

## Understanding Educational Inequality in Rural Lincolnshire: A Statistical Interrogation of Gaps in Educational Achievement

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### Abstract

*Historically, disparities between urban and rural academic achievement have been well documented in the literature [11]. Research is, however, unclear on definitions of rural and urban. What can be defined as a rural school has also greatly varied. Definitions include: population size [8], geographical location [13], number of pupils and teaching staff [15], and, in some cases, the research only states that a rural area was used [16]. These definitions are reduced down into a simplistic form that generally fails to explain the context of the study, creating problems for generalisation of the results [7]. There have been calls for stronger research using clear statistical definitions of locales to improve the outcomes of research [12].*

*Rural areas and populations have long been associated with inferior opportunities, one of which being the provision of education [1]. Evidence suggests that rural schools and their students are educationally at a disadvantage in comparison to their urban counterparts in terms of their academic achievement. This is particularly true in science and mathematics [11]. However, the sources for this inequality have long been disputed in the literature [1]. These include individual student factors and educational environment related factors. On an individual level, factors affecting rural students' science and mathematics achievement have been found to be related to aspirations [22], as an example. Educational environment factors have been found to include teacher retention and shortages issues, particularly in specialist subject areas such as mathematics and science [16]. Furthermore, for the educational environment a lack of access to resources has also been stated as an issue for rural attainment [10][9].*

*This research will aim to use a clear definition of rural and urban to examine differences between science and mathematics achievement in rural and urban Lincolnshire. Achievement inequality between the two areas will be investigated further through the study of influencing factors that affect science and mathematics achievement between the two locales.*

### 1. Introduction

The provision of education in rural areas and schools has been associated with inferior opportunities for student achievement [1]. A wide range of literature documents a disparity in educational achievement between rural and urban schools [21]. Research suggests that a difference in urban and rural achievement is particularly evident in science and mathematics [11]. Teacher recruitment, inefficient resources and pupil aspirations have been identified to possibly impact rural education. [16][19][22]. Research specific to urban and rural education has previously used a variety of different measures to determine the locational context of the school. However, there have been problems in past research where researchers have neglected to clarify the locational context in which the research has been conducted [7], with some failing to supply sufficient detail about the location of the research, reducing definitions down to a simplistic form [7].

This paper reports on the background literature and methodology towards assessing any achievement gaps in students examination results from rural and urban schools in Lincolnshire, making comparisons across and between urban and rural grammar and comprehensive schools.

### 2. Rural/urban definitions

Often in rural and urban education research there is no clear distinction of the measure used to classify an area [7][12]. Numerous definitions have been adopted in determining the location of educational establishments. The range for these definitions differ greatly, for example these have included: school size [12], teacher and student population [14], population densities [8] and geographical location [15]. With definitions based on such principles as school size and student populations, the extent to which the findings of research can be applied to other schools may possibly be questioned, as, for example, small schools could essentially exist in an urban city, limiting the use of such a measure on its own as a classification of either rural or urban. Other measures have placed



an emphasis on classifications being based on social constructions, with perceptions of cultural experiences, interactions between small close communities, and moral values as the determining factors of location [3]. Although the community life in and around a school adds depth to the research, by way of a classification it is, again, rather limited [5]. With a wide range of definitions, the usability of each measure is questioned in its applications cross culturally [7].

One of the more clear definitions used in the literature has considered both population densities and geographical features as a more thorough measure [12][20], which make applying contexts of rural study easier cross culturally. Within Britain there has been the production of official statistics defining areas as either urban or rural. These vary in the classification methods used but generally include geographical features and/or population densities. Despite the wide variety in type of classification, a clear theme can be seen to emerge from the data where locations can be sub-divided into various categories of urban and rural.

This research will aim to overcome current limitations by using one clear definition to classify Lincolnshire schools as either within urban or rural locations in order to investigate any gaps between student achievement in examinations.

### **3. Educational Factors**

Educational achievement is influenced by a number of different factors [1][21]. The different educational experiences of urban and rural students may lead to a difference between students' achievements in science and mathematics, with research pointing towards rural inequality [21][11].

#### **3.1 School Factors**

Teacher recruitment and retention is reported to be a problem for rural schools [10], with greater issue in the recruitment of specialist staff, such as those with science and mathematics qualifications. Research has shown that there are below average numbers of teachers in mathematics and science in secondary schools, with high rates of teacher turnover [16]. Research has shown that rural specialist teacher retention rates are affected by the isolation of the school, access to continued professional development, and limited numbers of other specialist teachers [10].

Furthermore there is reportedly lower funding in rural schools for educational resources [19]. The decreased rates of funding are implied to affect the quality of rural teaching, with less access to appropriate resources and teaching materials, and fewer funds to attract higher quality teachers with specialist knowledge in science and mathematics. Teacher perceptions toward limited teaching materials in urban and rural schools show a disparity, with rural schools facing a greater impact. In recent research an effect of teaching materials on student learning has been noted with teachers in small rural community schools reporting that a shortage of science laboratory equipment hinders student learning by 33.3%. This compares to teachers in perceptions large town schools, city schools and schools close to city centres reporting 10.3%, 20.4% and 13.5% for effects on student achievement [20].

#### **3.2 Student aspirations**

Future aspirations towards careers in science and mathematics may affect students' achievement. It has been noted that rural students own aspirations play a significant part in shaping future career goals and thus achievement in academic subjects [22]. Survey results found that rural students believed taking advanced maths and science classes was only for students who desired to attend university [6], with few rural students reporting aspirations of progressing to university [6].

Experiences in the community are associated with students' future aspirations [22]. Rural schools lack the experiences and role models in their community which enables them to see a career path in a science or mathematics related role [5]. The potential role models younger students are claimed to look to are young college graduates. However, graduates tend to stay in urban cities, where more job opportunities lie, meaning rural students are not exposed to science and mathematics related careers [5]. This has been identified in different research [2] which suggests there is less exposure in rural environments to science and mathematics related careers, with students not being educated into the differing ways these are practiced in society and the number of different jobs based around science and mathematics. Without the aspirations to follow in a science or mathematics career, students lack the motivation to achieve highly in these subjects [22].

#### **3.3 Low student numbers**



Rural schools have limited numbers of students who take up science and mathematics classes, often leading to courses being cancelled or availability being dramatically reduced [9]. Classes with limited student numbers are often replaced with more popular classes, where schools can make efficient use of resources [4]. The gap between urban and rural students take up of science and mathematics can evidently be seen in advanced placement courses, with 69% of rural students enrolled in such a class, compared to 93% of urban students [17]. The negative effect of small student populations in rural schools has not only been seen to affect availability of science and mathematics courses, but extends into extracurricular activity, such as the gifted and talented schemes. The reduced opportunities for rural students to follow any interests in specialist subject areas, such as advanced calculus, compared with those in urban schools [5], may potentially be affecting rural student achievement.

Shortages of students in high level specialist classes in rural schools leads to classes being cancelled, which indirectly affects teacher recruitment and retention as teachers leave for more stable jobs in urban schools [6]. Furthermore, small student populations decrease the availability of specialist vacancies in rural schools, due to courses not being viable with only a few students interested in taking the class. In some situations, schools may recruit one specialist teacher, such as a general science teacher who would be required to teach all science related subjects [18], leading to extra pressures in preparing class content.

Taking these factors into account, the potential disparities in education and student achievement in science and mathematics and the factors that influence achievement are yet to be understood within the context of rural and urban Lincolnshire.

Accordingly, this research will use a mixed method approach. Firstly, a quantitative method will be employed to explore any difference in science and mathematics achievement between rural and urban Lincolnshire based on GCSE examination results (public examinations). Any achievement inequality between the urban and rural schools will be investigated further through the study of influencing factors that may potentially affect science and mathematics achievement between the two locales. For this a qualitative method will be employed, with students and teachers being interviewed and comparisons made across the locations to discover any differences. It is expected, based on the literature presented, that rural school students will be achieving lower academically than their urban peers.

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