

THE RELATION BETWEEN EXPENDITURE ON EDUCATION AND ECONOMIC GROWTH.

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Abstract

This article aims to shed light on the role of education in promoting economic growth, with a particular focus on higher education and its quality, which depends on the size of expenditure on it and on the quality of human resources and the institutional framework and the research universities, which need special circumstances to be efficient, and to fulfil the necessary equipment in Algeria, where the government remains unique in fulfilling education in different levels, whereas; the state spends on education from the pre schooling to post graduation, in order to provide the society with qualified leaders and skilled workers in purpose to develop the society and growing the economy. For that, I can say that the aim of this article is to analyze the relationship between education and economic growth with focusing on Algeria.

INTRODUCTION

Despite that we know that the growth is not an end in itself ; but it makes it possible to achieve other important objectives of individuals or societies because it can spare people in mass from poverty and drudgery .it also creates the sources to support health, education and other millennium development goals to which the world has committed itself.

despite that we know also that growth is necessary, if not sufficient, condition for broader development, enlarging the slope for individuals to be productive and creative .we know that until 1970, traditional neoclassical growth models emphasize differences in factor accumulation to explain differences in income per capita across countries.

These models found factors such as saving rate (Solow 1956) preferences (Cass and coopmens 1965) or other exogenous parameters such as total factor productivity growth to be important

More recent, strands of growth theory, following Romer (1986) and Lucas (1988) are similar in this approach, but endogenize steady-state growth and technical progress; it became increasingly evident that accumulation factor alone was insufficient for sustained growth.

Economic growth began with the industrial revolution in the end of 18th century. Over the time, many economic growth theories and models have developed relation between education and economic growth, and that makes education to be regarded as one of leading determinants of the later; because, it contributes to economic growth by improving health, reducing fertility and possibly by contributing to political stability.

Despite we know that the main engine of growth is the accumulation of human capital of knowledge, and the main source of differences in living standard among nations is differences in human capital; physical capital plays an essential but decidedly subsidiary role.

The major important of education system to any labour market is, that world depends on its ability to produce literal, discipline and flexible labour forces via high quality of education when countries invest in human capital through education ;there is a potential for generating benefits to societies and individuals .

purpose: this article will highlight the role of education in the economic growth and development. More specific objectives of it are to:

- Identify the conditions under which the expansion of education at different levels would be fruitful for the accumulation of human and physical capital, and sustainable for economic growth.

- What lessons can Algeria learn from the experiences of developing countries?

To this end, the article addressed the following questions:

- 1.Does investment in education necessary to enhance economic growth.
- 2.What were the purposes of development strategy of Algeria independent?
- 3.What can policymakers do to make education system made optimal contribution to development?
- 4.What are the government efforts to improve the education system in order to realize its aims?
- 5.How much had Algeria invested in education over the past 50 years, and how much has the investment been translated into higher economic growth; better income distribution ,lower poverty and better quality of life.

Importance of education

Since the emergence the classical economic theory in the 18th century; economists have sought to determine the source of economic growth; from Adam smith’s examination of the division of labour in the “wealth of nations” to Joseph Schumpeter’s analysis of the importance of innovation in capitalism in the mid 20th century.

A particular important effect of these spillovers is on the economic growth of an entire country's economy. Early work by economists such as Schultz (1960) and Denison (1962) emphasized that an increase in overall educational attainment in a nation; increases the nation's stock of human capital, and thus increases its aggregate output and income. The productivity increases from the increasing in the human capital or the ability of the same number of people in a country to produce more or to produce goods and services that are valued more highly in the market; increases the amount of income earned in a country and thus makes all of the country better off.

Empirical studies in the literature on education and economic growth also find compelling evidence for the hypothesis that a substantial proportion of the growth of the economies is attributable to the rise in the educational levels of the workforce

Education has long been an important determinant of economic well-being. The theoretical growth literature emphasizes at least three mechanisms through which education may affect economic growth. We may speak of two ways in which education contributes to the economic advancement of society.

1. The increasing in the level of education of the overall population through acquiring higher level of education; and through gaining qualification suited to the need of the society, opening up the education system to include marginalized groups; opening up the system to vocational education to the economic needs of the society, and creating systematic opportunities for gaining adult qualifications.

2. increasing the efficiency of the education system itself through:

- Introducing compulsory preschool education.
- Establishing a system for quality assurance in education, a system of teacher professional development.
- Optimizing of the school network, which secures the rational usage of resources.
- Equipping schools.
- Promoting and modernising the methods of governance and administration in the education system.
- Increasing the number of years of compulsory education.
- Education can increase the innovative capacity of the economies, and the new knowledge or new technologies, products and processes promote growth as in theories of endogenous growth; Lucas (1988), Romer (1990) and Aghion and Hewitt (1998).
- Education can facilitate the diffusion and transmission of knowledge needed.

For that, we can say that education is not active only in the area of human capital, but also in social one.

Education and training was identified as an important source of human capital accumulation and the person undergoing education and training affected positively.

Relation between education and economic growth.

The macroeconomic analyses appeared at the end of 1980's within a convergence framework. R.Barro (1990) was the first to show that for a given level of wealth, the economic growth rate was positively related to the initial level of human capital of a country, whereas for a given level of human capital, the growth rate was negatively related to the initial level of GDP per capita. Convergence, therefore, appears to be strongly conditioned by the initial level of education. Azariadis and Drazen (1990) assume that economic growth is not a linear process; rather, it goes through successive stages in which the stocks of physical and human capital enables a country to reach a given growth level.

However, increasing the levels of education in a country does not necessarily lead to greater economic growth.

Psacharopoulos (1993) show that investment in education yields a higher rate of return than investment in physical capital. Romer (1986) Lucas (1988) have propounded the new growth theories in which sustained long-run growth of per capita income is explained by the likelihood of investment in human capital generating constant or increasing returns.

The different studies show that the variations of growth rates among countries can be explained partly by the initial level of human capital, but the higher level of investment in education does not affect the growth path as Barro and Lee (1994) show that. The increase in the number of those who attended secondary school between 1965-1985 in Singapore; had a positive effect on growth, but estimates by others do not confirm this result.

Using an aggregated production function, Benhabib and Spiegel (1994) and Pritchett (1996) also measured the impact of human capital on the rate of economic growth. They use various measurement of human capital, including the numbers of years of education, literacy rate, and secondary enrolment rate. Benhabib and Spiegel argue that human capital does have a role to play not as a factor of production but as a “factor” that allows for the adoption of new technology and makes physical capital more productive. They develop a model of economic growth. Britchet (1996) tests the impact of investment in human capital on a panel of 86 countries. His results show that there is not significant effect of education on economic growth. He then tests the same specification distinguishing by geographic area as well. Education is shown to have a positive impact in Asia and Latin America but a negative one in the MENA region .the result is relatively stable whatever the human capital variable used.

The region’s GDP per capita growth was positive and rapid in the 1960’s and 1970’s and much lower in the 1980’s and 1990’s, which makes us say that the education level has not significant effect on economic growth

GDP per capita growth.

	1960-1969	1970-1979	1980-1989	1990-2003
Algeria	1.7	3.9	-0.2	0.3
MENA countries	5.4	2.9	1.25	0.8
South Asia♠♠	3.0	4.9	4.5	4.3
Latin America♣	2.7	2.5	00	1.7

♣: Argentina ; Bras il ; Chele ; Mexico; Peru.

♠♠ : China, Indonesia; Republic of Korea; Malaysia; Philippines and Thailand

Source: the road not travelled; education reform in the Middle East

and

North Africa; World Bank; 2008;p45

Easterly (2001) presented results for sub-Saharan Africa that find no association between growth in education and growth in output per worker.

Maku’s (2009) study examines the connection between total government spending and economic growth in Nigeria over 30 years (1977-2006). His result shows that human capital investment as a share of real output has positive but, statistically, insignificant effect on the growth rate of real GDP. He concluded that government expenditure had no significant influence

on economic growth in Nigeria based on his analysis, which reveals that the variables have not maintained a uniform pattern in the period of study owing to persistent random shock effect on the time series.

However, a study of the joint development of government expenditures and economic growth in 23 OECD countries conducted by Lamartina and Zaghini (2007) showed that there is a structural positive correlation between public spending and GDP per capita. Thus, an increase in government's spending on human capital development is expected to culminate in an increase of per capita output.

Chandra (2010) has tested for a causal relationship between education investment and economic growth for India for the period 1951-2009, using linear and not linear granger causality method. He found that there is bi-directional causality between education spending and GDP in India

These empirical tests generally that the education is one of the initial conditions that define the long-term steady state toward which the economy tends: the countries that in 1960 had a higher level of education had a greater opportunity; 40 years later; to reach a higher level of development.

However, one of the main conclusions of the analyses of the education-growth relationship is the absence of homogeneity across countries.

This conclusion is supported by various empirical studies. They found that the effect is positive in the Southeast Asia countries; not significant in Latin America and negative in the MENA countries and sub Saharan countries. Nevertheless, it is thus incorrect to assume that education has the same impact on growth in all countries.

**Return to investment in education by level;
Regional averages (%)**

Region	Social			private		
	Primary	Secondary	Higher	primary	secondary	higher
Asia	16.2	11.1	11.0	20.0	15.8	18.2
Europe/Middle east/N Africa	15.6	9.7	9.9	13.8	13.6	18.8
Latin AmeriCaribbean	17.4	12.9	12.3	26.6	17.0	19.5
OECD	8.5	9.4	8.5	13.4	11.3	11.6
Sub-Saharan Africa	25.4	18.4	11.3	37.6	24.6	27.8
World	18.9	13.1	10.8	26.6	17.0	19.0

Source: psacharopoulos; George and Harry Patrinos 2002

We remark that the higher education is more efficient in private sector than the public one, because the first one invest in productive sector whereas the second invest in infrastructural one.

Following the classical contributions by Barro (1991, 1997), Mankiw and Weil (1992), a vast early literature across-country growth regression has tended to find significant positive association between quantitative measures of schooling and economic growth.

Pritchett(2001-2006) raises questions about the plausibility of simple growth model with years of schooling and stresses that it is important for economic growth to get other things right as well in particular; The institutional framework of the economy. But using average years of schooling

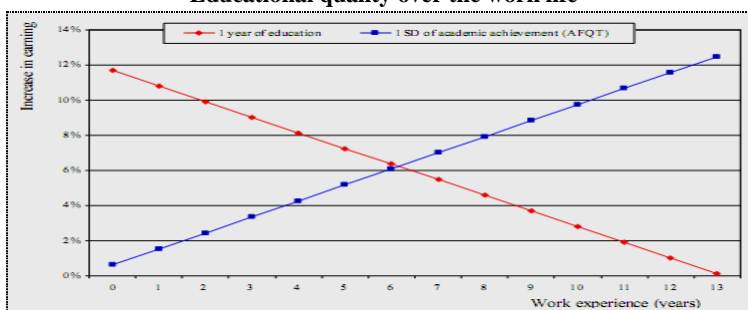
as an education measure implicitly assumes that a year of schooling delivers the same increase in knowledge and skills regardless of the education system.

Economic institutions appear to interact with the effect of educational quality on economic growth

From all studies and experiences above, I can conclude that:

- Returns to education fall as one goes up by the level of economic development.
- Returns to education fall by level of education.
- The low and middle-income countries record higher social rates of return compared to the high-income countries. The rates decline as one moves up the educational ladder; that is primary education has the largest rate of return followed by secondary education with tertiary education having the lowest rate of return among the three.
- The social rates of return are usually larger than the private rates of return.

Returns on observed educational quantity and observed Educational quality over the work life



Eric Hanushek+Ludger wÖßman: the role of education quality in Economic growth; World Bank policy research paper, February 2007; p9

Quality of education and economic growth

The first factor in explaining the weak relationship between education and economic growth is the quality of human capital and the capacity of workers to innovate or adopt new technology. However, does investment in education necessarily enhance economic growth?

Education and economic growth was based on the argument that; major effects of more education is that an important labour forces has an increased capacity to produce because more educated workers are more literal and numeral; they should be easier to train ; to learn more complex tasks; but it unclear a more educated labour force will increase economic growth. It also unclear, what kind of education contributes most to growth, and what level contributes most to growth?

Hanushek and Kimko (2000) find statistically significant positive effects of the quality of education on economic growth in 1960-1990 that dwarfs the association between quantity of education and growth.

Several studies have since found very similar results. Another early contribution, by Lee (1995), found an effect size similar to Hanushek and Kimko (2000) . Barro (2001) also found that, while both the quantity and the quality of education matter for economic growth, the quality is much more important. Ludger wÖßman (2002-2003) found that the share of cross-country variation in levels of economic development attributable to international differences in human capital rises dramatically when quality of education is taken into account.

However, when educational quality is added to a model that just includes initial income and years of schooling, the share of variation in economic growth jumped from 0.25 to 0.73, whereas,

the association between years of schooling and economic growth turns insignificant and is reduced to close to zero once the quality of education is included in the model.

Nevertheless, the quality of education depends on:

1. **The characteristics of good teachers:** which is not well understood because it depends on the measurements of what people knew; in despite educational quality has powerful effects on individual earnings, which related to cognitive skills, and the later appears closely related to the distribution of income and economic growth is strongly affected by the skills of workers.

2. **The institutional framework of a country** affects the relative profitability of piracy and productive activity. The allocation of talent between rent; seeking and entrepreneurship matters of growth: country with more engineering students grows faster, and country with more students grows more slowly.

3. **Research Universities,** which are integral part of the global high education and social environment. It faces many of the same challenges as higher education.

The central to the success of a research university is adequate and stable funding.

- National research universities will be increasingly challenged to attract top talents; both professors and students, in an increasingly competitive global academic marketplace.

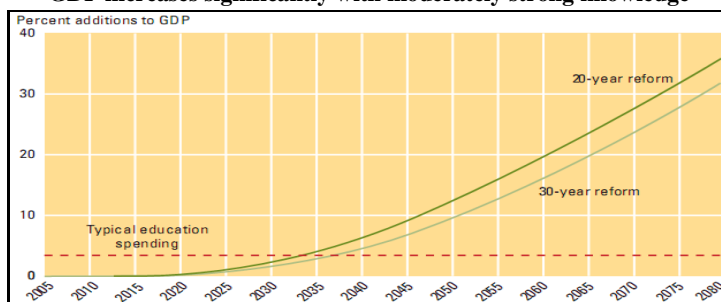
- Research University is public institution in almost all countries. The pressures toward the privatization of public universities, because of reduced public funding exist nearly everywhere..

Two aspects of any educational reform plan are important:

- What is the magnitude of the reform that is must accomplished?.
- How fast does any reform achieve its results?

The studies show that; a faster reform will have larger impacts on the economy as shown bellow, simply because the better workers become a dominant part of the workforce sooner.

GDP increases significantly with moderately strong knowledge



Eric Hamushek+Ludger wößman: education quality and Economic growth; World Bank, 2007; p11

The circumstances of the research university

There is widespread recognition of the importance of the research university in almost every country. The role of research in the global knowledge economy; are understood as central to sustainable economic growth; and stability. It aims to: create knowledge, create human capital, transfer of exist kow-how, technological innovation, capital investment, regional leadership, knowledge infrastructure production

The characteristics of successful research universities

Some of the characteristics of successful research universities; as defined by their placement in top echelons of the global ranking can be outlined as follows:

1. All successful research universities are stand at the top of an academic hierarchy.

2. Research universities, except in Japan and United states, are overwhelmingly public institutions.

3. Research universities are most successful where little or no competition arises from no university research institutes or where strong ties exist between the universities and such institutes.

4. Research universities require more funding than other universities to attract the best staff members and students and to provide the infrastructure necessary for top research and teaching.

5. Research universities must have adequate and sustained budgets.

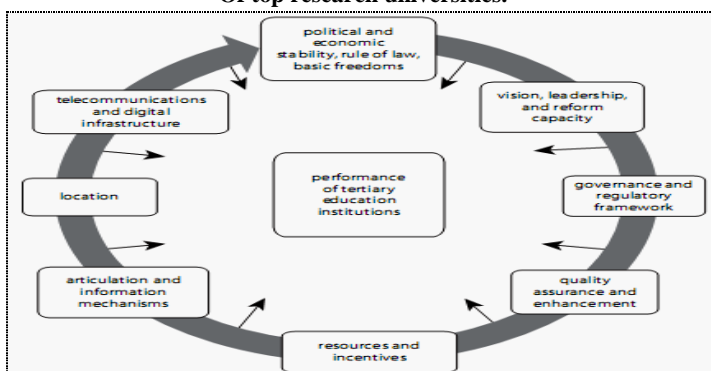
6. Research universities have the potential for significant income generation.

The requirements of research universities are manifold; as noted previously. They are physical and human, but also contain principles relating to academic work; including teaching; research; service; and academic standards.

Because research universities are central institutions in any knowledge and technology intensive society; and because they are seen as the key to excellent higher education system, their future is reasonably bright. The fact is that modern societies cannot do without them.

The main dimensions of the ecosystem are illustrated in the figure

**Understanding how the ecosystem influences the performance
Of top research universities.**



**Source: the road to academic excellence; the making of world
- class research Universities; World Bank; 2011; p336**

As a conclusion, when talent, resources; and governance are adequately aligned from the beginning, new universities have the potential to grow into high quality research institution within two or three decades.

New research universities face special challenges to attract academic and good students. They need to be sufficiently innovative to represent a convincing alternative to existing institutions. When it comes to transforming existing universities, however, leadership; governance, and management seem to be the key factors for starting a virtuous circle leading to momentous improvements.

National policies

The evolving links between the university and the business sector are becoming a major focus of policy as the role of technology in development expands.

Most of technological advances that have economic consequences can be traced indirectly or directly to universities, either through the training provided knowledge spillovers or the actual

research conducted or through university-industry links that enables firms and faculties members to collaborate in the development of technologies.

Government initially set the stage for the emergence of university-industry links through the higher education and innovation strategies. Those strategies determine:

- How much is spent on tertiary education.
- How distributed across institutions.
- What kind of disciplines is emphasizing.
- How much autonomy teaching institutions enjoy.
- What kind of competition exists among them?

the education system in Algeria tries to make individuals learn during a long period in purpose to make enterprises realize their objectives, because the lifelong learning has the potential to meeting these objectives; and that involves:

- A formal education, provides all individuals with opportunities to acquire a fundamental level of instruction.
- Multiple opportunities for individuals to continuously renew their knowledge, skills and competencies.
- An institutional set-up to quickly and smoothly adapt and respond to the changing education demand of individuals, firms, local and regional political actors and the international environment.

The World Bank's analytical framework for studying and explaining the dynamics of knowledge-driven development identifies converging roles of the four contribution factors:

- The macroeconomic incentive and institutional regime.
- The information and communication infrastructure.
- The national innovation system.
- The quality of human capital.

The contribution of tertiary education is acknowledged as vital because it exercises a direct influence on national productivity, which largely determines living standards and country's ability to compete and participate fully in the globalization progress more specifically, education institution support knowledge-driven economic growth strategies and poverty reduction by:

Training a qualified and adoptable labour forces; including; high-level scientists; professionals; technicians; teachers in basic and secondary education and future government civil services and business leaders.

Generating new knowledge.

Providing the capacity to access existing stores of global and adopt this knowledge to local use.

Tertiary education institutions are unique in their ability to integrate and create synergy among these three dimensions.

Corporation policies

The link between The new growth theories assert that developing nations have a better chance of catching up with more advance economies when they have a stock of labour with the necessary skills to develop new technologies themselves or to adopt and use foreign technology..

Investment in education; apparently; contributes much more to growth when those who are educated have the opportunity to use their education in more productive activity...

For a country to be competitive, the education system must be capable to provide two types of services:

1. It must be able to produce the broadest possible human capital which means, if knowledge is increasingly recognized as key of competitiveness, it follows the more people have a fundamental level of instruction, the better.

2. If a country's knowledge endowment is to be over static and growing, an individual's knowledge base must also continuously change and expand in.

Algeria's policies in growth

Overall, Algeria can be regarded as one of the fastest growing economies among MENA countries. The average annual growths rate between 1962-1999 is a respectable 5.0%. In spite that, it was not achieved yearly because the Algerian economy is marked up during this period by succession of rutting.

1. 1962-1985: period when Algeria enjoyed its highest economic growth; averaging 7% annually; which was led by growths in manufacturing sector which benefited by intensive public investment.

2. Period 1986-1988: the most difficult period in Algeria's economic growth history; declining an average of 0.7% annually.

3. 1989-1994: the period of implantation of the first adjustment program, and during which economic growth remained in declining period with nearly 0.1% annually.

4. 1995-2000: when the Algerian economy re-started its improvement with annual growth rate of 3.4%, which will be explained mostly by the result of adoption of the second economic reform supported by the World Bank and IMF.

The development system adopted in Algeria was centred on:

- Strong industrialization which considered the way by which other sector of the Algeria's economy will developed; consequently, large investment had to be granted to this sector: 54% of the total investment were centred in the field of industry; mines, energy, hydrocarbons in the first quadrennial plan (1970-1973) against 10% for the agriculture sector. The part of investment intended for the industrial sector increases during the second quadrennial plan (1974-1977), reaching more than 56% against only 6% for the agriculture sector.

- Microeconomic objectives were also assigned to public firm.

In summary, the key success of Algeria's early modern economy development owed to:

- A vision to promote economic growth through high public investment and productive activities and human capital financed by an increasing energy production and a high international prices for oil products

- A high development for local production realized both by public direct support and commercial protection

The principal objectives of education in Algeria

The constitution of Algeria of 1963 modified in 1989 and in 1996; and legislative texts; considered education as the basic factor for any economic and social change.

The ordonnance n°76-35 OF 16TH April 1976 was the first regulation text in this field. It defined the missions, ends, and objectives of educative system.

This text constitutes a prescribed cadre for the development axes. It leaned on:

- ✚ The authenticity of the consciousness and national culture of the Algerian people.

- ✚ The development of its spiritual values, traditions and fundamental choices.

- ✚ Educating the nation through the generalization of education and combating ignorance.

- ✚ The consecration of arabization principles, democratization of education; and the technical and scientific option of it.

- ✚ The guarantee of the right of education; its free of charge for all levels and whatever the type of the establishment, and its compulsory for the whole children between 6 and 16.

How the educational systems perform in Algeria? What are the major outcomes and how are the public resources utilized for education at different levels?

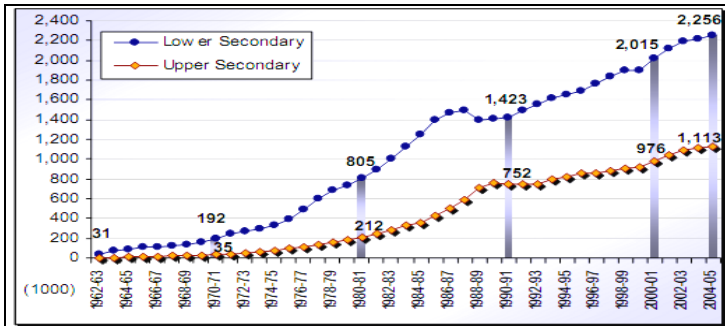
The Algerian educational system operates at four levels. They are:

- Preschool; until recently provided largely by the private sector and nursery schools.
- Primary cycle of five years and a lower (middle) secondary cycle of four years constituting nine years of compulsory education.
- Post compulsory education consisting of two streams; upper secondary education of durations provided by vocational training centres.
- High education provided by universities and specialize national centres.

Since 2000; enrolment at the primary level has declined with the sharp drop in fertility rates and reduced size of the 0-5 year's population.

During the past 10 years preceeding2004, enrolment at primary level fell at 2 percent per year. In contrast, enrolment in lower secondary and upper secondary grew at 3.4% per year but enrolment at higher education grew at 12.4% per year, tripling between1994 and 2004 and doubling since 1999 as shown in the diagrams bellow.

Enrolment in lower an upper secondary Education (1962-2004)



Source: A public expenditure review, assuring high quality Public investment; World Bank; volume 1; 2007; p113

1. Algeria has achieved near universal participation in primary education and relatively participation in lower secondary education; but compared with other countries, the rates in upper secondary and higher education remain low.

2. Enrolment in vocational education and training has been rising steadily; more than doubling over the past 10 years. In 2004-2005, these programmes enrolled almost 400.000 students representing almost one quarter of the enrolment in post compulsory education.

Objectives of higher education:

The main aim of higher education is to contribute in the development of scientific and technological research, diffusion of knowledge, elevation of scientific, cultural, and professional levels. We can summarize its objectives in:

- Generalization of the education reform.
- Improvement of the Quality.
- Promotion of excellence poles.
- Development of scientific research.
- Openness on the international environment.
- Generalization of the use of the new technologies of information.
- Good governance of higher education establishments.

The focus of the new strategy is to:

- Rapidly expand access as well as pass rates on the baccalaureate.
- Introduce the license, master, doctorate (L.M.D) program.

Doubling the number of universities places by 2010.

The following diagram shows the evolution of enrolment in high education.

Enrolled students in higher education (1962-2011)

	1962/63	69/70	79/80	89/90	1999/2000	2009/2010	2010/2011
Graduate students	2725	12243	57445	181350	407995	1034313	1077945
Post graduate students	156	317	3965	13967	20846	58975	60617
global	2881*	12560	61410	195317	428841	1093288	1138568

* Among them, there are 820 Algerians and 2061 Europeans

Source: higher education and scientific research in Algeria, 50years in development servicing,

Ministry of high education and scientific research 2012; p32

We remark that the students number multiplied by: 9times between 1960and 1970; 4.5 times between 1970and 1980; 3times between 1980and 1990; 2.25 times between 1990and 2000; and by 2.5 times between 2000 and 2010; whereas, the number of students in OECD countries multiplied by 10 times between 2000 and 2010.

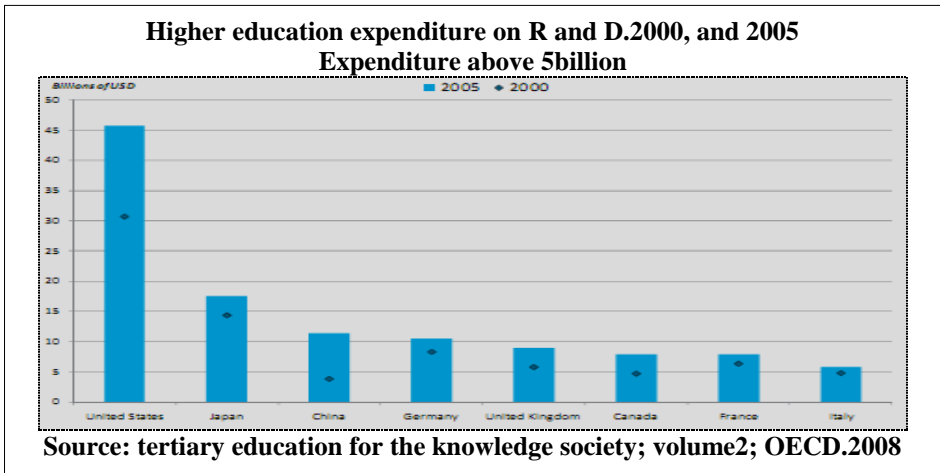
However, spends of Algeria on higher education was relatively more than many comparator countries; it was mainly because of the high social, not instructional, expenditures, whereas: boarding, scholarship, food and transport account for nearly 50%of recurrent in high education. The expenditure on food represented between 30and 40 percent of all social expenditure between 2001and 2005 as shown bellow.

Composition of recurrent expenditure in high Education; 2001-2005

	2001	2002	2003	2004	2005
Total recurrent expenditure(DA millions)	47.103	58.716	63.495	63.495	78.671
Social expenditure (DA millions)	18.745	27.757	32.045	32.045	37.475
Social expenditure (as a percentage of total)	39.8	47.3	50.5	50.5	47.8
Per student social expenditure(DA)	38.363	48.703	51.998	51.998	51.904
Per student all other expenditure(DA)	58.036	54.321	51.033	51.033	57.058
Composition of social expenditure(in percentage)					
Wages	20.5	17.6	15.8	17.4	17.3
Materials and maintenance	9.1	21.1	25.1	22.5	9.7
Cultural and sport activities	0.9	1.5	1.8	1.5	1.8
Scholarship	22.9	18.7	15.9	18.2	20.0
Food	38.8	32.9	31.2	28.6	40.0
Transport	7.7	8.3	10.2	11.8	11.2

Source: A public expenditure review, assuring high quality public Investment; World Bank; volume 1; 2007; p130.

Whereas, the major percentage of higher education expenditure in most developed countries is on research and development as shown in the diagram below, where that USA appears is the country the most expeditor on R and D with more than 45 percent of their higher education expenditure on research and development, which make it the greatest country in all fields.

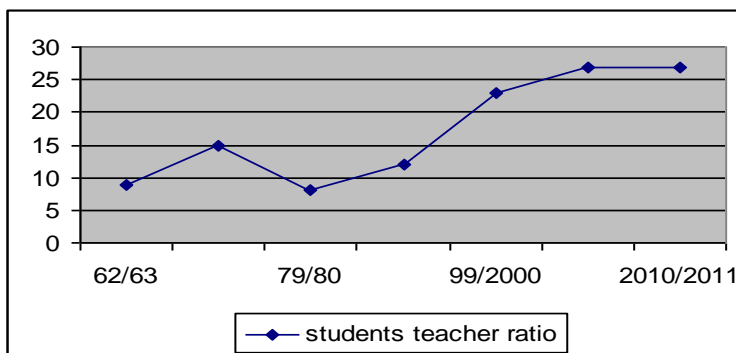


3.The proposed expansion of vocational education and training to increase the coverage of post compulsory education.

4.Then, a clear definition was defined for the overall vision for year 2025; objectives and strategies for modernizing higher education, improving its efficiency, and increasing its contribution to growth and social development. This would enable a better assessment of proposed large-scale public investment in education.

5.the higher education was intended to inject a more higher level managers and engineers in order to manage; efficiently ;the economy and to generate more economic value from the university’s intellectual resources; and from the industrial sector which was the favourable sector for the public investment, but, unfortunately; it has been realized neither this nor that because the Algerian economy was working away from the effectiveness of effective industrial economy, and university-industry links. Whereas; the modern universities have to inject a more entrepreneurial dimensions into the education experience of its students, particularly those in technical fields. However, that goal was difficult to realize it in a university suffer from the high ratio of students to teachers as shown bellow despite that hanushek and kimko (2000) find that there is not clear significant effects in this field.

**Students to teacher ratios in higher education
Period 1962-2011**



Source: higher education and scientific research in Algeria, 50years in development services;

Ministry of high education and scientific research 2012; p58

In undergraduate education; the student to teacher ratio ranges from 12 in natural science to 75 in law, economic, and management. therefore, this is a great obstacle on the way of improving high education, which ought to defeat the 21st century challenges.

Investment in education in Algeria

Investment in education is an effective ganging of country’s efforts to increase the level of human capital Algeria does well on spending on education as a proportion of GDP compared to many countries.

On the period of 1965-2003, Algerian government spend an average of approximately 6.3% of its GDP on education, whereas, the mean of spending was 5% in MENA region and 3.2% in Latin America countries as shown in the table below.

Average expenditure in education as a percentage of GDP 1965-2003

periods	1965-1974	1975-1984	1985-1994	1995-2003
Algeria	6.2	6.1	7.2	6.1
MENA countries	4.4	4.6	5.5	5.3
Latin America ♣	3.0	3.4	3.2	3.9
South east of Asia ♣♣	2.6	3.3	3.1	3.6

♣: Argentina ; Brasil ; Chele ; Mexico; Peru.

♣♣ : China, Indonesia; Republic of Korea; Malaysia; Philippines and Thailand

Source: The road not travelled; education reform in the Middle East and North Africa; World Bank; 2008, page 11.

This large amount of spending on education as a percentage of GDP in Algeria has successfully increases enrolment; and led to a significant improvement over time of net enrolment, which will lead to reiterate its commitments to achieve the six objectives of the education for all ; and the eight-millennium development goals by 2015¹.

¹ The eight millennium development goals are to(1) eradicate extreme poverty and hunger ;(2) :achieve universal primary education ;(3) : promote gender quality and empower women ;(4) : reduce child mortality ;(5) :improve maternal health ;

The following table shows the evolution of public education expenditure in Algeria during the period 2000-2006

Evolution of public education expenditure in Algeria 2000-2006

	2000	2001	2002	2003	2004	2005	2006
Total(billion DA)	223	274	302	338	376	400	439
School education(% total)	71.6	68.7	66.2	66.3	67.6	65.1	59.3
Technical and profess(%total)	6.7	7.4	7.4	7.9	6.2	7.8	7.5
Higher education(%total)	21.8	23.9	26.4	25.8	26.1	27.1	33.2
As a% of government expenditure	19	20.8	19.5	20	19.9	16.7	15.3
As a % of GDP	5.5	6.5	6.8	6.4	6.2	5.4	4.9

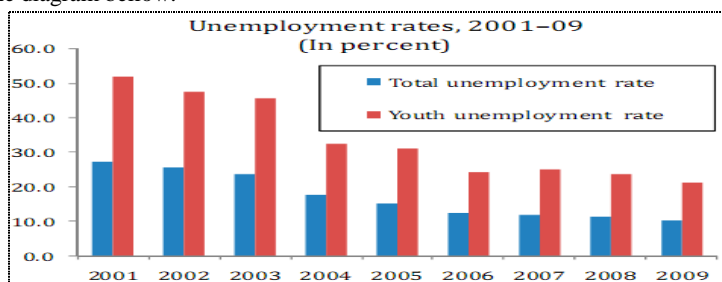
Source: A public expenditure review, assuring high quality public Investment; World Bank; volume 1; 2007; p124.

Subsectoral allocations indicate strategic objectives on the 2025 horizon and show a steady-trend in priority toward higher education. The share rose from about one-fifth of education budget in 2000 to one third in 2006. higher education’s share of recurrent expenditure has also increased to about one quarter of total recurrent spending.

However, a strong desires to start a business; combined with good idea, careful planning, and hard work, can lead to a very engaging and profitable endeavour.

Most economies agree that entrepreneurship is essential to the vitality of any economy; developed or developing; because entrepreneurs create new business, generating jobs for themselves and those they employ.

For that, the high educational reform in Algeria aimed to encourage universities to adopt the LMD which will introduce a credit system, and allow student more flexibility and choice, , and to make students adopt an entrepreneurial thinking allows them to create economic activities generating income, because most economists today agree that entrepreneurship is a necessary ingredient for stimulating economic growth and employment opportunities in all societies because successful small business are the primary engines and jobs creation, income growth and poverty reduction especially among youth who suffer form high percentage of unemployment as shown in the diagram bellow.



**International monetary fund country report n°11/39
February 2011**

(6):combat HIV/AIDS malaria and other diseases; (7):ensure environment sustainability; and (8):develop a global partnership for development.

In many cases; entrepreneurial activities increase competition; and with technological or operational changes, it can increase productivity as well. Entrepreneurs are the generators of social welfare. For that, we can say that they give security to other people.

The economic policy of Algeria does well for encouraging people, especially youth of them, to create their business, which results in the creation of hundred thousands during last decade as shown in the table below

Source: Samia Gharbi: SME/SMI in Algeria, inventory fixtures; Mars 2011

	2003	2004	2005	2006	2007	2008	2009	2010
Private	207949	225449	245842	269806	293946	392013	408155	606737
Public	788	778	874	739	666	626	598	560
craftsman	79850	86732	96072	106222	116347	126887	162085	---
total	288587	312959	342788	376767	410959	519526	570838	607297

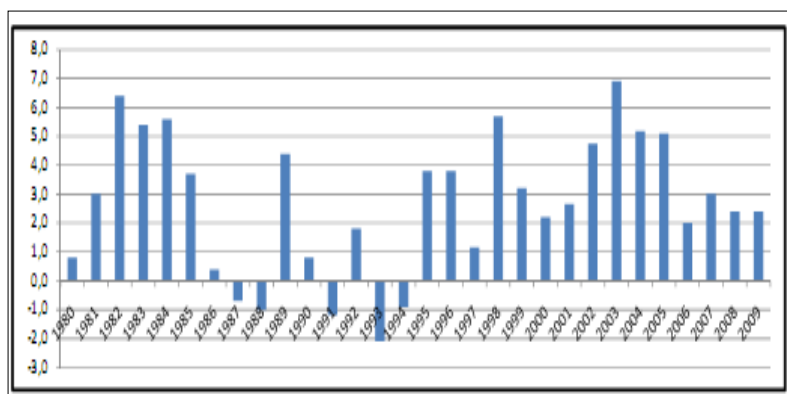
Source: statistics and information systems direction; ministry of industry, Small and medium business and investment.

However, these businesses, in its majority, created in the field of commerce and services, which results in lack in the number of Innovation today, is the most important driver of economic growth; it relies upon a social climate supporting entrepreneurship with a culture of economic and intellectual freedom.

Whereas, during the period that preceded the economic reform starting, which led to privatization of enterprise, Algeria account higher economic growth, especially in the productive sector as showed bellow.

GDP per capita growth during the period 1980-2008

GDP real growth rate



Source: Fatiha Talahite+Ahmed Hammadache, L'économie Algérienne Dans Le contexte de la crise financière internationale ; intervention à la Journée d'étude Sur L'économie Algérienne aux défis de la globalisation : Mardi 8fevrier 2011

But unfortunately, these growth rates were not a result of neither productivity nor innovation because the Algeria's economy is a rental economy, remains depend on hydrocarbon sector , not on productive sectors, especially, the industrial one, which knew a felling down in its share in Algeria' GDP during the period1998-2004 as an example, as shown bellow despite that the enrolment in school reached a high level in the last decade

Sectoral share in GDP as (%) during the period 1994-2004

	1998	1999	2000	2001	2002	2003	2004
GDP in 109 DA	2810,1	3215,1	4078,7	4235,7	4446	5264,2	6100
Agriculture	12,5	11,9	9	10,4	10	9,7	9,1
Hydrocarbons	24,5	29,6	42	36,5	35,1	35,5	38,2
Industry	9,9	9	7,7	7,9	7,9	6,5	6,0
BTPH	11,6	10,2	8,7	9,1	9,8	8,5	8,3
Merchandise services	26,8	25,6	21,6	24,2	24,8	21,5	20,7
Non merchandise services	14,8	13,7	11	11,9	12,5	18,2	17,7
TOTAL	100	100	100	100	100	100	100

Source : planning delegate services

In the past, schools have taught children how to solve known problem with known methods, a process that encourage them to reason in established ways. Now schools need instead to encourage children to master change, discover new problems, and devise new solutions. That is to say, instead of encouraging uniformity; the innovation economy encourages diversity and creativity. Banks and investors must redefine risk to appraise more accurately the path –breaking and innovation project

CONCLUSION/

From all the above we conclude that:

- The effect of education, which will be on technological capability, will depend in large part on the policies adopted to reach that.
- Its potential role in innovation must view as part of a complex system.
- The current challenges of economic development policy is to ensure that public sector agencies learn to work in new and more effective way with a range of public and private sector partners.
- The evolution of technological policy shows that it is not limited to technological advancement, rather, economic and industrial implications are significant
- Effective economic development policy builds on successful experiments with associative government.
- The vitality of research universities and spin off enterprises is shaped by national innovation system, as well as by the local policy and innovation environment.
- The success of university technology transfer relies on the quality of the local innovation environment at a large extend.
- Inject a more entrepreneurial dimension in the educational experience of its students, particularly those in technical field.
- Understanding of the applicability of research is limited because the embryonic basic research question would be industrially applicable.
- Fuzzy differentiation exists between basic science and application, where the companies engaged in science-based industry, find it hard to set boundaries between the basic science and applications, therefore, may not be able to determine the suitable extend of it.

For that, the education system in Algeria has to respond to the challenges of the new economy through:

- Putting a strategic planning for industrialization and educational reforms, characterizing by flexibility in initiating required changes and responding to new challenges
- Encouraging all industries to exploit and apply new advances in technology as possible.

- Producing academic excellence and technological innovation.
- Ensuring strong links among education, the labour market; and economic development.
- Develop mechanisms to matriculate high quality students, including a merit based admission policy, and to recruit quality staff.
- Develop a prioritized, development-oriented research strategy backed by an excellent infrastructure; support facilities and incentive schemes with an aim to achieve excellence, to develop management strategies to maintain cost effectiveness in program offerings and research.
- Implement a concerted policy effort to diversify resources.
- Align educational reforms with economic reforms.
- Development of the ability and capacity of school leaders.
- Developing competence in selected new technology where Algeria has a comparative advantage.

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