

## **Educational Productivity Research in the Contexts of Developed and Developing Countries**

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### **Abstract**

Educational productivity research has been a powerful tool to determine what affects students' academic achievement and to suggest effective educational investment for policy makers in both developed and developing countries. This research method has attempted to identify factors which influence educational achievement, treating school factors (e.g. teacher-pupil ratio, availability of educational resources, school management) as independent variables and treating educational achievement as a dependent variable. There has been small, but constantly reported, numbers of studies which identify significant difference between the findings of the educational productivity research from developed and developing countries. In this paper, first, I review some of the research on the differences and then argue why the differences occur between the two types of countries.

### **1 School inputs vs. pupils' social status**

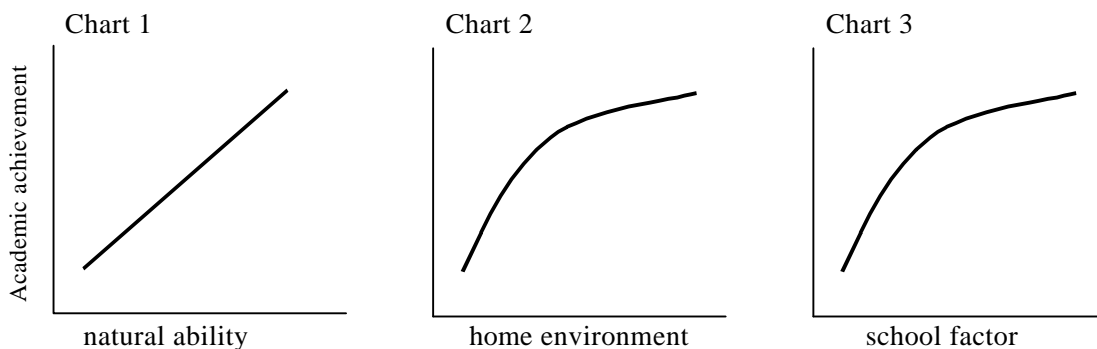
Educational productivity research has been a powerful tool to determine what affects students' academic achievement and to suggest effective educational investment for policy makers in both developed and developing countries. Two reports had a great impact on the investigation of educational productivity in the beginning of educational productivity research. The first is "Equality of Educational Opportunity" (Coleman et al., 1966). This is commonly called "the Coleman Report." The second is "the Plowden Report" (Peaker, 1971.) Both of them reported an astonishing finding that students' academic achievement is determined not by school factors but by "preschool factors" such as students' family background. Since then, many researchers have tried to counterargue these discouraging findings for educators. Although many of these attempts have failed and recomfirmed the earlier conclusion, a few researchers found some counter evidence in the context of developing countries.

Heyneman and Loxley (1983) challenged the conclusion of small school effects on academic achievement from the perspective of comparative education. They reviewed studies which were conducted in twenty nine countries including both developed and developing countries and found that the tendency which the Coleman report and many others suggested is not universal. The key findings of their research are "the lower the income of the country, the weaker the influence of pupils' social status on achievement" and "conversely, in low income countries, the effect of school and teacher quality on academic achievement in primary school is comparatively greater."

Fuller (1987), reviewing about 60 studies of educational productivity, pointed out several problems in the research on the effect of schools vs. students' family background. First, he argued that the students' background factors may not have been specified adequately in the

research. He suggested that because social class structures in developing countries are not as stratified as in developed countries, he suggests, "Western measures of class may not vary substantially." "because of the lack of variation (of social class), traditional constructs of class would simply not be strongly associated with variation in achievement around the mean." Second, he pointed out that very few studies control for pupil "ability" or regressed posttest achievement scores in pretest scores. Third, he found that almost no studies in developing countries have focused on levels of early cognitive development although many studies have found that parents likely influence them. He did not deny Heyneman and Loxley's conclusion, but he suggested these specification problems of student family background might distort the research, thus overstating the school's aggregate influence.

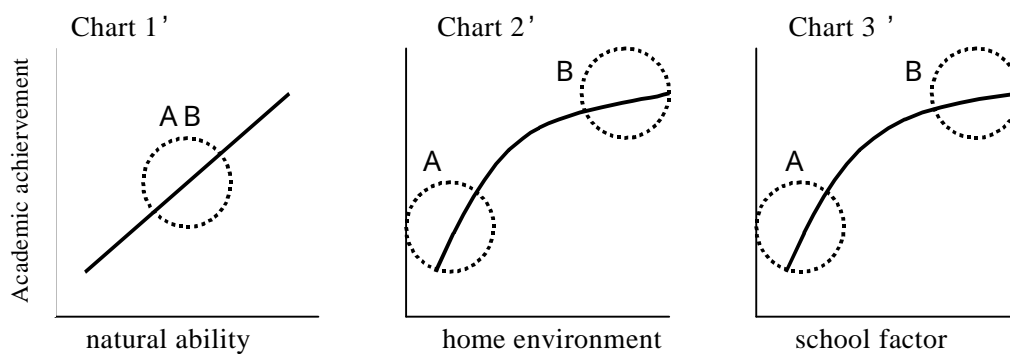
Riddell (1989) challenged Heyneman and Loxley's conclusion more directly. He criticized "the misapplication of a single-level model" because educational reality is "clearly hierarchical." The grouping of students in the previous studies were not random but reflected residential patterns of communities, admissions policies of schools and selection of particular classes. This non random grouping, he asserted, may have violated the assumptions of regression analysis. He concluded that "there are strong grounds for skepticism concerning the differences between developed and developing countries, which Heyneman emphasizes, related to the effect of background factors on educational achievement ... his theory remains unsubstantiated due to the extreme methodological weaknesses exposed above."



Is there the difference suggested by Heyneman in the effects of school factors and students' backgrounds between developed and developing countries? Although there were several criticisms of his research methods, no one challenged his conclusion itself. Heyneman's research took inductive approaches to find the difference. Here I would like to approach this problem deductively. First, treating the school factors as just one factor, I suggest only two elements, which consist of the effect of the family's socio-economic status factor on students' academic achievement to simplify the argument. One is students' natural ability. This is a given factor for students when they were born. Natural ability is assumed to have high correlation with students' parents educational background. Second is students' educational environment at home. This factor is also related to family's social and economic status assuming that parents with more income and more education can prepare a better educational environment for students. This simplification is attempted to distinguish factors which are already built into students (inside factor) and factors which surround students (outside factor.) Then, adding the school factor (also

outside factor) into this consideration, I can draw three charts on the relationships between the factors and students' academic achievement. Chart 1 of natural ability has a straight line, assuming that academic achievement increases in proportion to natural ability, while Chart 2 of home environment and Chart 3 of school factors have curve line, assuming that the outside effects have diminishing marginal effects on academic achievement. In other words, as we keep providing better home and school environments to a student, it becomes more difficult to get additionally higher academic achievement although they always have a positive effect.

Then, let us think where the students in developed countries and developing countries are located in these charts. Starting from chart 3, it is easy to assume that many students in developing countries are located in the A area and students in developed countries are located in the B area because of the relatively better situation of school inputs in developed countries and relatively worse situation of school inputs in developing countries although both areas of countries have exceptional cases. Chart 2 of home environment should have the same pattern of location because there are more families with poor conditions in developing countries than in developed countries and there are more families with good conditions in developed countries than in developing countries although there are also exceptions in both types of countries. Chart 1 shows the assumption that the talent of students is diffused across nations.

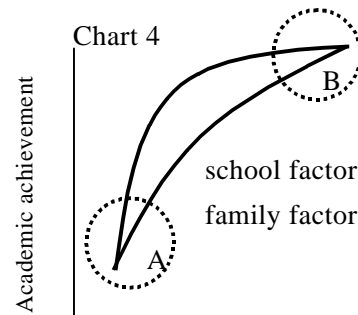


If the assumptions which were shown in the charts are correct, what do they imply? Chart 3 again shows that additional school improvement has a larger impact on academic achievement in developing countries than in developed countries. In other words, the additional school input is relatively less meaningful in developed countries than in developing countries because a relatively high standard of school inputs is achieved in developed countries. Chart 2 of home environment shows the same pattern. In developing countries, home environment should also have a larger impact on academic achievement than in developed countries and it has a smaller impact in developed countries. Chart 1 shows that there is no difference in the impact of natural ability on academic achievement in developed and developing countries.

My conclusion is that there should be differences of the impact of school inputs and the family's socio-economic status, if you see this latter factor as home environment, on academic achievement between developed and developing countries. However, there should not be difference in the impact of family background, if you consider this factor related to natural ability, between developed and developing countries. How does my assumption differ from the

conventional observations? My assumption explains a part of the findings of previous research that school factors are more important in developing countries than in developed countries. However, my assumption contradicts the observation that family background is less important in developed countries than in developing countries because even if we combine the factors which are presented in chart 1 and chart 2, it is still possible to assume that family background is also more important in developing countries than developed countries.

One possible explanation is shown in chart 4. If the curve line of family background impact, combined with natural ability and home environment, is flatter than the curve line of school inputs, in developing countries (shown in A area), school inputs has relatively larger additional impact on academic achievement than family background and, in developed countries, family background has a relatively larger additional impact on academic achievement than school inputs.



Recognizing the possibility for further sophistication of this explanation, I presented it to address the existence of the diminishing marginal effect of inputs on academic achievement. This explanation also applies to the following discussion on the differences among school inputs between developed and developing countries.

## 2 Among school inputs

Educational productivity research originally aimed to identify the most effective allocation of resources in schools. Because there is a huge gap in average educational inputs between developed and developing countries, it is quite understandable that many studies report the difference in the effects of school inputs on educational achievement between the two types of countries. There are several meta-analysis reports which reviewed available studies on educational productivity in developed and developing countries. Harbison and Hanushek's (1992) is one of the most complete studies and illustrates the difference in findings very clearly between the U.S. and developing countries, reviewing 187 studies in the U.S. and 96 studies in developing countries. In this section, first, I present the differences and similarities of the effects of school inputs between the two types of countries mainly based on Harbison and Hanushek's research, and second, I would like to discuss how the differences occurred.

### 2.1 Difference - school facilities and teachers

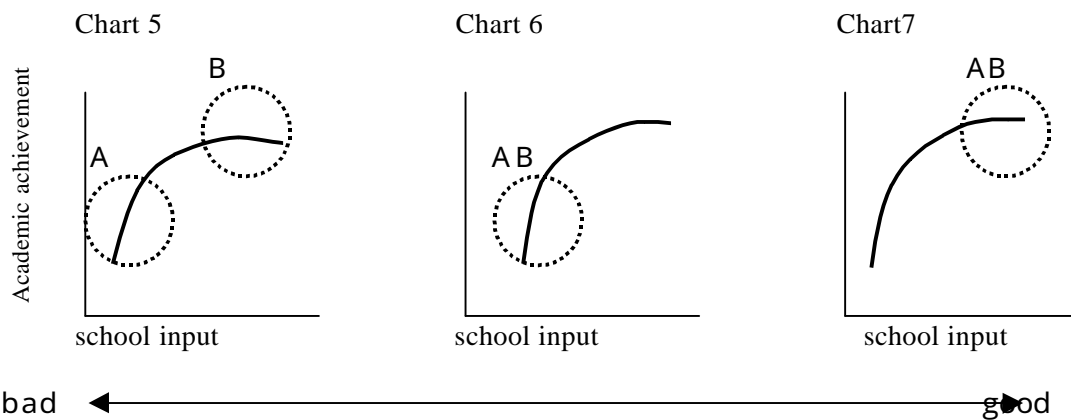
One of the clearest differences in educational inputs between developed and developing countries can be found in the investigation of the effects of material inputs. Generally, material inputs are found to have a larger effect on achievement in developing countries. Harbison and Hanushek's research showed that 22 out of 34 reviewed studies in developing countries while only 7 studies found significant effects of facilities out of 74 studies in the U.S. More specifically, Fuller (1987), reviewing over 60 studies in developing countries, found that classroom desks and school libraries generally had significant effects on achievement. However, he suggested that classroom laboratories in the teaching of science may not have any significant

relationship with performance. A radio is also a popular school facility in developing countries. Although the initial investment in developing radio curriculum is costly, the radio itself is not costly and the instruction is generally found to be efficient.

Many studies have investigated the effects of several kinds of instructional devices. Textbooks and teachers' guides are obviously the most common devices and are found to have significantly positive impacts on achievement in developing countries. On the other hand, they do not show clear positive effects in developed countries. (Heyneman, Farrell and Sepulveda-Stuado, 1981)

The investigation of teachers' education effects also shows different results in developed and developing countries. According to Harbison and Hanushek's review, 35 of 63 studies showed statistically significant positive effects of teachers' education on achievement in developing countries. On the other hand, only 8 of 113 showed the same results in the U.S. In other words, the original assumption, that providing more education to teachers improves education, is still alive in developing countries but not in the U.S.

How can we interpret the difference of findings in developed and developing countries? This difference can be explained again with the curve line of diminishing marginal effects. In chart 5, A area, where many of the cases from developing countries are located, facilities and teachers' education are scarce. There, additional input can make a large progress. On the other hand, cases from developed countries in B already have high levels of inputs. Therefore, additional inputs cannot make a significant contribution.



## 2.2 Similarities - class size and teachers' experience

According to Harbison and Hanushek's review, class size and teachers' experience were not supported as effective tools for increasing students achievement, both in developing countries and the United States. On the other hand, instruction time and homework assignments have a significant positive impact on achievement in both developed and developing countries. (Fuller, 1987)

The curve line of diminishing marginal effects can explain these similarities also. However, the locations of cases from developed and developing countries are different from what

we saw above. In chart 6, the cases from both developed and developing countries are located in AB area. For example, it is understandable that teachers' experience does not differ between the two types of countries. Class size is not too different in developed and developing countries also. Lockheed and Verspoor (1991) reported that, in 1985, the student-teacher ratio in lower middle income countries was 29 and that in high income countries was 20.

Although the cross national data on homework assignment is not available, the average annual hours of instruction time is reported. (Lockeed and Verspoor, 1991) They are 870 hours in low-income countries and 914 hours in high income countries. Again, the gap is not large. The location from cases from developed and developing countries should not be apart in the chart. Chart 7 illustrates the situation of instruction time and homework assignment. Since the locations of the cases are different in Chart 6 and Chart 7, the effect of each input is different. In chart 6, the inputs do not make a significant contribution, whereas, in chart 7, the inputs do. However, they are similar across nations because the situations of school inputs are similar across nations.

### **3 Conclusion - implication for policy makers**

What can this research on difference in educational production function between developed and developing nations tell to policy makers? The research is to warn policy makers who try to apply easily the research findings in developed countries to the context of developing countries. In different settings, there is much possibility for different tendencies. However, decision making in the educational policies of developing countries often relies on the experience of developed countries because (1) a certain portion of educational expenditures in developing countries comes from international aid, (2) many developing countries accept educational experts from developed countries on the basis of technical cooperation, (3) academia in developed countries is influential in developed countries and (4) many policy makers are educated in developed countries.

In this paper, I mainly discussed the influence of economic level on educational production function. However, there should be more factors which make the finding of the research less consistent across nations. Cultural and political differences also should be considered when one examines the difference in educational process across nations.

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