

## **Education Policy and Industrial Development: The Cases of Korea and Mexico\***

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*After many scholars' studies, it has been suggested that among several facts of economic growth, Korea's relatively intensive investment in education made its fast economic growth possible. This study started from the question of whether large education expenditure automatically leads to a fast economic growth. We suggest that the expenditure must be allocated to the education level that is in accordance with the industrial policy, which in turn must consist with the country's economic development stage. In Korea, the education sector supplied workers with adequate level of education that was required in each stage of development, whereas in Mexico, the supply of workers by education level was mismatched with the demand for labor derived from the industrial structure at each development stage. We conclude that not only the size of the expenditure but also its efficient use is important to guarantee the positive effects of education expenditure on economic growth.*

**Keywords: Education Expenditure, Economic Growth, Efficiency of Education, Industrial Policy, Development Stage**

### 1. INTRODUCTION

Many scholars conducted comparative studies on the difference in economic performance between East Asia and Latin America. The results of such studies show that the main causes of this notable difference can be explained by the difference in economic policies, resource endowments, institutional quality, and education, among others. As for Korea's fast economic growth, many observers suggest that the country's relatively heavy and intensive investment in education led to the fast economic growth.

But there remains the question of whether a relatively larger education expenditure is enough to guarantee good economic performance or whether some expenditure strategy is needed to maximize the growth effects of education expenditure.

We compare the cases of Korea and Mexico to show that a large expenditure on education does not automatically exert positive effects on growth but that the expenditure must be allocated to the education level that is in accordance with the industrial policy which in turn must be consistent with the country's economic development stage. Furthermore, its efficient use is important to guarantee its positive effects on economic growth.

### 2. INDUSTRIAL POLICY AND EDUCATION POLICY

The allocation of education expenditure must be in line with the stage of economic

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development. In an early stage of economic development, education expenditure must be focused on the primary education level. The reason is that main economic sectors at this stage are primary sectors such as agriculture and mining, and resource-based industries, where most of labor demand is for workers with primary education. Workers with tertiary education would be overqualified, and using these workers in primary sectors would be a waste of resources. As the economy accumulates some capital, labor intensive industries such as light manufactures will develop and these industries will demand medium skilled workers. At this stage, the demand for workers will move from those with primary education to those with secondary education. So, government expenditure on secondary education must be increased at this stage. As industries intensive in medium skilled worker, such as heavy industries, takes up a larger part in the economy this trend will intensify. Finally, when the economy growth relies on knowledge-based industries, workers with tertiary education will be more important, and larger amount of expenditure must be allocated to higher education level.

There are several researches which analyzed the effects of education expenditure on growth by education level. Papageorgiou (2003) from a cross-country regression with 80 countries suggests that primary education contributes mainly to production of final output, whereas post-primary education contributes mainly to innovation and imitation of technology. Self and Grabowski (2004) examines the impact of the various categories of education on income growth in India and found that primary education has a strong causal impact on growth, with more limited evidence of such an impact for secondary education and none at all for tertiary education. Pereira and St. Aubyn (2009) decomposed annual average years of schooling series for Portugal into different schooling levels series and found that increasing education at all levels except tertiary have a positive and significant effect on growth.

However, few researches analyze the effect of education expenditure on the supply of workers by level of education, and the effect of the latter on industrial development. We will begin by reviewing the industrial policy and education policy of Korea and Mexico, and then analyze the effect of education expenditure on industrial development of the two countries.

### **2.1. Korea**

For the sake of analysis, Korea's development stages are divided into 4 stages: (1) reconstruction period after the Korean War (1953-1960) (2) take-off phase between 1961 and 1972, when labor-intensive industries were developed, (3) heavy-chemical industry (HCI) phase between 1973 and 1979, when capital-intensive industries were promoted, (4) rationalization and liberalization phase between 1980 and mid 1990s, when technology and skill-intensive industries took the lead, and (5) knowledge based economy since mid 1990s.

After the Korean War, the government invested more than 10% of the government's total budget on the education sector as a part of its national reconstruction. Education policy was an important element of Korea's reconstruction program as a way of preparing for the following economic growth program. Compulsory primary education was achieved in this period. The take-off phase (1961-1972) was marked by an export-oriented economic policy and protective measures for the domestic market. Light industries, such as textile, apparel, and footwear industries, were promoted, and the large demand for cheap and modestly educated semi-skilled workers in these industries, could be satisfied thanks to the education investment in the 1950s. Education policy in this period can be summarized as open door

policy to lower secondary education. Entrance exam to lower secondary school was abolished, and high school equalization policy was implemented. As a consequence, the enrollment rate of secondary education increased substantially. In 1970s, the demand for skilled labor accelerated especially because of the implementation of heavy and chemical industry drive policy, which aimed at deepening the industrial structure around industries such as chemicals, basic metals, general machinery, shipbuilding, and electronics. As a consequence of this policy, the share of the heavy-chemical industry in total manufacture production increased from 33% in 1972 to 44% in 1980.

The change generated the need for more skilled workers, which the government tried to satisfy by increasing the expenditure on secondary education and technical and vocational education. Technical secondary and vocational training schools were made responsible for the cultivation of an industrial workforce. Junior technical colleges were developed in order to accommodate the growing need for mid-level technicians. Higher education was also expanded at the tertiary and graduate levels, with a special emphasis on science and technology. Despite certain negative consequences, the HCI drive was critical in expanding Korea's human resource.

The rationalization and liberalization phase (1980~mid-1990s) is characterized by a shift toward technology and skill-intensive industries. During this period, the most important changes in education sector were open door policy to tertiary education and the rapid expansion of private sector institutions and private financing for education and skill training. The rate of secondary school graduates entering universities increased from 39% in 1980 to 73% in 1995.<sup>1</sup> Even as the private sector began to gradually supplement the government's primary role in vocational training, the government nonetheless was able to enhance the overall technological capacity of Korea.

Since the 1997 financial crisis, the Korean government has been emphasizing the use of knowledge technologies to produce economic benefits as well as job creation. Accordingly, the government is paying more attention to tertiary education than before.

## 2.2. Mexico

In 1920s, 70% of the population was illiterate and only 3.5 million could read and write.<sup>2</sup> To alleviate this situation, Mexico invested heavily on primary education and introduced Federal Law on Education, which was aimed at promoting a popular and humanist education. From the late 1920s through the 1940s, Mexico's economic growth called 'Mexican Miracle' was sustained by the government's increasing commitment to primary education for the general population. As the main industries of Mexico were primary and labor intensive manufacturing industries, the government education expenditure was focused the primary education. The result was successful, the enrollment ratio in primary education reaching 100% in the late 1960s. By this time, the nation's development strategy was well supported by education policy.

With the oil discoveries in 1976, oil and petrochemical sectors became the economy's most dynamic ones, and the main industrial structure shifted from primary to oil and heavy

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<sup>1</sup> Upper secondary schools excluding technical and vocational schools.

<sup>2</sup> Guadalupe Gonzalez de Turner, "Disparities, Contrasts and Developments in Contemporary Mexican Education, *Int. J. Educational Development*, Vol. 7, No. 3. King's College, University of London, U.K. 1987, p. 183.

industries. Educational efficiency problem appeared in this period following industrialization and urbanization of former stage. Urban industrialization continued and led to a rapid increase in the demand for workers in the urban area. Because of this phenomenon, students living in the urban area opted to work instead of studying. Between 1960 and 1965, for each 100 pupils enrolled in the first grade of primary schools, only 23 completed the sixth, with an attrition rate of 77%. Another important feature of Mexico's education is the rapid expansion of secondary education. By 1975, Mexico's government rapidly expanded expenditure on secondary education and invested much more on this level than other educational levels. However, this high investment in secondary education policy did not last for long time. After five years of increased expenditure on secondary education, Mexican government changed its attention to higher education. The government intended to educate more high-skilled workers than needed at the stage of development.

With the debt crisis in 1983, Mexico's education policy changed. To cope with the economic crisis and to reduce public deficit, Mexican government had to cut the public expenditure including the expenditure on education, which as a ratio to GDP declined from 4.3% in 1982 to 2.1% in 1988. However, the cut was not uniform across the levels of education. Mexico reduced the expenditure on primary and secondary education while maintaining that on higher education. Mexico promoted higher education much earlier than justified by its industrial development stage, and the supply of high skilled labor did not match the demand. Mexico's main industries were labor intensive industries and oil sector in which the demand for skilled labor is relatively small. The oil sector required skilled workers, but because of its capital intensive nature, the demand for workers was limited.

Mexican government addressed this mismatch in the 1990s, changing the education policy once more. Mexican government rapidly increased the investment in primary education and enforced the basic educational reform. Efforts were made to reach high efficiency in primary education and to reduce or eliminate primary repeaters.

### 3. EXPENDITURE ON EDUCATION

The main difference between Korea and Mexico in terms of education policy was not the amount but the allocation of the public expenditure on education.

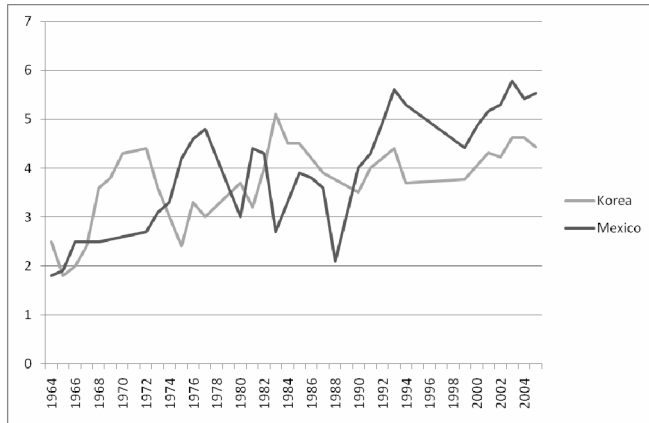
Figure 1 shows the evolution of public expenditure on education as percentage of national income. In average, the expenditure on education was not very different between the two countries. One important point is that Mexico increased the expenditure on education during the oil boom of the 1970s, but reduced it during the period of debt crisis in 1982-1990.

The public expenditure on education as percentage of total government expenditure of Mexico was similar to that of Korea in average. However, the expenditure on education decreased more than others during the crisis period of 1985-1990, as shown in Figure 2. This means that education was not priority in the allocation of resources. But after 1995, the share of education in total government expenditure has been higher than Korea.

The main difference between the two countries in terms of education's expenditure lies in the distribution of the expenditure on the various levels of education. Figure 3 shows the evolution of public expenditure on education by level: primary, secondary, and tertiary level.

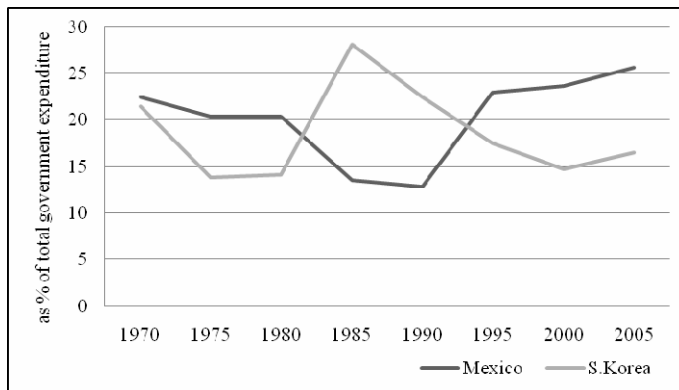
The comparison of Korea's and Mexico's public expenditures on the primary education level as percentages of their total expenditures on education revealed that in its early stage of economic development, Korea allocated a very high percentage of educational expenditure

**Figure 1.** Korea's and Mexico's Public Expenditure on Education (% of GDP)



Source: UNESCO Yearbook (1961~2005).

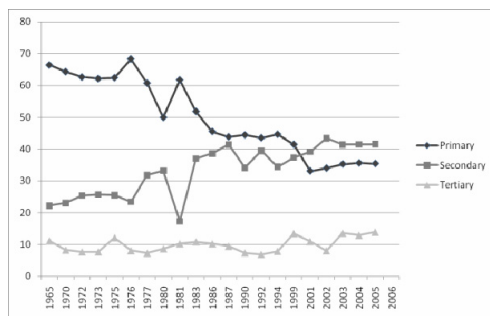
**Figure 2.** Expenditure on Education as Percentage of Total Government Expenditure



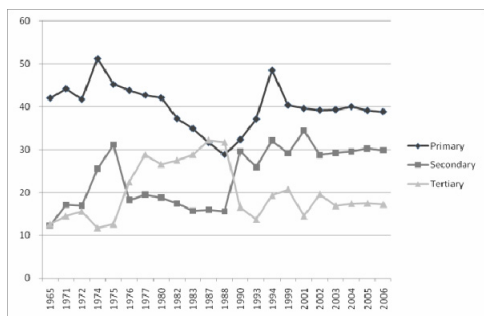
Source: World Bank time series data from 1970 to 2005.

**Figure 3.** Public Expenditure on Education by Level

(a) Korea



(b) Mexico



Source: UNESCO Yearbook (1965~2005).

on primary education until the 1990s. In the case of Mexico, the expenditure on primary education was also over 40% before 1982, which is much larger than on other levels of education. But it was far lower than that of Korea, and declined rapidly after 1982. The decline in Korea was steady whereas, in Mexico it was erratic declining in the 1980s but increasing once more in the early 1990s.

As for secondary education level, Korea's expenditure steadily increased, whereas in Mexico it fluctuated. It can be inferred from Figure 3 that in the initial period of its economic-development, Korea allocated more of its educational budget to primary education. Then, it gradually reduced its spending on the primary education level and increased its spending on the secondary education level. However, in Mexico it is very difficult to find any relationship between economic development and the allocation of education expenditure by level. This may be because of the lack of a long term education policy which is consistent with industrial policy.

Korea's and Mexico's public expenditures on tertiary education as percentages of their total educational expenditures, shows highly unexpected trend. After 1965, Mexico has always allocated more of its educational budget to tertiary education compared to Korea. Even in the 1980s, which was widely regarded as a "lost decade" in Latin America due to the severe economic crisis that occurred therein at that time, the share of tertiary education level in Mexico's total education expenditure was about 30%, whereas in Korea, it never exceeded 15%.

#### 4. EXPENDITURE AND EFFICIENCY IN EDUCATION

The difference in the expenditure pattern with respect to education levels resulted in different performance. Figure 4 shows the enrollment ratios of Korea and Mexico by education level. In the primary education level, the enrollment rates of the two countries were not very different.

Due to Korea's heavy investment in primary education, which was close to 70% of total education expenditure, Korea could achieve 100% primary-school enrollment rate in 1965. Mexico reached the same level in 1970. After reaching the enrollment rate of 100% in primary school, the two countries maintained it thereafter.

However, in secondary and tertiary levels, Korea's enrollment ratios have been higher than Mexico's. Figure 4 shows that Korea's secondary-school enrollment ratio was higher than that of Mexico by about 20% between 1950s and 1990s. The gap is decreasing after late 1990s. As for the enrollment ratio in the tertiary level, Korea's ratio increased rapidly after 1980s, whereas Mexico's did not change significantly for several decades.<sup>3</sup>

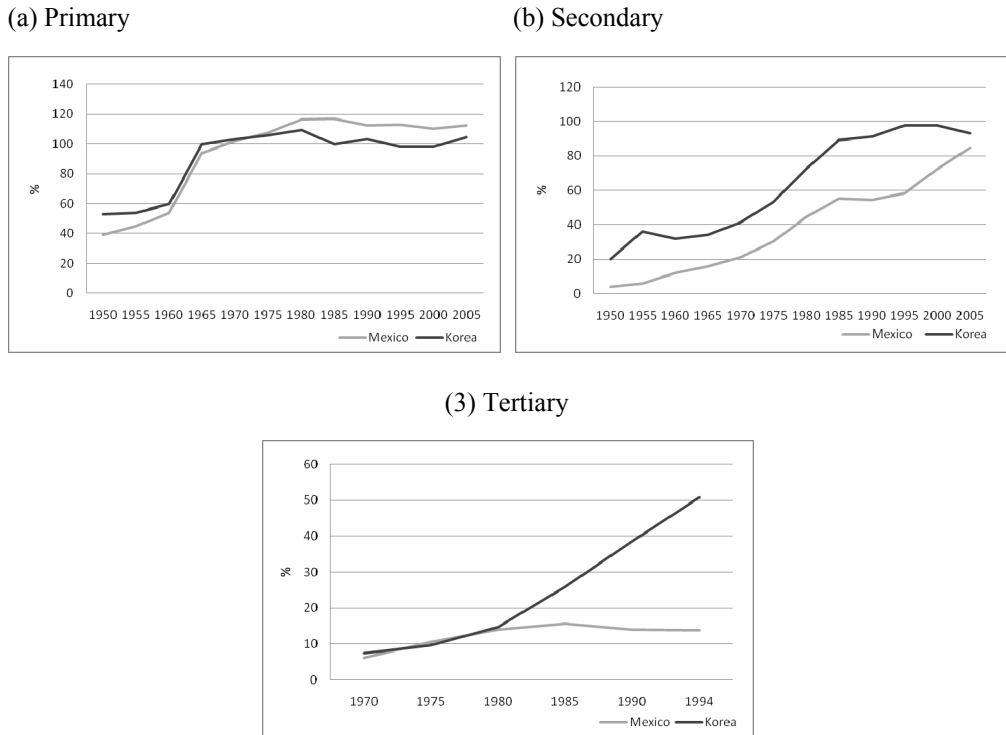
This may seem inconsistent and strange considering the allocation of education expenditure in Mexico. Compared to Korea, Mexico allocated a larger amount of education expenditure on higher education level. One factor that explains this may be the difference in the primary education completion and repetition ratios between the two countries.

Figure 5 shows the completion and repetition ratios of primary school of Korea and Mexico. Only three lines are shown in Figure 5 because in Korea, there was no primary education repeater in all the years that were considered. Here lies the obvious difference

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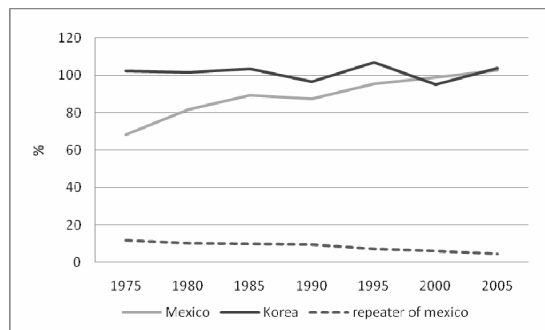
<sup>3</sup> The data for tertiary education enrollment was available only for 1970-1994 in the UNESCO Yearbook.

**Figure 4.** Enrollment Ratios of Korea and Mexico by Level



Source: The data from 1950 to 1965 is from UNESCO Yearbook and the data after 1965 is from World Bank.

**Figure 5.** Completion Ratio of Primary Education



Source: World Bank (1975~2005).

between the two countries in terms of their educational-development policies with regard to primary education. Setting aside the public-expenditure aspect, the two countries' educational policies can be said to be fundamentally different from their basic concepts. Korea implemented an educational policy that ensures the Korean children's completion of

six-year primary education without repeating any year. This was done by fielding people in the workplace who have completed at least basic education. Further, most of the students were given the opportunities to enter the next higher school level. On the other hand, Mexico has had significant number of primary education repeaters until now, and its primary education completion ratio was 30%, lower than that of Korea in the 1970s. The fact that almost one third of the people entering primary school do not complete the primary education signals that a large proportion of the population is leaving school without having acquired a basic set of competencies.

The low primary education completion ratio of Mexico explains why Mexico had so low secondary-school enrollment ratio in spite of the high primary-school enrollment ratio. The low primary-school completion ratio in Mexico reflects the low efficiency of education. Even if Mexico’s education expenditure on primary school was similar to Korea’s, Korea was much more efficient in reaching the intended level of education.

Mexico shifted prematurely to a policy emphasizing the secondary education before the primary education was provided and before the industrial demand for workers with secondary education was enough to employ all the graduates from secondary school. However, Korea did not change its education policy focusing on primary education until 1960s when the primary school enrollment and completion ratios reached 100%.

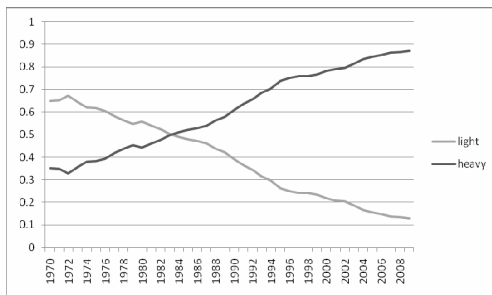
5. EDUCATION POLICY AND INDUSTRIAL STRUCTURE

Economic development usually entails the growth of capital intensive sectors and the decline of labor intensive sectors.<sup>4</sup> This process can be performed more efficiently if the education sector supplies the adequate amount of educated workers in each stage of development. A larger supply of highly educated workers may also lead to a faster economic development. However, if the supply of highly educated workers is much larger than the demand, there may be a waste of resources and a structural mismatch in the labor market.

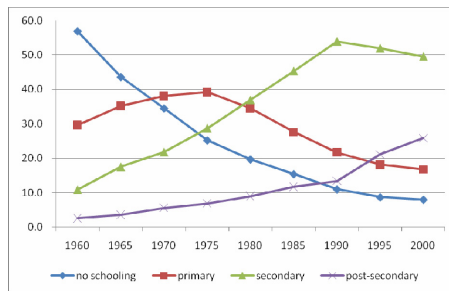
In the Korean case, the education sector supplied workers with adequate level of education as was demanded for in the industrial sectors. As shown in Figure 6, the share in industrial production of heavy industries, which are intensive in capital and skilled labor,

Figure 6. Industrial Structure and Supply of Workers by Education Level: Korea

(a) Industrial Structure



(b) Supply of Workers by Education Level

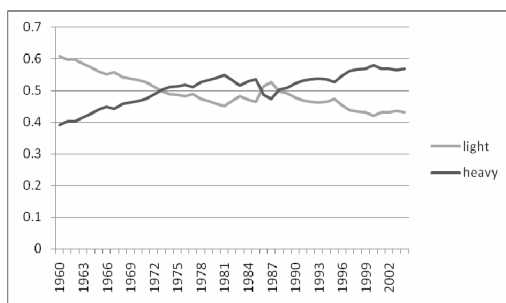


<sup>4</sup> Capital refers to either physical capital or human capital.

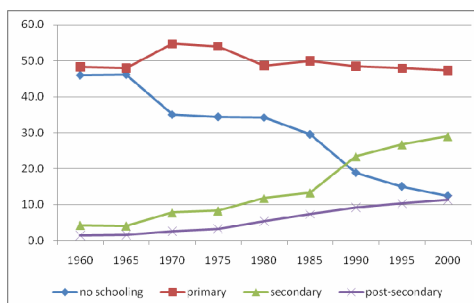


**Figure 7.** Industrial structure and supply of workers by education level: Mexico

(a) Industrial Structure



(b) Supply of Workers by Education Level



gradually increased from 35% in 1970 to 86% in 2008. Korean education sector increased the supply of workers with primary and secondary education at beginning of the industrialization in the 1906s and early 1970s. After mid 1970s, when the heavy industries gained momentum due to heavy and chemical industries drive policy, the education sector reduced the supply of workers with primary education and increased the supply of those with secondary education. This process continued until 1990s, when the industrial structure shifted to knowledge based industries. At this stage, the supply of workers with secondary education was gradually replaced with the supply of those with tertiary education.

In the case of Mexico, the industrial policy was erratic, and this was reflected in the industrial structure. As shown in Figure 7, the share of heavy industries in industrial production increased from 39% in 1960 to 55% in 1981, but reduced to 47% in 1987. After 1987, it gradually increased to reach 57% in 2004. In the 1960s, Mexican education sector slightly increased the supply of workers with primary education. The workers with no schooling were replaced with those with secondary education and with post-secondary education. The increase of the supply of workers with secondary education was too slow, partly because of the high repetition rate of primary school. Workers with post-secondary education increased at a similar pace as those with secondary education. However, because of the slow growth of the industries intensive in highly educated workers, the demand for workers with post-secondary education was not large enough to absorb all the workers supplied by the education sector.

## 5. CONCLUSION

We have seen from the cases of Korea and Mexico that a large expenditure on education does not automatically lead to a faster economic development. The expenditure must be allocated to the education level that is in accordance with the industrial policy which in turn must consist with the country's economic development stage. In Korea, the education sector supplied workers with adequate level of education that was required in each stage of development, whereas in Mexico, the supply of workers by education level was mismatched with the demand for labor derived from the industrial structure at each development stage. Therefore, we can conclude that not only the size of the expenditure but also its efficient use

is important to guarantee the positive effects of education expenditure on economic growth.

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#### REFERENCES

- López-Acevedo, Gladys, 2006, "Mexico: Two Decades of the Evolution of Education and Inequality", World Bank Policy Research Working Paper No. 3919.
- López-Acevedo, Gladys and Angel Salinas, 2000, "The Distribution of Mexico's Public Spending on Education," World Bank Policy Research Working Paper No. 2404.
- Gonzalez de Turner, Guadalupe "Disparities, Contrasts and Developments in Contemporary Mexican Education," *International Journal of Educational Development*, Vol. 7, No. 3, King's College, University of London, U.K. 1987
- Pereira, João and Miguel St. Aubyn, 2009, "What Level of Education Matters Most for Growth? Evidence from Portugal," *Economics of Education Review* 28: 67-73.
- Papageorgiou, Chris, 2003, "Distinguishing between the Effects of Primary and Post-Primary Education on Economic Growth," *Review of Development Economics*, 7(4): 622-635.
- Self, Sharmistha and Richard Grabowski, 2004, "Does Education at All Levels Cause Growth? India, a Case Study," *Economics of Education Review* 23: 47-55.

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