Exploring socioeconomic inequality in educational opportunity and outcomes in Sweden and beyond

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For many decades, an important goal of the Swedish school system has been to provide equal educational opportunities in an integrated environment (Arnesen & Lundahl, 2006). This educational model, often referred to as “a school for all”, was shared with Sweden's Nordic neighbours and was considered central to the Social Democratic welfare state. During the 2000s, however, a socioeconomic performance gap developed in Sweden and more and more students left compulsory school without full grades. Research shows that school segregation in terms of student composition, performance and opportunities for learning has increased (e.g. Mullis et al., 2016; Mullis et al., 2017; OECD, 2016; The National Agency for Education, 2005, 2020a) and so has the importance of family background for student achievement (Löfstedt, 2019).

Educational equality is one of the most important pedagogical and political issues of our time (e.g. Baker et al., 2002; Broer et al., 2019; Jerrim et al., 2019; Keeves, 1992). Promoting social equality through education is a long established global theme in education (Coleman et al., 1990; United Nations General Assembly resolution 70/1, 2015). This dissertation focuses on school equivalence in terms of socioeconomic differences in students’ school performance and opportunities for learning.

Background

Since the beginning of the 1990s, the Swedish school system has undergone several significant changes. It has been reformed in accordance with the principles of market economics, the control of education has been decentralized, and free school choice has been introduced. Since the independent school reform and the free choice of school, the number of independent schools has increased markedly and 15% of the pupils in compulsory school now attend an independent school (The National Agency for Education, 2018a, 2020b). There is a wide range of schools to choose from, with different pedagogical orientations (Lundahl, 2016).

During this reform period, Swedish society also changed. The Swedish welfare system deteriorated and both income disparities (Aaberge et al., 2018) and housing segregation increased (Bevelander, 2004; Malmberg et al., 2016). The proportion of foreign-born citizens also increased markedly (The Swedish Migration Agency, 2018) and the number of pupils who received mother tongue instruction doubled (The National Agency for Education, 2018b, 2018c).

Previous research indicates an increasing segregation regarding Socioeconomic and foreign background between schools (e.g. Söderström & Uusitalo, 2005; Yang Hansen & Gustafsson, 2016) since the introduction of free school choice. Housing segregation explains most of the middle school variation (Holmlund et al., 2014; Malmberg et al., 2016), and this variation is reflected in increased performance gaps at school level (The National Agency for Education, 2020a). Schools in less
privileged areas find it difficult to attract and retain teachers (Borelius, 2010; Möller, 2010), which affects the equality of education and students’ opportunities for learning.

Sweden’s results in international large-scale studies are currently recovering after a long period of decline (Mullis et al., 2016; Mullis et al., 2017; OECD, 2016). In comparison with other OECD countries, the decline in Sweden’s school performance has been among the strongest (Löfstedt, 2019). Although Sweden’s results in recent international knowledge surveys have improved, the differences in performance between schools have increased (e.g. Chmielewski, 2019). Sweden’s irregular results in international knowledge measurements and large middle school variation make it interesting to study inequality in an international context.

Socioeconomic status (SES) and opportunity to learn (OTL) are the key concepts in this dissertation. SES can be described as ranking an individual or a family in a hierarchy according to their possession or control of resources such as wealth, power or social status (Mueller & Parcel, 1981). SES has a long and well-documented explanatory power in educational science (e.g. Coleman et al., 1966). According to Bourdieu (1986), SES can be expressed through three intertwined aspects: social capital, cultural capital and economic capital. Social capital refers to the family’s social connections and networks, cultural capital includes cultural and educational consumption and economic capital refers to economic status. The higher social classes have long had the strongest educational results. Based on Bourdieu’s theoretical approach, this is explained by the fact that the education system reproduces the benefits of a higher social class, and that socioeconomically well-positioned parents place greater value on education while having the resources required to ensure their children’s success (Goldthorpe, 1996). However, the importance of cultural totems used to indicate socioeconomic status have changed over time (Goldthorpe, 1996), and it is therefore important to consider how socioeconomic status is operationalized before using the term in studies of school equivalence.

For a long time, the measurement of SES has been based on a composition of parental education, occupation, and income (Duncan et al., 1972; Gottfried, 1985; Hauser, 1994; Mueller & Parcel, 1981; White, 1982). In many large-scale international studies, it is common to replace parental income with a measure of home resources (Cowan et al., 2012; Sirin, 2005) and to include additional variables. SES also shows a significant impact on student performance (Lee et al., 2019). However, it is not uncommon for researchers to use individual variables to measure SES (Strietholt et al., 2019). There is disagreement in the literature about which individual SES indicator can best predict school performance: some argue for parental education (Tan, 2017), and others for objects at home (Sirin, 2005).

The concept of OTL is based on the idea that exposure to the subject content will have a strong influence on performance (Eggen et al., 1987), and that the teaching content is associated with the teaching quality and the learning environment (McDonnell, 1995). Many studies have shown that OTL has a positive association with students’ mathematics performance (e.g. Dupriez & Dumay, 2006; Fuchs & Woessmann, 2007; Gamoran et al., 1997; Reeves, 2012; Rowan et al., 2002; Schmidt
et al., 2001). As OTL is created through teachers’ practice and interpretation of the curriculum (e.g. Porter & Smithson, 2001; Schmidt et al., 1997), the conditions for students’ OTL can vary between classrooms and schools. This entails a risk to between-school equality.

The major changes in the Swedish education system since the 1990s can be understood as possible influencing factors in relation to Sweden’s fluctuating results in various international large-scale studies, as well as the growing performance gap. In this context, SES and OTL can be used in the analysis to deepen the understanding of changes in equality in Swedish compulsory school.

**Purpose**

The purpose of the dissertation is to investigate inequality in Swedish compulsory school from an international perspective. The dissertation focuses on the differences in students’ performance, socioeconomic background and opportunity to learn, and examines the mechanisms behind them. The dissertation’s three studies examine inequality from different perspectives. Study I examines how the concept of socioeconomic status can be operationalized over time in Sweden; Study II explores the interplay between socioeconomic status, the opportunity to learn and achievement - at different times and countries; and Study III focuses on how teacher education (i.e., specialized and non-specialized teachers) affects the relationship between SES, OTL, and performance.

The three studies consistently show the existence of performance differences in Sweden, as well as their persistence over time. The dissertation examines the relationships between students’ socioeconomic backgrounds and the opportunities that exist within the classrooms. This relationship is an explanatory factor in relation to this performance gap both internationally and within Sweden. The differences found in Swedish schools provide context for mismatches between the curriculum that is examined in international assessments and the curriculum that is taught in Swedish schools. This forms the basis of the integrated discussion in the dissertation.

**Theoretical Framework**

The theoretical framework of the dissertation is based on the model for potential educational experiences (Schmidt et al., 1997) and Bourdieu’s theory of social reproduction. Firstly, the theoretical framework connects the two main concepts in the dissertation (socioeconomic status and opportunities for learning) via the model for potential educational experiences. Secondly, the model is viewed through a theoretical lens shaped by Bourdieu’s theory of social reproduction.

The curriculum has long been considered experiential (e.g. Bobbitt, 1918; Dewey, 1902). As such, the curriculum is based on a series of activities or experiences that students must go through in school on the way to adulthood. Although the student as an individual is at the centre of this description of the curriculum, education is still a communal project with students within classes and classes within schools. As a result, the curriculum must reflect common goals of experience for the participants in
the educational project. The TIMSS model for potential educational experiences illustrates educational experience as a delicate web of multilevel relationships between goals, actors, and choices within the system, classrooms, and individuals (Schmidt et al., 1997). At the system level, curricula are intended. This intended curriculum is designed and often politically controlled at the national level. Within classrooms, the implemented curriculum is planned and implemented by teachers. The achieved curriculum is at the student level and is a result of the implemented curriculum (Houang & Schmidt, 2008; Schmidt et al., 1997). Through a number of goals, countries specify what students should learn, teachers implement these goals to varying degrees within their classes, and students achieve learning to varying degrees. The sum of these measures can then be quantified through student achievement in international large-scale studies (e.g. TIMSS).

The implemented curriculum moderates the relationship between the intended and achieved curriculum. The curriculum that is manifested at class level is an expression of desired experiences in the intended curriculum. This manifested curriculum is opportunity. All choices made at school and classroom level have consequences for opportunities. It is important to understand how educational opportunities are distributed in order to contextualise and understand the achieved curriculum and student performance as well as the performance gap.

The belief that students will perform better in subjects and content that they have learned than those who have not (e.g. Eggen et al., 1987) has long been perceived as an opportunity to learn (OTL) in the IEA studies (see Schmidt et al., 1997). Through the lens in the TIMSS model for potential educational experiences, the OTL measure in the TIMSS survey can be understood as the sum of the many choices made at national, school and classroom level that determine the opportunities that students receive.

In potential educational experiences, the model affects student characteristics both the curriculum achieved and the completed curriculum. Therefore, it is important to consider potential educational experience in relation to students’ social origins. The theory of social reproduction is used to understand the role of the student background in education. Within this framework, it is emphasized that education contributes to the reproduction of power relations between social groups (Bourdieu, 1971). Social reproduction has taken place through school since antiquity (e.g. Guillory, 2013; Lloyd, 1990). This link between student background and achievement was not eliminated during the 20th century, despite a focus on comprehensive and meritocratic education (Coleman et al., 1966; Jencks et al., 1972). The persistent link between socioeconomic status and achievement in the literature (e.g. Marzano, 2003; Scheerens & Bosker, 1997; Scheerens et al., 2007) underlines the relationship between student background and experience in modern educational institutions. According to Bourdieu (1998), the family defines an individual’s position in the social space. If an individual wants to deviate from the educational path defined by the family’s position in the hierarchy, this will require deliberate action. These potential movements at the individual level interact with the educational opportunities expressed at the class level in the model for potential educational experiences. For example, families can move their children to a
better school or accept the school to which they are assigned. Such a movement can affect the opportunities a student receives and whether they experience social reproduction within the school system.

The three empirical studies in the dissertation examine the curricula expectations, delivery, instruction, and results from the system, classroom and student level. The family’s socioeconomic status is used to identify the difference in results and the variation in the opportunity to learn in a mediated mechanism.

**Method**

Since the turn of the millennium, large-scale international studies have become the dominant tool for monitoring and comparing countries’ school systems. These studies provide rich and important data on school results and a wealth of contextual information to promote a better understanding of how different education systems work and the mechanisms behind the performance gap (Gustafsson & Rosén, 2014; Nóvoa & Yariv-Mashal, 2003). The dissertation is based on data from two international large-scale studies - PISA (Program for International Student Achievement) and TIMSS (Trends in International Mathematics and Science Study).

PISA examines 15-year-olds’ knowledge in reading, mathematics and science and evaluates whether students are equipped with the knowledge and skills necessary to participate in further life. PISA has been conducted every three years since 2000, and tests the knowledge of 15-year-old students from OECD member countries and non-OECD countries (so-called ‘partner countries’). Over time, more and more non-OECD countries have participated in PISA, to the extent that they now outnumber OECD member economies in the latest PISA surveys (OECD, 2019). These skills and knowledge are tested by asking students to apply their learning in new situations (OECD, 2019). Each PISA survey has a main area, which rotates every three years (reading in 2000, 2009 and 2018; mathematics in 2003 and 2012 and science in 2006 and 2015), however, the other two subjects are also tested in each PISA round, albeit to a lesser extent.

The TIMSS survey has been conducted every four years since 1995 and tests students’ achievements in mathematics and science for students in grades 4 and 8. TIMSS has a curriculum-based assessment framework, which is based on common content knowledge in all participating countries (Mullis et al., 2016). The purpose of the TIMSS survey is to help countries make decisions to improve their teaching and learning in mathematics and science (Mullis et al., 2016).

Both the PISA and TIMSS surveys collect data using rigorous testing procedures. The PISA survey uses a two-step stratified sample design (see e.g. OECD, 2014). In the first step, schools with 15-year-old students are selected. The probability of a school being selected is in proportion to the number of 15-year-olds enrolled in it. The second step in the selection is selected students within the school, with a target group size of 42 students per school (OECD, 2017). A stratified, two-stage, cluster sample design is used in the TIMSS survey. In the first stage schools are chosen, and in the second stage one or more classes within the school are chosen.
Exploring socioeconomic inequality in educational opportunity and outcomes in Sweden and beyond

(Martin et al., 2016). In the majority of countries, the target for sample size is 150 schools and about 4,000 students (Martin et al., 2016). The rigorous procedure is very important for all scientific claims made after analyses of these data. The sample in these studies means that the conclusions from empirical analyses can be generalized to the population of students of the corresponding age.

The choice to use data from both the TIMSS and PISA surveys in the dissertation was motivated by both the objectives of each sub-study and the design of the two international large-scale studies. Since the aim of Study I was to build a measurement model for socioeconomic status, PISA data could be used thanks to the expansive data collection on socioeconomic status within that dataset. The purpose of examining the relationships between socioeconomic status, learning ability, and achievement at multiple time points in Study II required the use of TIMSS data, as the PISA survey has fewer measurement points for each major area. Finally, in order to integrate teacher characteristics into the model of pedagogical inequality in Study III, TIMSS data was necessary because the PISA survey does not provide information from teachers.

Variables

Study I used variables from 6 cycles of PISA survey student questionnaires relating to home resources and family background (a desk, study space, textbooks, educational software, access to own room, internet connection, classical literature, poetry, artwork, number of books in student home, and parents’ level of education). In the second and third sub-studies, variables from the TIMSS survey’s student and teacher questionnaires were used. Both of these studies used student performance in the TIMSS survey as a result variable. Study II used student achievement in both mathematics and science, but Study III used student achievement in only mathematics. In Study II, the number of books in the student’s home and the parents’ level of education were used to indicate Socioeconomic status. Variables from the teacher questionnaires were merged to create cycle-specific OTL variables. Because the constructs examined in Study III (socioeconomic status, OTL, teacher quality, and the teacher’s perception of the school’s emphasis on academic success) were modelled as latent variables, several variables from the student and teacher questionnaires were used.

Method of analysis

One of the most popular methods for statistical analysis in the social sciences is structural equation modelling (SEM). SEM is a framework within which researchers can investigate complex relationships between variables. SEM has many uses. Researchers can, for example, establish a measurement model with confirmatory factor analysis to examine relationships between a theoretical concept through observable indicators. SEM can also investigate complex mechanisms between different concepts by linking measurement models in a structural model according to a theoretical framework. Both measurement models and structural models can
examine relationships between variables at several levels simultaneously (Hox & Bechger, 2007; Hoyle, 2012). Multilevel analysis is applied to take into account the hierarchical data structure. The method breaks down the total variance in an outcome variable according to the observation levels (individual - school) contained in the data and tries to explain the variance at each level. Multilevel analysis has been used in studies II and III.

Several of the concepts in the dissertation are not directly observable, e.g. socioeconomic status, opportunity to learn, and teacher quality. Therefore, confirmatory factor analysis (CFA) is used to define the non-observable concept (latent variable) with several observable indicators, a process requiring a strong theoretical or empirical basis for the selection of indicators and the model specification (Brown, 2015). CFA also provides a strong framework for comparing measurement models across groups and time (i.e., between cohorts at different time points) through multi-group confirmatory factor analysis (MGCFA). MGCFA integrates several groups into a single model and provides a basis for comparisons between groups (Brown, 2015). The Measurement Invariance (MI) method is often applied to validate measurement models comparability by testing whether (1) factor structure is identical (Configural Invariance); (2) factor charge for each indicator is equal (Metric Invariance); (3) expected values (i.e., the intercept) for each indicator are equal (Scalar Invariance). This process is necessary for researchers to be able to make legitimate comparisons between cohorts (Cheung & Rensvold, 2002). To compare mean values and the variance of latent variables between subgroups, Scalar Invariance is required (Millsap, 2012). However, this assumption (i.e. equal factor loadings and intercept of the indicators) often fails. In addition, chi-2 difference testing for each parameter becomes very cumbersome, especially when many subgroups are compared. Therefore, the dissertation uses a newly developed method - the alignment approach- to evaluate the invariance of measurement models. The alignment method enables comparison and assessment of measurement equivalence across a large number of groups and subgroups within populations and allows partial invariance in the parameter estimates (Asparouhov & Muthén, 2014; Munck et al., 2017). The alignment method is based on the configuration model and estimates the individual factor mean and variance for each group while discovering the most suitable pattern for measurement variance (Asparouhov & Muthén, 2014). This method is applied in study I.

Results

Study I


Socioeconomic status is one of the most important predictors of educational achievement. The PISA survey measures socioeconomic status with ESCS
instruments. ESCS has been criticized in the literature due to poor model adaptation in several countries. Study I used Swedish PISA data to develop a tailored model of socioeconomic status, which can be used across several PISA surveys. The results showed that it is possible to build a measurement model of Socioeconomic status that utilizes the questions that were included in all PISA surveys. A measurement model was designed for PISA 2000, and then tested over the following five PISA surveys (PISA 2003, 2006, 2009 and 2015). Measurement variance was tested with the so-called alignment analysis. The final model showed good model adaptation across all PISA surveys, and it illustrated a new approach for operationalizing socioeconomic status in several time point analyses within an individual country and between different countries.

Study II

The literature indicates that the students’ socioeconomic background and how much subject content (or Opportunity to learn - OTL) they have significantly affects achievement. The purpose of Study II was to observe socioeconomic inequalities in outcomes and in opportunity to learn, and to investigate whether differences in opportunity to learn mediate differences in outcomes. These socioeconomic inequalities in results and in opportunities are illustrated in a triangular OTL-SES performance model with data from 78 countries, and the study examined the relationship between SES, OTL and performance at four cycles of TIMSS.

The study found that inequalities in mathematics results were almost universal, but inequalities in opportunities were small and rarely significant. The analysis provided little evidence that inequalities in opportunities mediate inequalities in results. Schooling perpetuated socioeconomic inequalities in only a small group of countries. These countries are highly developed and use English as a language of instruction (e.g. England, Scotland, Singapore). In Sweden, the study showed a performance gap at each time point, but inequalities in opportunity were only observed in the 2003 and 2015 cycles. In addition, opportunity to learn only mediated the effect of socioeconomic background on results from the 2003 cycle in Sweden.

Study III

1 NB. A revised version of Study II was published subsequent to the publication and defence of this doctoral thesis
The third study focuses on modelling equivalence in the opportunity to learn from a Swedish perspective. As the purpose of the study was to provide context for the understanding of why school results differ between different Swedish schools, Swedish data from year 8 students in TIMSS 2015 are used. The study examines differences between classrooms by integrating teacher characteristics into the triangular SES -OTL performance model.

In the first step, the study examined the difference in teacher quality, performance and opportunity differences between classes with higher or lower socioeconomic composition, and a correlation between teacher quality and teacher specialization. In the second step, the study showed different patterns of inequalities between classes with and without a mathematics-specialized teacher. In both groups of the two-group model, there were large differences in performance, while differences in OTL remain in classes with specialized teachers, but not in classes with non-specialized teachers. Study III emphasizes the importance of high-quality teachers for student achievement.

**Discussion and conclusions**

The empirical studies in this dissertation show the importance of examining the measurement of inequality-defining concepts. Several approaches to the measurement of SES and OTL are explored in the dissertation. These approaches help build our understanding of both the concepts and benefits of data from international large-scale studies. The results of the dissertation highlight the existence of persistent global socioeconomic inequality in student achievement. The empirical studies do not show that OTL worsens performance gaps, but there is still room to explore this relationship. Finally, the empirical work in this dissertation deepens the understanding of the possibility gap in the Swedish context by showing that inequality patterns vary for specialized and non-specialized teachers.

Unequal opportunities are concentrated in highly developed countries. The great opportunities that exist in English-speaking countries indicate that there may be a distinct cultural norm within the Anglosphere in terms of student background and the implementation of the curriculum. Where there is a significant gap in possibilities, this dissertation suggests that the integration of teaching qualities can explain these inequalities.
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Exploring socioeconomic inequality in educational opportunity and outcomes in Sweden and beyond


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