Social Capital and Student Achievement in Norwegian Secondary Schools

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Abstract:

This paper investigates student social capital in Norwegian secondary schools and its effects on student achievement. Using data from the national survey 'Young in Norway 2002', it explores the concept and measurement of social capital in the school context by applying factor analysis. The paper also tests an analytical model that links student home background, social capital at school and student academic achievement, using a structural modelling technique. Control variables in the analysis are student age, gender, school size and home community. Testing the analytical model with female and male student subgroup data takes gender perspectives into consideration. Finally, statistical results are presented and discussed, and implications for further research are provided. The study finds that student social capital, generated from student social relations with parents, teachers and peers, has a significant influence on student achievement.

Keywords: social capital, Norwegian secondary school, student achievement, gender, structural linear relations

Introduction

Comprehensive schooling, a core curriculum and the principle of equal educational access for all allow every Norwegian child to enjoy at least thirteen years of free public schooling before they choose between higher education and labour market entry. Policies for equality in terms of education have deep roots in Norway and a high degree of formal equality supports participation in the education system regardless of social and cultural background, gender, place of residence or special needs. However, as in many other societies (Cabrera and La Nasa, 2001; Choy *et al.*, 2000; Erikson and Jonsson, 1998; Hu, 2003; Husén, 1989; OECD, 2001, 2003, 2004), links still exist between participation in education, learning outcomes and home socio-economic status in Norway (Huang 2007).

Although the effect of parental educational attainment and family economic situation on student achievement persists in most societies, the variance of a child's educational outcome explained by home background is still rather limited (Buru-Bellat, 2004). In addition to the influences of human and economic capital at home, research has found that home structure and residential stability can influence parental expectations, parent-child discussion of school activities, type of school attended, school changing, parental involvement in school activities and parent-school academic contact. These factors, in turn, are strongly associated with student school achievement (Güzel and Berberoglu, 2005; Meier, 1999) and ultimately impact student educational attainment (Sandefur and Wells, 1999; Sandefur et al., 2006). Moreover, school characteristics such as location, resource differences and endogenous social interactions have an impact on the school environment, student educational norms and goals, which in turn influence both student achievement and eventual educational attainment (Morgen, 2001; Mortimer, 1997). Overall, however, student home socio-economic background is found to override school effects (Breen and Jonsson, 2005; Thrupp, 1999).

As human capital is transferred, at least partly, through interaction between parents and their children, families with high levels of human capital but low levels of interaction do not necessarily lead to a child's success in school. Human and economic capital in the home are more easily translated into success at school when a good child-parent relationship is also present (Teachman *et al.*, 1996). Moreover, children connect and interact not only with their parents but also with others outside the home, especially peers and teachers at school. These outside relationships are also found to influence a child's development (Harding, 2003;

McDonough, 1997). An international comparative study based on the PISA 2000 results (Olsen, 2003), has showed that Norwegian schools have a worse than average teacher-student relationship compared with other Nordic countries. This factor had a negative effect on student reading ability, explaining 14 per cent of the variance between schools in Norway. Nevertheless, there lacks a holistic view on children's social relations forged in home, school, community and the greater society or the actual impact of these social relations on the wellbeing of children. The empirical research on these issues is scarce.

Using data from a national survey in Norwegian secondary schools in 2002, this paper investigates student social relations through a conceptual framework of social capital and its effect on student academic achievement in the Norwegian school context. The paper starts with a review of social capital theories, followed by the development of an analytical framework and the introduction of data and methods. Statistical results are then reported and discussed.

Theories and the conceptual framework

Social capital as an influential factor for children's educational achievement was first introduced by James Coleman (1988). Coleman suggests that in addition to parental educational attainment and family income, another equally important determinant of the wellbeing and educational development of children is the level of 'connectedness' between the child and his or her family, friends, community and school. According to Coleman, this connectedness – a product of social relationships and social involvement – generates social capital. Coleman further suggests that the concept of social capital serves as a mechanism for transmitting the effects of family human capital from parents to children. Coleman defines social capital as follows:

> "Social Capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structures, they facilitate certain aspect of social structures and they facilitate certain actions of actors – whether persons or corporate actors – within the structure." (Coleman, 1988, p. 98).

One of the distinguishing features of the concept of social capital is that it embraces a number of different areas of investigation. Indeed, the concept consists of a variety of components that facilitate its application at different levels of organisations in a society as well as to society itself. Therefore, the concept can be interpreted in a variety of ways, depending on the dominant paradigms in a particular discipline. Studies of social capital since Coleman have advocated a variety of ways of clarifying the concept. Some suggest both general (i.e. structural) and specific (i.e. relationships between actors) aspects of social capital (Teachman et al, 1996). Others propose two parts of social capital: interpersonal relationships and resources that individuals use to advance their purposes (Schoen et al, 1997) or two distinct categories of social capital, namely forms and benefits (Sandefur and Laumann, 1998). Lin (2000) defines social capital as the 'investment and use of embedded resources in social relations for expected returns'.

Astone et al. (1999), however, offer three dimensions of social capital, all of which are pertinent to this study: forms of social capital (i.e. relationships); quality of social capital (i.e. interactions within the relationships); and the resources available via a form of social capital (i.e. the effects). If we apply Astone et al.'s three dimensions of social capital to the school context, we may assume at the outset that students in the same social milieu and educational system largely possess the same forms of social relations. Specifically, a child's relationship with his or her parents is forged at birth while relationships with teachers and peers are formed at school. These relationships apply to all children in the same home and school environments. However, even when home and school socio-economic conditions are controlled, some children typically have more activated relationships, or more activities in their relationships, than others. These relational interactions can be characterised as either friendly or conflicting. Therefore, the quality of relationships and interactions vary among children, and relationships with different qualities will eventually, to various degrees, act as positive or negative influences on their wellbeing and future development. Figure 1 illustrates the conceptual and analytical framework of this study.

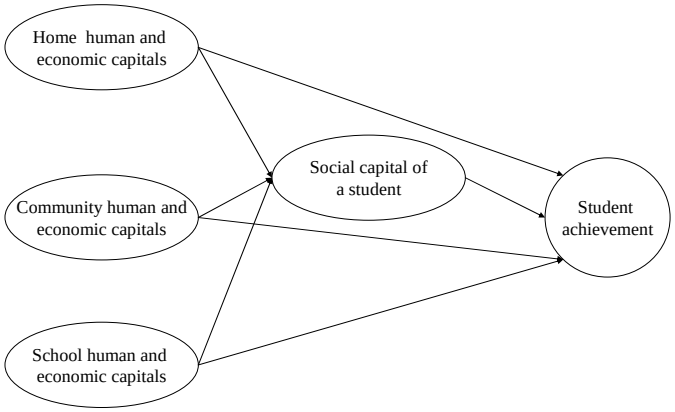

Figure 1 Path diagram for a hypothesised model linking students' home, community and school backgrounds with social capital and student achievement

This framework rests on the assumption that the social capital available to or possible for a student is formed within three contexts: home, community (or neighbourhood), and school. The quality of relationships within the family can lead to parental involvement in and assistance to, their child's schooling (Coleman, 1988; Sandefur et al, 2006; Teachman et al., 1996). Relationships with teachers can provide access to information and opportunities that enhance the educational performance of children (Hill and Rowe, 1996, 1998; Rowe, 1997; Meier, 1999) and the same can be said about relationships with friends and/or peers (Stanton-Salazar and Dornbusch, 1995). It is hypothesised in the framework that background variables have both direct and indirect effects, via social capital, on student achievement. Moreover, resources derived from the social capital of a student directly influence school achievement while mediating the effects of the home, community and school environments.

The data and methods

The data used in this study are from a national survey on secondary school students, including lower and upper secondary schools, in Norway in 2002, called Young in Norway 2002 (i.e. Ung i Norge 2002). This survey used a questionnaire distributed to 12,000 randomly selected from 73 schools nationwide during class hours in February 2002. Students had two hours to answer the questionnaire. The response rate was 92.3 per cent, and the complete dataset comprises 11,406 responses from students ranging in age from 13 to 19 years. The data include information on student home background, student relationships with parents and

friends, school satisfaction and adjustment, educational planning and occupational choice, problematic behaviour, body and self-image, organisational participation, sports and leisure activities, use of mobile telephone, use of computer and internet.

The analysis utilises 10,682 cases, after dropping cases that lack information on achievement, 51 per cent of which represent female students. School size varies considerably across Norway with about half (48 per cent) of the students in the sample study from the 18 large schools (i.e. over 200 students sampled per school) and the other half from the 28 medium (i.e. 100-199 students sampled per school) and 27 small (i.e. less than 100 students sampled from each school) schools. Table 1 presents descriptive statistics of the variables used for the analysis of this study. Home human capital is a latent construct built around father's and mother's educational attainment. Home economic capital is a latent variable measured by asking students' perceptions of their home economic situation over the past two years and their home economic situation compared with other families in their neighbourhood. Student achievement is a construct of the test scores of the three subjects (Norwegian, mathematics and English) presented in Table 1. Student age, gender ('0'as male, '1' as female), school size and location of home community ('1' as remote village, '6' as large urban area) are used as control variables in the analysis.

Table 1. Descriptive statistics of variables measuring home background and academic achievement

Variables	N cases	Minim.	Maxim.	Mean	Std. D.
Father's education	9843	1	4	2.94	1.01
Mother's education	9919	1	4	2.84	1.03
Family economic situation compared to neighbours	10536	1	5	3.16	0.74
Family economic situation over the past two years	10553	1	5	3.86	0.93
Student age	10682	13	19	15.62	1.74
Student gender	10575	0	1	0.51	0.50
School size (ranked by number of cases selected at each school)	10678	1	67	45.70	16.29
Community (home location, from remote rural to big urban)	10557	1	6	3.42	1.73
Norwegian achievement	10682	0	6	3.81	0.94
Mathematics achievement	10682	0	6	3.55	1.18
English achievement	10682	0	6	3.88	1.03

Questions and answers from the dataset are used for extracting social capital factors. In total, over 80 items on different Likert scales (1-5, 1-4 and 1-3) contain roughly four categories: student relationship with parents and other family members; student activities and feelings about being at school; relationships with teachers and other school personnel; and relationships and interactions with friends. Exploratory Factor Analysis is used at the early stage to search for variables that appear to measure distinct latent factors of interest. Table 2

summarises the loadings of four social capital factors extracted from the data. The assignment of a meaningful name to each factor (i.e. factor 1 as 'good child-parent interaction', factor 2 as 'good peer-teacher interaction', factor 3 as 'seeking helps from friends' and factor 4 as 'seeking helps from teachers') allows the four factors to represent three forms of social capital a student possesses in three contexts (home, school and community) as shown in the conceptual framework (see Figure 1).

Table2. Factor loadings of social capital variables

	1	2	3	4
My parents always ask me about by test results from school.	0.75	-0.05	-0.01	0.03
My parents are very interested in my schoolwork.	0.73	0.11	0.02	0.01
My parents appraise me often about my schoolwork.	0.72	0.10	0.11	0.04
My parents usually know about my activities in school.	0.71	-0.04	-0.05	0.08
My parents talk often about how clever I am.	0.68	0.10	0.07	0.01
I always tell my parents the results of my tests and schoolwork.	0.68	0.01	-0.01	0.06
My parents often help me with my schoolwork.	0.67	-0.10	-0.10	0.03
My parents often ask me how I am doing in school.	0.66	0.04	-0.02	0.03
How often do you discuss social problems with your friends?	-0.06	0.86	0.09	0.01
How often do you discuss social problems with other people?	0.01	0.81	0.07	0.07
How interested are you in social issues?	0.12	0.71	-0.02	0.06
How often do students and teachers in class discuss social issues?	0.04	0.64	0.08	0.04
For personal problems, I seek help from a friend.	0.02	0.07	0.74	0.07
For my future education plan, a friend is the person I talk with.	-0.06	0.04	0.74	0.06
For schoolwork, a friend is the person I seek help from.	0.04	0.07	0.69	0.08
For personal problems, a teacher is the person I go to.	0.04	0.00	-0.08	0.74
For my future education plan, a teacher is the person I talk with.	-0.02	0.11	0.22	0.68
For schoolwork, a teacher is the person I seek help from.	0.13	0.06	0.11	0.62

Note: Extraction method: Principal Component Analysis. Rotation method: Varimax with Kaiser Normalisation. Total variance explained: 54%.

Once the variables for the latent construct are identified, confirmatory Factor Analysis is applied to determine whether the latent variables specified and the measurement model hypothesised actually fit the data. After determining an appropriate measurement model, a structure equation modelling method, known as Linear Structural Relations (LISREL) technique, is used to test the hypothesised model. A structural equation model measures the contributions of various factors in predicting a particular outcome while providing unique information about the direct and indirect paths of reliable influence (Mueller, 1996; Ransdell, 2001; Ransdell *el al.*, 2001). LISREL methods allow for the simultaneous utilisation of a measurement model and a structural equation model. LISREL methods also allow the use of one or more directly measured or manifest variables to provide estimates and simultaneously test the effects of the latent variables on one another. Other advantages of LISREL modelling

include the strength in estimating the unknown coefficients of a set of linear structural equations, the treatment of measurement errors, and the ability to consider simultaneity and/or interdependence.

The reporting procedure of model test results in the next section follows standards established in previous research in social sciences. According to a classification of standardised regression weights (Desjardins, 2003) in social science research using population sample survey data, a regression weight over 0.30 is considered a very strong effect, from 0.20 to 0.30 is a strong effect, from 0.10 to 0.20 is a moderate effect and below 0.10 is a weak effect. The decision to accept or reject a hypothesised structural model is taken with reference to the fit statistics. Chi-square (χ^2) is most frequently cited as a measure of the overall goodness of fit of the model to the data (Jöreskog and Sörbom, 1993). The Root Mean Square Residual (RMR) represents the average deviation of the predicted from the actual correlation matrix. The Good-of-fit Index (GFI) indicates the proportion of the joint amount of data variance and covariance that can be explained by the tested model. The common rule for an acceptable fit of a model is an RMR below 0.05 points, with AGFI (Adjusted Good-of-fit Index) and GFI exceeding 0.90 (Hoyle and Panter, 1995; Tuijnman and Keeves, 1997).

Results

Table 3 presents the results of a linear structural model linking student home human and economic capital, variables of student social capital and student achievement. Model A is the basic model testing the effects of home human and economic capital on student achievement with social capital variables as intermediating factors. The results in Model A show that home human capital measured by father's and mother's educational attainment has positive effects on social capital variables and student achievement. Home human capital is strongly positively associated with 'good peer teacher interactions' and student achievement. Home economic capital has a strong positive effect only on 'good child-parent interaction' and very weak effects on other social capital variables and student achievement. Neither home human capital nor home economic capital has any effect on 'seeking help from teachers'. Ultimately, home background variables have rather limited effects on social capital variables, as very little of social capital variances are explained by the two home background variables (see the R^2s of Model A in Table 3).

Table 3. Standardised maximum likelihood regression weights of effects of home human and economic capital and student social capital variables on student achievement

Independent variables	*Intermediating variables*								*Dependent variable*	
	Good child-parent interaction		Good peer-teacher		Friends help		Teachers help		Achievement	
	A	B	A	B	A	B	A	B	A	B
Home human capital	0.10	0.13	0.28	0.24	0.04	0.03	---	---	0.26	0.26
Home economic capital	0.23	0.24	-0.04	---	-0.09	0.04	---	---	-0.05	---
Student age		-0.29		0.40		0.22		0.18		-0.08
School size		0.02		---		-0.04		-0.06		-0.02
Community		-0.03		0.02		---		---		-0.05
Gender		0.26		---		0.66		0.12		0.34
R^2	0.07	0.22	0.08	0.22	0.01	0.47	0.00	0.04	0.30	0.34
Intermediating variables										
Good child-parent interaction									0.39	0.28
Good peer-teacher									0.12	0.21
Friends' help									0.11	-0.12
Teachers' help									-0.06	---

Note: --- indicates an effect not significant at 0.05 level. The correlation between independent variables is 0.29 as they are allowed to correlate in the model specification. Fit statistics for the models: A: χ^2/df: 29.73; RMR: 0.04; GFI: 0.96; AGFI: 0.94. B: χ^2/df: 37.08; RMR: 0.04; GFI: 0.94; AGFI: 0.92.

Model B tests the basic model with the same variables in Model A controlling for student age, gender, school size and home community. While the introduction of the four control variables in Model B changes very little in the effects of home human and economic capital, it helps to substantially explain the variances of social capital variables (see R^2s of Model B in Table 3). Meanwhile, all social capital effects on student achievement change significantly with the introduction of the control variables. The positive effect of 'good child-parent interaction' on achievement is reduced while the effect of 'good peer-teacher interaction' is strengthened. Interestingly, the effect of 'seeking help from friends' on achievement changes from positive to negative while the weak effect of 'seeking help from teachers' becomes insignificant. Nevertheless, among the four control variables, student age and especially gender are found to have rather strong effects on social capital variables and student achievement.

Further analysis of each control variable reveals that effect of the changes of social capital variables could be due to the strong effect of the gender variable, as the patterns of social capital in school among boys and girls can be reasonably assumed to be different. Table 4 presents the statistical results of the same linear structural model tested separately with female and male student subgroup data. The results show that female and male students share similar

strengths of links between home background variables and school achievement when compared with the group as a whole. Although student age seems to work rather strongly against their good interaction with their parents, it helps both genders build social capital with friends and teachers. 'Good child-parent interaction' is a strongly positive asset for both genders vis-à-vis school achievement. Home human and economic capital and student social capital variables appear to exert slightly more positive influences on female students than on male students. More specifically, a one-standard deviation increase in home human capital is associated with an improvement of 'good peer teacher interaction' of 0.21 among male students and of 0.27 among female students, while a one-standard deviation increase in 'good peer-teacher interaction' is associated with an improvement of student achievement of 0.14 among male students and of 0.21 among female students.

The influence of 'seeking help from friends' is not statistically significant for either female or male students, while 'seeking help from teachers' has no statistically significant influence among male students but has a very weak negative influence among female students. All the fit statistics met the conventional criteria and remained stable across all the subgroup tests, meaning that all model tests fit well with the data (see notes in Table 3 and Table 4). However, the social capital factors in the model are also likely to be endogenous to student achievement. For example, the quality of students' social relations may actually result from academic achievement at various earlier points in their school career. Nevertheless, although the use of the data in this study could not solve the problem of endogeneity in the model, it is at least substantially mitigated by the application of social capital theory and by the interpretation of the model as descriptive rather than causal.

Table 4. Standardised maximum likelihood regression weights of effects of home human and economic capital and student social capital variables on student achievement, by female and male student groups

Independent variables	*Intermediating variables*								*Dependent variable*	
	Good child-parent Interaction		Good peer-teacher		Friends help		Teachers help		Achievement	
	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl
Home human capital	0.11	0.15	0.21	0.27	---	0.07	---	---	0.27	0.28
Home economic capital	0.21	0.22	---	---	---	---	---	0.05	---	-0.04
Student age	-0.38	-0.23	0.38	0.41	0.27	0.22	0.13	0.19	---	-0.17
School size	---	0.03	---	-0.04	-0.06	---	-0.05	-0.06	---	-0.03
Community	-0.04	---	0.04	---	0.06	-0.10	---	---	---	-0.08
R^2	0.22	0.14	0.20	0.24	0.07	0.06	0.02	0.03	0.24	0.34
Intermediating variables										

Good child-parent interaction		0.34	0.35
Good peer-teacher		0.14	0.21
Friends' help		---	---
Teachers' help		---	-0.05

Note: --- indicates an effect not significant at 0.05 level. Fit statistics for the models: Boy: χ^2/df: 17.38; RMR: 0.04; GFI: 0.94; AGFI: 0.92. Girl: χ^2/df: 17.22; RMR: 0.04; GFI: 0.95; AGFI: 0.92.

Discussion

As a whole, the statistical analyses show that factors in the home play an important role in building student social capital, a result that positively influences achievement at school. Home human and economic capital positively influence 'good child-parent interaction' and 'good peer-teacher interaction', which in turn have rather strong positive effects on student achievement. Nonetheless, the limited effects of home economic capital might still be due to the poor measures of this construct since students' perceptions of their family economic situation might not be the correct measures of home economic capital. While student age works strongly against 'good child-parent interaction', it helps build social capital outside the home (e.g. 'good peer-teacher interaction', which has a rather positive impact on achievement). While a close positive relationship with teachers at school has a very weak negative effect on student achievement, peer friendship has a weak positive effect on student achievement as a whole. However, this positive effect disappears in the female and male subgroups model. School size and home community have very little influence on social capital factors or on student achievement.

Although the data indicate that female students receive more benefit from social capital, the statistical results show that student social capital functions in similar ways for both female and male students. First, home human and economic capital have a generally positive influence on building student social capital, with a slightly more positive effect on female students. Second, while student age has a strongly negative effect on social capital in the home, it has a strongly positive influence on social capital outside the home. In this case, female students are less negatively affected in the home and more positively affected outside the home. Third, while a good peer-teacher interactive relationship in school has a positive effect on student achievement, the effect is strong for girls but only moderate for boys. Although the differences between female and male students are relatively small, they still suggest that the Norwegian school setting is more 'girl friendly'. This finding, which the data

confirm, coincides with the general impression that girls are more active and better at networking at school, thereby leading them to acquire more social capital than their male counterparts.

The variance of student achievement explained by the model is substantial (i.e. 30 per cent). Home human and economic capital alone explain 11 per cent of the variance of student achievement before social capital variables are introduced into the model as intermediating factors. This finding implies that student social capital contributes considerably to school achievement both by exerting direct effects and by mediating influences from the home background. The statistical results presented in this study provide more empirical evidence to the literature on the inequality of student achievement and the persistent link between home background and student outcome. Additionally, by applying a broad conceptual approach which considers not only the effects of human and economic conditions in the home, school and community but also student social relations which potentially influence student learning, this study has attempted to apply the concept of social capital and made an effort to measure and test the effect of social capital at individual student level in the school context. However, the findings from this study do not clarify the effects of close student-teacher relationships and peer friendships, possibly because of the poor measures of these factors in the data. This lack of clarity points to the need for further investigation in future research. The substantial contribution of social capital to student learning discussed and empirically tested in previous research as well as in this study is expected to remain at the centre of debate and future research.

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