools endure high forms of administrative control, and in many ways are dependent on the bureaucratic functioning of the local government, while private schools are able to operate more autonomously.

Data collection and variables

Data collection

Originally, our research started out as a large-scale survey carried out in a stratified sample of 250 Dutch primary schools, and their school boards. The system to identify students, schools, and school boards allows for a combination of these data sets. Such a combination offers a rich source of information about pupils' educational careers and factors that affect these careers. The information that is available at different levels (pupil,

classroom, school, and school board) offers considerable advantages. The analyses in this paper are based on a selection of data from 90 Dutch primary schools and their school boards, with a complete set of data on our indicators. Our data represent a reliable national sample of Dutch schools for primary education, and our findings are generalizable to the population of Dutch primary schools.

The original data sets of primary schools and their school boards were set up to find predictors of effective schools from the viewpoints of schools on the one hand and school boards on the other. Different surveys were constructed to provide information on school boards' characteristics, and on schools and classrooms. In order to obtain such varied information from the schools concerned, surveys were carried out among three different school groups: (1) the school heads; (2) the grade 8 teachers; and (3) the chairs of the school boards.

Most of the governance structure indicators and school and classroom level indicators are measured using Likert scales, which are sufficiently reliable (Cronbach's alpha reliability between 0.71 and 0.92), or with reliable Rasch scales (Loevinger H between 0.38 and 0.67), and sometimes by using percentages or sum scores. The psychometric characteristics of the scales and variables have been gathered together in the Appendix, which contains three tables of descriptive data available on pupil level characteristics (Table A1), on school and school board characteristics (Table A2), and on classroom characteristics (Table A3).

Because of the available data set this study has taken a solely quantitative approach. However, we acknowledge the importance of other, more qualitative, approaches to obtain more specific information on the nature of the processes that take place in schools and classrooms and how the governance structure and the community around the school affect the schooling process. The next step in this research will be an analysis of examples of best practice, to obtain more in-depth information about the specific processes that take place in public and private schools that have been able to develop an effective educational climate, including effective school-based governance and parents strongly involved in school life.

Pupil-level variables

Our study distinguishes two hierarchical levels, that is, pupil level and school level. Our output measure is the mathematics achievement of pupils. The maths scores of approximately 700 pupils in the 8th grade of primary schools (11- and 12-year-olds) were measured using a standardized achievement test. This is a national test that is taken in most Dutch primary schools.

In this study, the focus is on macro-level effects. However, since self-selection may cause differences between the pupil populations of schools, possible individual correlates should be taken into account together with maths achievement. Pupils-level variables such as sex, socio-economic background (SES), intelligence (IQ) and maths achievements (math) in the year before are therefore handled as covariates in the analysis model.

Unfortunately, the religious background of the pupils was not taken into account in the pupil survey. Sex is handled as a dummy variable, and in the case of the VARCL analysis: male = 1 and female = 2. The socio-economic status of the pupils is measured by means of a composite score of the work status and the formal education level of the father and mother. This score ranges from 5 (low SES) to 30 (high SES) and the third and fourth moments (skewness and kurtosis) of this variable indicate that its distribution hardly departs from a completely symmetric bell-shape curve, and thus approximates a normal distribution curve. Therefore we handle this variable as an interval scale. Pupil intelligence is measured using three subtests of ISI, a Dutch intelligence test. The distribution of the pupil variables, the covariates and the output measure are presented in Table A1 in the Appendix.

School-level variables

The governance structure of public and private school boards was measured at the school level. Several indicators were used to measure the schools' culture and policy towards parental participation in the school as well. Table A2 in the Appendix presents the psychometric characteristics of the scales used. The governance structure was measured by conducting a survey among the chairs of the school boards. If the chair lacked certain kinds of information he/she was advised to obtain additional information from the secretary of the school board. The information obtained concerned the scope of governance ('scale': how many schools does one board govern) and the board's financial policy ('finpolicy'). The financial policy was measured using a scale of 13 items ($\alpha = 0.82$) with the same question for each item: 'how frequently is the school board involved with ...?', e.g. 'getting extra finances for their school'. Also we used two indicators concerning the intensity of external communication of the school board. The first one relates to how often the school board had regular meetings with various members of the school community ('regular'). The second ('influence') measured the perception of the school board of the influence of the school community members like the principal, the teachers, the parent committee and the parents in general, on school board decisions.

School policy towards the relationship with parents constituted the second aspect at the school level. These indicators were measured by surveys of the primary school heads. Information on parental participation in the school was given by the school head, and focused on the frequency with which parents were involved in practical aspects such as extracurricular activities and lessons ('freparents'). These indicators also measured parental influence on the schools' policy, the schools' organization and the schools' education goals ('involtype'). The ('cohesion') factor refers to the cohesion within the school team itself concerning parental participation in their school. The school head was asked to assess the degree to which the school team shows a positive attitude towards parental participation in the school. This item's range goes from a very low, through a moderate, then strong, then very strong positive attitude towards parental participation.

The third aspect concerned the schools' educational culture. Aspects concerning the educational culture of the school were measured by means of a survey that combined questions for the school head on the extent of an achievement-oriented policy in his/her school ('achieve'), on the degree to which education was evaluated at school level ('evaluate') and on the emphasis the school head placed on the learning of basic skills like reading and science, as opposed to social and creative skills ('basics'). Furthermore, 'monitor' is concerned with the degree to which the school has a policy to evaluate the pupils' achievement, at school level, in order to facilitate consistency in the learning process. Other data collected from the head of school included the degree of an orderly school climate ('order') with formally stated school rules ('rules').

Classroom-level variables

The factors that indicate an effective classroom culture were measured by a survey that was filled out by the Grade 8 teachers in 90 primary schools (see Appendix, Table A3, for psychometric characteristics).

The quality of the instructional process at the classroom level was represented by the clarity of classroom rules during instruction ('rule-sinstr'), and was measured using an 8-item scale with statements on the rules. Another indicator concerned the pupils' freedom to organize their own learning process ('responsible'). On an 8-item scale, the teachers assessed how much influence they allow their pupils in matters like asking other pupils for help during lessons, deciding themselves which tasks they conduct first, assessing their own work, and going to the library when they think it is needed. Teachers' participation in the decision-making process ('participation') and the degree of their achievement orientation ('orientation') are also expected to have positive influences on the classroom's educational culture.

In our survey among teachers, we also assessed time, and opportunity to learn. We measured the percentage of time reportedly spent on basics like arithmetic and language ('%basics') and the amount of homework given by teachers ('homework'). The efficiency of organization of the instruction process ('organization') was measured by the percentage of time teachers reported spending on the planning of their lessons for the following day, the making of a weekly teaching plan, keeping to the timetable, and by the assigned time spent on lessons. The last indicator measured how teachers deal with pupils with learning problems ('planproblem'), whether they used special procedures to observe these pupils, wrote notes about them, or referred to a set of observations or a written working procedure on the specific problems of pupils at risk.

Multilevel modelling of the research problem

Our data set has a hierarchical structure. Although it relates to different conceptual levels (classrooms, schools, and boards), we are dealing with a

two-level data set. At the macro level, our study is based on a random sample of 90 Dutch primary schools. At the micro level, we are working with a random sample of 700 pupils from Grade 8, all 11- or 12-year-olds.

The theoretical background of this study concentrates on the governance structures, school, and classroom variables that could (partly) explain (are conditioners of) the sector effect. In order to draw up a modelling strategy, we need to determine the measure of the sector effect first. The sector effect is presented by the factor 'denomination', which consists of four school categories: public ($n = 27$), Catholic ($n = 32$), Protestant ($n = 25$) and neutral (secular) private ($n = 6$) schools. Second, the covariates model is fitted, containing individual-level variables such as intelligence, sex, and socioeconomic background. Finally, we introduce governance structure indicators and school and classroom factors into the multilevel analysis in three separate variable blocks.

Students are clustered within schools, which may indicate that their responses are not independent of each another. Thus, we violate one of the basic assumptions of traditional regression, and possibly this could lead to overestimating of group-level effects and underestimating the standard errors of the school effects. To tackle this violation of the independence assumption, multilevel analyses with a pupil level and a school level were conducted. In such a multilevel model the variance is partitioned into within-school and between-school components (Longford 1986, 1993, Bryk and Raudenbush 1992). This procedure removes any distortion of the between-school error variance caused by a non-independence of responses within schools (Gamoran 1996).

Results

The basic idea behind the following analyses is that sector effects on individual maths performance can be explained by school governance structure and by school and classroom factors associated with an effective educational culture.

Basic variance components and individual level effects

The so-called 'empty' model (Table 1, model 1) is the first model fitted. This model clarifies the amount of variance that is situated at the pupil level on the one hand and at school level on the other. The 'empty' model shows a significant difference in between-school variance of 43.0 points out of a total of 189.6 points ($189.6 = 43.0 + 146.6$; see Table 1, last row) in maths achievement. This outcome indicates that it is possible to search for governance and school and classroom-level correlates that could account for this school-level variance. The intra-school correlation coefficient, that is, the indicator of the percentage of variance at the school level is 0.23, i.e. $43.0/(43.0 + 146.6)$. Thus, 23% of the total variance in maths scores is due to school-level factors. This significant degree of between-school variance also indicates that the maths scores at the aggregated school level, in terms

Table 1. Results of the multilevel regression (standard error in parentheses).

	Model 1 Empty	Model 2 Pupil	Model 3 Sector	Model 4 School I: Governance	Model 5 School II: Parents	Model 6 School III: Culture	Model 7 Classroom last	Model 7A Classroom first
Grand mean	102.3	43.2	40.6	34.6	34.7	25.2	8.1	29.5
(2) IQ		0.54 (0.03)**	n.s.d.	n.s.d.	n.s.d.	n.s.d.	n.s.d.	n.s.d.
male		0.00 (0.00)						
female		-1.4 (0.8)*						
SES		1.3 (0.3)**						
(3) public		0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	n.s.d.	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Catholic		4.6 (1.5)**	-0.80 (2.4)	-0.80 (2.4)		-1.9 (2.2)	-2.2 (1.8)	5.0 (1.4)**
vProtestant		2.0 (1.7)	-2.8 (2.5)	-2.8 (2.5)		-3.7 (2.3)	-2.8 (2.0)	2.6 (1.6)
vNeutral		4.0 (3.2)	0.51 (3.9)	0.51 (3.9)		-0.48 (3.4)	-1.1 (2.9)	4.9 (2.9)*
(4) scale			-0.12 (0.09)	-0.12 (0.09)	n.s.d.	4.2 (1.3)**	0.72 (0.29)**	
finpolicy			-0.51 (0.59)	-0.51 (0.59)			3.2 (1.0)**	
regular			0.50 (0.40)	0.50 (0.40)				
influence			3.3 (1.5)**	3.3 (1.5)**				
relimission			0.43 (0.42)	0.43 (0.42)				
(5) involtype					-1.1 (1.6)			
frepparents					1.6 (1.4)	2.6 (1.3)**	2.6 (1.0)**	
cohesion					0.01 (0.21)		0.53 (0.16)**	
(6) achieve						-0.20 (0.09)**		
evaluate						-0.15 (0.34)		
monitor						2.6 (0.48)**	2.5 (0.45)**	
teamstable						-0.02 (0.02)		
(7) rulesinstr							3.7 (2.0)*	2.8 (2.5)
homework							-2.4 (1.3)*	0.57 (1.5)
together							-1.8 (0.61)**	-1.6 (0.7)**
organization							0.09 (0.03)**	0.08 (0.04)**
planproblem							1.4 (0.44)**	1.3 (0.52)**
%basics							0.07 (0.05)	0.09 (0.05)**
feedbackst							-3.5 (1.3)**	-1.9 (1.3)
orientation							1.1 (0.85)	-0.96 (1.1)
School variance	43.0	25.1	21.2	16.7	16.4	8.3	0.2	11.9
Student variance	146.6	83.2	83.2	83.1	83.2	82.7	83.4	84.2 (9.2)
Random var. comp. sex	-	12.3 (3.5)	10.9 (3.3)	10.8 (3.3)	10.1 (3.2)	10.6 (3.3)	9.7 (3.1)	9.1 (3.0)
% Explained school variance	-	-	16%	33%	35%	67%	99%	53%

** : Significant effect at 0.01 alpha Level; * : Significant effect at 0.05 alpha Level.

of a 10% prediction interval, will vary between 89.7 and 115.5 points. In other words, differences between schools in maths outcomes are substantial.

The pupil model (model 2) shows three significant effects on pupil performance. Pupils with higher intelligence levels (IQ) from higher socio-economic backgrounds (SES), and boys in general (male), perform relatively well. Introduction of the sex variable makes it clear that there are also random effects that reveal differences in the success rates of male and female students (Table 1, last row).

Sector effects

The third model in Table 1 reveals the core of the four school sectors: public, Catholic, Protestant or neutral primary schools. The public schools serve as a baseline group in the analysis and they also score lowest of the four school sector categories in mathematics. However, after controlling for the differences in pupil intake, such as sex, intelligence, and socio-economic status, we can state that Catholic schools show significantly higher achievement levels in maths than do public schools. The Protestant and the neutral schools do not differ significantly from the public schools. The sector effect explains about 16% of the estimated between-school variance (Table 1, last row). Although it accounts for a substantial part of school-level variance, the latter being 23% of the total (pupil and school) variance, this indicates that the sector effect explains only about 4% of the total variance in maths scores (16% of 23%).

School effects

The school-level variables are arranged in three blocks: school governance structure (model 4), policy towards parents (model 5), and school culture factors (model 6). Our research objective is to find out if indicators of these three blocks mediate the sector effect in some way.

Only one of the structural variables of school governance (Table 1, model 4) shows a significant impact on maths achievement, i.e. the 'influence' of the school community members on school board decisions. It is remarkable that, after including this factor, the positive impact of attending a Catholic school totally disappears. This finding shows that the school community members, such as the principal, the teachers, and the parents, have a stronger influence in the decision-making process of Catholic schools than those in the other three sectors. This difference seems especially striking if we compare Catholic schools with public schools. The explained school variance increases by 17 points, from 16% to 33%.

A variable cluster concerning school policy measures on the contact between school and home environment (Table 1, model 5, parents) is incorporated in the analysis. None of the included variables exerts a substantial impact on maths achievement or on the sector effect.

School culture variables, which can be seen as conditional to instructional effectiveness, are the third cluster of variables (Table 1, model 6) and exert a strong impact on mathematical achievement. In particular, the emphasis of school culture on the monitoring of pupil performance ('monitor') shows a significant effect. Interestingly, the incorporation of the school culture variable in the model also leads to some changes in the effects of school policy in the relationship between school and home environment. The frequency of parental participation in the school ('frepparents') becomes a significant factor at this stage of the analysis. It is possible that the emphasis on evaluation and monitoring stimulates more school/parent contacts. Inclusion of school culture leads to: (a) negative coefficients for the original positive effects on maths for the private, especially the Catholic, schools (again a mediating effect); and to (b) a quite substantial increase in the explained between-school variance, i.e. an increase from 35% to 67%.

After including the school-level factors, we do not observe a significant decrease in the random variance component, regarding gender. In other words, school-level factors, such as 'the influence of school community members on their school board decisions' and 'the degree of pupil evaluation-oriented policy of the school', do not produce an egalitarian effect.

Classroom effects

Finally, we have included the classroom effectiveness factors in the model (Table 1, model 7). Beforehand, we expected that initially the classroom factors would have a significant impact on mathematical achievement and then that they would substantially mediate the sector effect. The first expectation is affirmed by the results shown in Table 1 for model 7. Four variables (teachers working 'together', the efficient 'organization' of the classroom, teachers dealing with pupils with learning 'planproblems' and feedback on student achievement, or 'feedbtest') exert strong effects on maths achievement. The negative effect of the variable 'together' indicates that teachers who also work together in regular school activities produce higher achievement levels than teachers who only work together in extra-curricular activities. The negative effect of the variable 'feedbtest' is unexpected. In general, feedback on students' achievement is considered to have positive effects. We explain this negative direction with a cautionary note on: (i) the operationalization of this variable; and (ii) its relation to other variables in our model. First, in most research projects, the variable 'feedback' is operationalized as the teacher feedback in the ongoing instructional process. In our study, however, the variable we used refers to teacher feedback on diagnostic and achievement tests only. Second, as we have already seen a strong positive effect of monitoring on pupil achievement, it is possible that the multicollinearity of variables causes the negative direction of this effect.

Furthermore, our model shows the classrooms variables' moderate effects on maths achievement, such as the clarity in classroom rules and the

extent to which teachers give homework systematically. The combined impact of these factors on maths achievement is large, as is clearly expressed in the additional explained variance of 32 points (from 67% to 99%). The almost completely bounded school-level variance by our school and classroom factors indicates that the maximum possible variance of 23% is indeed explained.

Due to the fact that school-level factors have already shown strong mediating sector effects, it is impossible to verify or reject the hypothesis of classroom factors mediating the sector effect directly. Therefore, an additional analysis was performed in which classroom-level factors are introduced to the model immediately after the sector effect has been established. The results are presented in Table 1, column 7A, classroom first. This analysis again shows strong effects of the variables 'together', 'organization' and 'planproblem' (no effect of 'feedbtest') which, in combination, explain the 37% of school-level variance. Moreover, after including classroom factors we observe a decrease in the random variance component of sex. The classroom factors, such as cooperation among teachers, efficient planning, feedback procedures on achievement tests and clarity of rules, seem to produce some egalitarian effects on sex-specific achievement.

However, classroom-level variables exert no sector mediating effects at all. The initial distribution of the effects of public, Catholic, Protestant, and neutral private schools on maths achievement remains largely stable after including classroom variables. Thus, we have to conclude that the hypothesis concerning the mediating sector effect of classroom-level effectiveness factors is not supported.

Conclusion and discussion

Mediating the sector effect

Our main research purpose was to examine whether the differences in maths achievement in the different sectors could be explained as a function of differences in governance structure, school effectiveness factors, and classroom-level factors in public and private schools. The results of our analysis show that the sector effect, in our case the higher pupil achievement level in Catholic schools, can for a substantial part be explained by the variables we used in our analysis, especially by that of the schools' educational culture. Furthermore, it is particularly interesting that although Catholic school pupils do not have the highest IQ and SES levels, they achieve the highest results in mathematics out of the four denominational categories. We found this after taking into account the pupil intake differences of the schools. However, if other possible so-called 'selection-effect variables', such as 'differential educational objectives of parents' or 'strength of the religious home background', were taken into account then the outcomes could well have been different.

Our fitting multilevel model seems to demonstrate that the classroom-level variables exert no sector mediating effects at all. The initial

distribution of the effects of public, Catholic, Protestant, and neutral schools on maths achievement remains largely stable after the inclusion of classroom variables. However, although the importance of the classroom level is not visible in mediating the sector effect, it is of utmost importance for the effectiveness of schools. The extent to which teachers work together in regular school activities and their use of efficient planning procedures concerning the instruction process in general, and for pupils with learning difficulties in particular, exert significant effects on maths achievement. Additionally, the extent to which clarity exists in classroom rules and the extent to which teachers give homework to all pupils and check homework systematically show moderate effects on maths achievement.

The proportion of the explained school-level variance (including the sector effect) in our analysis reaches 67%. When we examine the variance, explained by the various variables blocks in our analysis, it appears that the school level is the most substantial of all levels. Interestingly, we observe an interaction effect: the incorporation of school culture variables leads to some changes in the effects of school policy on the home-school relationship. After school culture variables are included, the frequency of parental participation in school and also the consensus within the school team on parental participation together become a significant factor at this stage of the analysis. It is possible that an emphasis on evaluation and monitoring stimulates more school/parent contacts.

School governance features

It appears that the sector effect itself is particularly mediated by school governance characteristics. This mediating effect is remarkable: the positive impact of attending a Catholic school totally disappears after including the school governance factor. This finding shows that in Catholic schools the influence of school community members (such as the school head, the teachers, and the parents) on the school boards' decisions is stronger than in all of the other three sector categories, and is much higher than in public schools. After including school culture variables, a significant effect is also found for the frequency of formal meetings with the above-mentioned members of the school community. Interestingly, the stronger the community members' influence on the school governance, the higher the maths achievement level becomes. Dutch private schools and, in particular, Dutch Catholic schools seem to have more effective school boards, which have a closer relationship with their schools, are more involved in the schooling process and hold a more visible profile than the local authorities that govern public schools. Private schools show more mutual contact between staff and parents with less bureaucratic rules, and it seems that they are more able to develop a common educational basis. A possible explanation of this finding is that local authorities influence public schooling, e.g. advocating educational experiments for political reasons, while boards of denominational schools are strong representatives of the parents. Especially in Catholic schools, boards' decisions are influenced more by parents' wishes, and therefore it is possible that the schooling

processes in Catholic schools are more adjusted to parents' wishes and are more in line with the pupils' home environment.

The role of religious education

The Netherlands presents an interesting paradox. On the one hand, international comparison shows that The Netherlands is among the strongest secularized countries of Western society. However, on the other hand, it has an extensive number of private schools. This indicates that Dutch religious schools, as is the case in many other countries, function in a less religious society. It is well known that parents choose schools for their children that they believe best meet their educational objectives, conditional on their own social, economic, and religious constraints. Because in The Netherlands the public and private schools are equally supported by the Government there must be reasons why non-religious parents send their children to religious schools and not to public schools. As well as the reasons mentioned above (which are the outcome of our research), other explanations are possible. Hofman and Hofman (2001) reviewed a number of empirical studies to explain this paradox, arguing that private education is still attractive to parents not so much for religious reasons but because conditions in private schools are more able to facilitate effective school features. The Dutch case shows that denominational schools are still attractive for parents in a pluralist society, not so much because of religious reasons, but rather because the religious beliefs are not strongly manifest in the lessons and traditions of these schools. Furthermore, there are no constraints of travel distance or rules for admission. Nevertheless, one of the most important reasons for non-religious parents to chose religious schools is because of their effectiveness. Furthermore, our findings show that modern parents, religious as well as non-religious, seem to appreciate schools that give attention to norms and values and help pupils with the moral and ethical questions of life. An interesting aspect is the extent to which sector-related school choice resembles differences in religious attitudes or lifestyles in private schools. This is an important question, because school choice is not independent of the socio-economic background of parents. Frequently, social networks of friends and relatives providing information about public and private schools are segregated by race and education levels. Parents from higher socio-economic backgrounds seem to find easier access to information on school quality than others (Sugarman and Kemerer 1999). This could point to some kind of interaction or even reinforcement of the importance of family characteristics in school choice and the outcomes of schooling.

School community and school governance

Our research results indicate that the governance structure and especially the culture of Catholic schools reinforce the importance of the school community in relation to school governance. In line with this we observe

the much discussed findings of Chubb and Moe's (1990) research, which indicate the significance of a different administrative organization concerning the effectiveness of public and private schools. Our outcomes indicate the need for new directions in explaining the sector effect. Our findings concerning the importance of the influence of the school community members on school board decisions and the emphasis in school policy on evaluation and monitoring of pupil performances reinforce the importance of the communication and mutual understanding between school board members and school heads. Bryk *et al.* (1993) largely explain the effectiveness of Catholic high schools by their communal character.

Our findings indicate the importance of the influence of the school community members on the school boards' decisions, advocating an approach with less centralized decision-making and with more authority given to individual schools. The policy and decisions of the school board should rely more strongly on input from members of the school community. Furthermore, school heads should consult various school community members, and incorporate their opinions into a communal educational school policy. Other studies outline similar conclusions. From his study, in which he analysed the perceptions of 74 chief executive officers on restructuring schools and the role of the superintendency, Murphy (1994) concluded that developing a community should be enhanced. Moreover a 'team approach' seems to be a preferred vehicle for involving others such as school staff and members of the community in the decision-making processes of the school or district. Coleman and LaRocque (1990) also stressed the relevance of research on the process of negotiation in organizations, particularly the decision-making process in school districts. Sergiovanni (1994) even made a strong case for building community in schools as an important end in its own right.

Towards a responsive leadership style

The empirical evidence presented here leads to the conclusion that effective leadership features and especially coherence within schools produce a sense of community that, in turn, shapes conditions in schools that positively affect student achievement. These findings are all the more interesting as they are in line with research findings from other countries, e.g. the USA, where school finance systems are considerably different from those of The Netherlands. It seems there is a larger issue involved and we must consider the social impact of our research. Our findings have cross-cultural significance, because organizational and management conditions in schools appear to be at the core of sector differences in different countries with different educational systems. A positive educational climate, parents' educational involvement and effective school-based management are found to be prerequisites for an effective schooling process in countries all over the world. It seems that the outcomes of schooling are sensitive to contextual differences in the management of public and private schools, and we suggest that contextual differences in the different sectors should be

taken into account and be used to (partly) explain differences in the outcomes of schooling.

A responsive management style by school leaders next to that of school boards could make schools even better social contexts of learning. Frequent communication of school leader and teachers with the parents concerning the learning process of their children, and parents having a balanced influence on the decision-making process of the school management, as in the case of school boards, could be prerequisites for sustaining effective educational learning contexts. For schools to develop an effective educational climate and instruction processes and to make sure that teachers know how to deal with each and every pupil, frequent monitoring of the educational growth (cognitive and socially) of pupils seems important. We have found that schools that work efficiently, that have a monitoring policy for measuring, following and improving pupil achievement, and that focus their monitoring policy on activities at the different levels in the school seem to achieve better results. In fact, this points to the application of a school-based management structure using more collaborative decision-making models and relaying valuable information to persons closest to the pupils, the school team. The findings of our study seem particularly timely for educational researchers and practitioners in those countries where the interest in school-based management and governance is rising. If policy-makers, governors, school managers and, especially, school leaders and teachers take these findings into account, schools and pupils in different countries could benefit.

However, further research could make clear the specific processes that underlie our findings. This study has taken a solely quantitative approach to the functioning of schools. However, we acknowledge the importance of other, more qualitative, approaches to obtain more specific information on the nature and the processes that take place in schools and classrooms, and how the governance structure and the community around the school affects the schooling process. Studies that combine quantitative and qualitative research methods in finding out how different school systems are able to develop effective educational climates and effective school-based governance, and how they get parents to become more involved in school life, are essential if we are to gain more insight into educational processes, thereby promoting further improvement of both public and private educational systems.

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Appendix

Table A1. Descriptive statistics of pupil-level variables and sector.

	Mean	Std. Dev.	Min.	Max.	N
Mathematics	103.2	13.6	58.9	122.4	718
Intelligence	103.7	14.3	54.5	147.8	718
Socecon. status	3.5	1.3	1.0	6.0	698
Sex	1 = male, 2 = female				
	Mathematics	IQ	SES	N	
Public	99.2	102.6	3.3	177	
Catholic	105.2	104.3	3.5	349	
Protestant	102.5	103.5	3.4	148	
Neutral (secular)	105.6	105.6	3.8	24	

Table A2. Descriptive statistics of school-level variables^a.

Variable	Mean	Std Dev	Minimum	Maximum	N items	Reliability
Governance structure						
scale	5.93	8.22	1.00	44.00	1	–
finpolicy	0.04	1.05	–2.18	2.83	13	$\alpha = 0.83$
regular	6.25	2.31	2.00	10.00	5	$\alpha = 0.80$
influence	2.05	0.45	1.38	3.38	8	$\alpha = 0.73$
School–parent policy						
frepresents	2.84	0.43	1.71	4.00	4	$\alpha = 0.80$
involtype	2.59	0.42	1.75	4.00	3	$\alpha = 0.71$
cohesion	4.44	2.86	0.00	18.00	1	–
School culture						
achieve	2.52	0.62	2.00	4.00	2	sum
evaluate	3.99	1.63	1.00	6.00	2	sum
basics	3.16	0.69	2.00	5.00	6	$H = 0.53$
order	4.49	0.41	2.91	5.00	11	$\alpha = 0.83$
rules	1.97	0.65	1.00	4.00	4	$H = 0.67$
monitor	4.18	1.27	1.00	6.00	3	sum
teamstable	73.81	22.06	0.00	100.00	1	%

^a α = Cronbach's alpha reliability; H = Loevingers' H (a monotone Rasch scale).

Table A3. Descriptive statistics of classroom-level variables^a.

Variable	Mean	Std Dev	Minimum	Maximum	N items	Reliability
Instructional quality						
rulesinstr	2.82	0.25	1.50	3.00	8	$\alpha = 0.87$
feedbtst	2.76	0.45	1.67	3.83	12	$\alpha = 0.72$
responsible	2.22	0.46	1.50	3.63	8	$\alpha = 0.73$
participation	31.08	6.53	12.00	40.00	8	$\alpha = 0.92$
orientation	2.36	0.58	1.22	3.89	9	$\alpha = 0.75$
together	1.06	0.92	0	3	3	$H = 0.38$
Time and opportunity to learn						
%basics	50.84	10.82	28	100	2	ratio
homework	1.97	0.43	1.0	3.33	3	sum
organization	65.08	15.92	20	100	4	%
planproblem	2.13	1.17	0	4	4	$H = 0.43$

^a α = Cronbach's alpha reliability; H = Loevingers' H (a monotone Rasch scale).

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