Chapter 16
Commuting to School:
A New Spatial Interaction Modelling Framework

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ABSTRACT

The education sector in England and Wales is becoming increasingly data rich, with the regular collection of the Pupil Level Annual School Census (PLASC) and school preference information, together with the compilation of school performance league tables. However, it is also a rapidly changing environment both in terms of demographic demand as well as policy responses from Government. The latest policy documents require that local education authorities provide fair and equitable admissions policies for all, while at the same time limiting the number of surplus school places. Moreover, funding has to be targeted appropriately in the face of significant changes in the complexion and number of state educated school pupils. Therefore, it is crucial for education planners to be able to interpret the large quantities of data collected each year into valuable intelligence to support planning and decision making. This chapter explores the use of classic spatial interaction models with journey to school data for the purpose of school network planning for the city of Leeds. The limitations associated with the application of spatial interaction models in the education sector will be discussed, and modifications to the computational form will be explored using a genetic algorithm. Spatial interaction models representing pupils from different socio-demographic backgrounds will be calibrated and incorporated into an overarching logic model called the Spatial Education Model (SEM). Finally, the SEM will be used to forecast pupil numbers attending schools in the study area up to the year 2013.

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THE EDUCATION SECTOR

School education is commonly seen in national news headlines as one of the major political debating topics. Changes in policy since the introduction of the 1988 Education Reform Act (ERA) have created a quasi-competitive market within which schools now operate (Harris & Johnston, 2008). The 1988 ERA also devolved much responsibility away from Local Education Authorities (LEAs) to individual schools and the 2007 School Admissions Code incorporated mandatory provisions for the first time to ensure that school oversubscription policies were implemented in a manner so as to not disadvantage any particular section of society. This has produced an environment where LEAs have less direct control over schools but more responsibility to ensure that education provision is ubiquitous in their areas, in the face of an overall declining pupil population (Figure 1).

These conditions make effective planning in the education sector crucial and the collection of pupil level data, initiated in 2002 with the first collection of the Pupil Level Annual School Census (PLASC), has increased the volume of information that is available to education planners. As explained in Chapter 1, PLASC contains data about each individual pupil, including their address, free school meal eligibility, age, ethnicity and institution attended. This is an invaluable information source for education planning, although the data is affected by errors and inconsistencies which researchers and education planners should be aware of (Harland & Stillwell, 2007a; Ewens, 2005). The PLASC is a very large dataset with over 8,000,000 records collected and collated by the Department for Children, Schools and Families (DCSF) on each collection date (Jones and Elias, 2006).

An additional dataset of significant value in education research and policy evaluation is pupil preference data. Similar to the PLASC, this dataset contains information on the location of each individual pupil but it also contains information on the preferred schools each individual pupil would like to attend. It provides an insight into the choices made by pupils and their families when selecting a school. Although collected nationally and collated by the DCSF, the dataset is unfortunately not published in its raw form. In compliance with the Information as to Provision of Education (England) Regulations 2008, a report based on the national preference data, showing aggregate school preferences and allocations figures is published on an annual basis (DCSF, 2008).

Academically, studies into ethnic segregation in schools have proliferated in the last decade (Gibson & Asthana, 2000a; 2000b; Gorard, 1999; 2000; 2004; Johnston et al., 2004; 2005; 2006). This is at least in part due to the release of the

Figure 1. 2004-based school-age population projections, England. Source: Government Actuary 2004 (GAD, 2004)