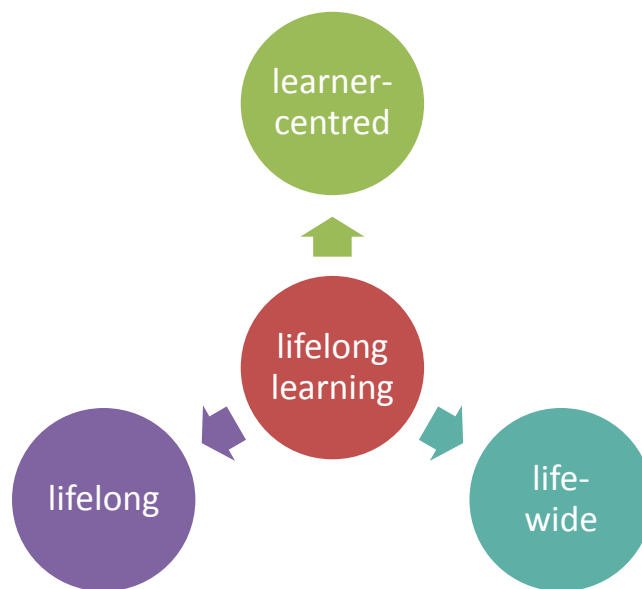




# Building-up Human Capital in Senegal- E-Learning for School-drop outs Possibilities of a Lifelong Learning Vision

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## 1 Introduction

In today's knowledge based economy innovativeness, education and the ability to update knowledge are the main drivers of economic growth. In corollary the only way for developing countries to reduce poverty and enhance economic growth is to rebuild their human capital. And the best mean to do so is the adoption of a lifelong learning vision and the use of modern ICT.



Source: Wikipedia; <http://de.wikipedia.org/wiki/Senegal>;  
latest call: 20.09.2009

As will be shown in this discussion paper, this especially holds for Senegal, the republic in the very west of the African continent. Poor in natural resources the future of the Sahel-county is largely determined by its ability to create labor with high value added.<sup>5</sup> Even though Senegal, since its independence in 1960, ranks amongst all African states as one of the most politically stable countries, it has to deal with the typical problems of most sub-Saharan countries. With a Human Development Index of 0.502 (which gives the country a rank of 153rd out of 179 countries)<sup>6</sup>, a GDP of only 820\$ per capita<sup>7</sup> and an employment rate of 54%<sup>8</sup> Senegal is one of the poorest countries in the world.

Especially when it comes to the educational system, the former French colony struggles with the marks of its colonial past. Only 49,12%<sup>9</sup> of the population is literate with high gender disparities and differences between rural and urban regions. As in most French speaking African countries this is partly due to the adaptation of the French formal educational system. Despite French being the language Senegalese students are taught

<sup>5</sup> World Bank (2007); p.9-10

<sup>6</sup> UNDP (2009)

<sup>7</sup> World Bank (2009b)

<sup>8</sup> World Bank (2009d); Employment to population ratio, ages 15-24, total (%)

<sup>9</sup> World Bank (2009a)

in, roughly 25% of the ethnically, culturally, and linguistically very diverse<sup>10</sup> population is “capable of using French as a language through which...” it has “...access to information, whether it be written or oral”.<sup>11</sup> Although various reforms after the independency of Senegal were striving to decentralize and to open up to the private sector, the system is still too rigid to respond to the needs of the Senegalese labor market: The majority of the Senegalese student’s drops out of the formal educational system in the first years of schooling without any major certificate. And the Senegalese government has not yet created a strong net to absorb those losses to the labor market. However, the market reacted with the supply of various courses for school drop outs. But these schools most of the time lack in the necessary quality.<sup>12</sup>

In the following will be shown that the implementation of a lifelong learning vision could help Senegal to break the vicious cycle of low knowledge and education, low economic prosperity and the high vulnerability to poverty of the population. E-Learning, among experts, has become the major tool to realize this vision as it embodies the new media’s and possibilities forming today’s economy. This discussion paper will give a broad analyze about the actual situation in Senegal, the needs of the labor market, school drop outs as targeted group and the resources on hand to realize a e-Learning program for school drop outs.

The structure of this paper follows this line of argument. The next chapter will start with the features of the Senegalese labor market and the educational status of the population, which will give an introduction to the second chapter. Chapter three gives an explanation for the weak investment of the Senegalese population in education and will answer to the question why an e-Learning program should address school drop outs. In the fourth chapter will be analyzed why a lifelong learning vision could help Senegal to free himself out of its economic isolation and which features of the targeted group creates the adequacy of e-Learning. Chapter five will give an overview over the technology relevant in the Senegalese context and the cost structure of the relevant resources. The seventh chapter will give a short overview of the relevance of mobile learning for the Senegalese context and the last chapter will conclude.

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<sup>10</sup> World Fact book (2009): 7 main different ethnic groups (Wolof 43.3%, Pular 23.8%, Serer 14.7%, Jola 3.7%, Mandinka 3%, Soninke 1.1%, European and Lebanese 1%, other 9.4%) and 5 different languages spoken (French (official), Wolof, Pulaar, Jola, Mandinka); 94% of the population are Muslim, 5% Christian an 1% follow indigenous beliefs

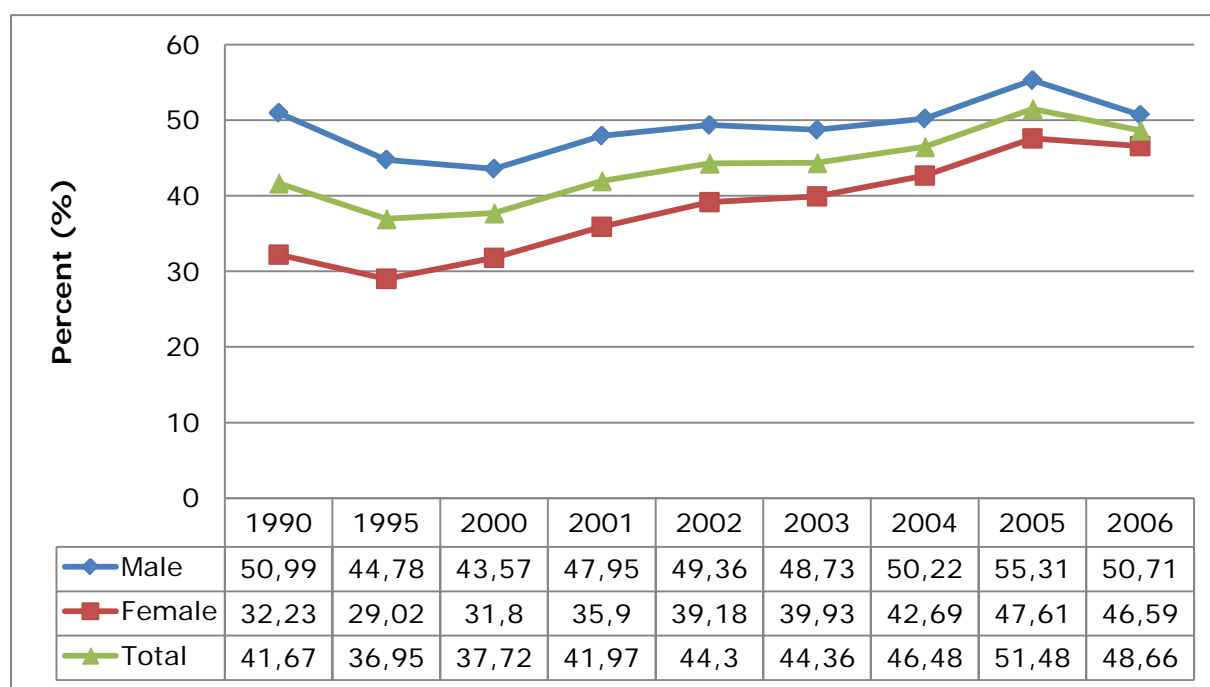
<sup>11</sup> Kuenzi (2006); p 211

<sup>12</sup> Atchoarena (2006); p. 108- 113

## 2 Features of the Senegalese labor market

The problem of students dropping out of the educational system is the biggest problem to the Senegalese economy. Even though the average of years people attend school in Senegal is 7 times bigger now than it was back in 1960 the disparity between Senegal and industrialized countries in years of school attendance has changed from 8,3 to 9,5 years in the same period.<sup>13</sup> Regarding the educational status of the Senegalese population, the country can be ranked among the least developed countries in the world. With an adult literacy rate (15 years and older) of 42,6% and a youth literacy rate (people between 15 and 24 years) of 51,3% in 2007, Senegal ranges even below the Sub-Saharan average<sup>14</sup> (which ranged in the period from 2005 to 2007 at 62,1% for adults and 71% for youth). That means that every second young adult is not able to read and write and this figure becomes even more alarming if we take into account the high gender disparity in terms of literacy. Especially in rural areas the educational status of the population is very low.

**Figure 1: Primary completion rate**



Source: World Bank (2009a)

When it comes to problems of the educational status of Senegal, one has to start with the still very low primary completion rate (see figure 1). Even though in 2007 the government managed to augment the total net primary enrollment ratio from only 57% in 2000 up to 73% in 2007, the primary completion rate diminished in the same period from 63% to 53%. It is especially unclear, if in the cases of school drop outs in the period of the six years of compulsory primary education, pupils leave with basic knowledge in reading and writing.

The major problem is that the issue of pupils dropping out of the educational system does not diminish with further education. Although one can claim that the majority of

<sup>13</sup> World Bank (2007); p.49

<sup>14</sup> UNESCO (2009)

youth can read and write (esp. in urban areas), for most of the Senegalese no further education and specialization is taking place. It is estimated that almost 7 out of 10 children are already excluded from the lower secondary education (students from 13 to 17 years) with even higher rates in the subsequent classes of secondary education. Hence most students do not achieve the first significant degree, the secondary school diploma (BFEM), whereupon the pass rates were only slightly superior to 30% in the period from 2004 to 2005. Thus these students do not have the possibility to continue upper secondary schooling till the university entrance diploma or a vocational training in a technical field. For this reason only 5% of the student body continues till upper secondary education.<sup>15</sup> Also the achievement rates of the secondary school diploma as well as the university entrance diploma remain insufficient. The question rises, if the quality of secondary education is high enough to qualify the students for further education or job life. The same doubts rise in view of the technical education with its very low participation and achievement rates.

Considering the small part of the educational expenditure that is invested on these two important branches of the Senegalese educational system it becomes evident that the preparation for the respective exams cannot be satisfactory. The Government only spends 17,4% of its total budget in secondary education and 8,3% on technical education. On the other hand 20% of the expenditure on education is spent on tertiary education which represents only a miniscule part of Senegal's student body.<sup>16</sup> Also it has to be taken into account that only 5% of the Senegalese GDP is education expenditures, which is extremely low considering the fact that the GDP of an African country like Senegal is only a small part of the GDP of an industrialized country (with the same population size) that spends the same part of its GDP in education. Thus there are already some incremental deficits on the offer side of education.

It is not surprising that the productivity of the human labor force of Senegal globally corresponds only to 5% of the productivity observed in the United States and is 7 to 5 times lower than the average productivity of Asia and Latin America. Senegal's productivity ranges even below the African average<sup>17</sup> which again shows a strong correlation of economic performance and the qualification of the labor force. At the same time the poor qualification is a big handicap to foreign investments in the country.

Here it becomes clear evidence that the structure of labor force of Senegal is very homogenous. In terms of formal education, most of the Senegalese workers do not acquire special knowledge and qualifications that could help them to differentiate from the rest of the labor force. In this manner it becomes apparent that the offer of qualified labor is very limited in Senegal which also hinders foreign investments.

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<sup>15</sup> World Bank (2007); p.52

<sup>16</sup> World Bank (2007); p.52

<sup>17</sup> World Bank (2007); p.35



### 3 Reasons for the humble investment of the Senegalese labor force in education

If one wants to motivate people for further education with e-Learning, it is important to understand why the Senegalese population invests so little in its human capital. The Human Capital Model is a useful tool to analyze the reasons for the missing productivity and qualification of the Senegalese labor force.

The main issue of the human capital concept is that education can be interpreted as investment that leads to economic and social advantages. Assuming a perfect labor market, the basic assumptions of the theory are that education is raising the productivity of the labor force and that the individual acts as a manager of its own labor force by investing a certain amount of money and time in his education to generate a certain interest of education.<sup>18</sup>

As every model it does not illustrate actual facts, it is only aimed at explaining some fundamental mechanisms. The human capital model assumes a perfect market which basically means that:

- all market participants are perfectly mobile and dispose of all the relevant information's
- there are no (subjective or objective) barriers of access (neither for education nor on the labor market
- there are no externalities, which means that all advantages or disadvantages emerging from a decision of a participant, do only affect the individual<sup>19</sup>.

Basically no country has a perfect market situation but in the case of Senegal very incremental mechanisms are abrogated because of some basic dysfunctions of the market. These dysfunctions mainly are:

1. a dual labor market, consisting of a formal and an informal sector
2. high poverty of the population and
3. information asymmetry.

and will be discussed below.

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<sup>18</sup> Pechar (2006)

<sup>19</sup> Pechar (2006)

### 3.1 The dual (labor) market in Senegal and its influence on the human capital

#### 3.1.1 Attributes of the informal sector



Source: [http://article.wn.com/view/2009/02/02/World\\_Bank\\_Predicts\\_Up\\_to\\_50\\_Decline\\_in\\_Africas\\_Economic\\_Gro/](http://article.wn.com/view/2009/02/02/World_Bank_Predicts_Up_to_50_Decline_in_Africas_Economic_Gro/); latest call: 20.06.2009

The existence of an informal sector is not a peculiarity of Senegal. The informal economy has rapidly developed almost all around the globe, including the industrialized countries<sup>20</sup> and “contributes significantly to output and employment of most Developing Countries”<sup>21</sup> Senegal can be distinguished by a very high value of the informal sector, as it is the case for most sub-Saharan Countries, where the Informal Sector generally is larger “than in other parts of the developing world”<sup>22</sup>. Even though the informal sectors differ amongst all countries each of them have in common that none of the activities in the informal sector are accredited, recorded, protected or regulated by the public authorities. The fact that they are not recognized by the law does not mean that they operate criminally. Most of the time these enterprises produce goods and services that are completely legal. Jobs in the informal sector have their own economic policy, which means that they have their own rules, conventions, institutions and formal structures. As enterprises in the informal sector are not acknowledged by the law they do not enjoy any juridical or social protection or only very few. The highest share of enterprises in the

<sup>20</sup> Conférence internationale du Travail (2002); p.1

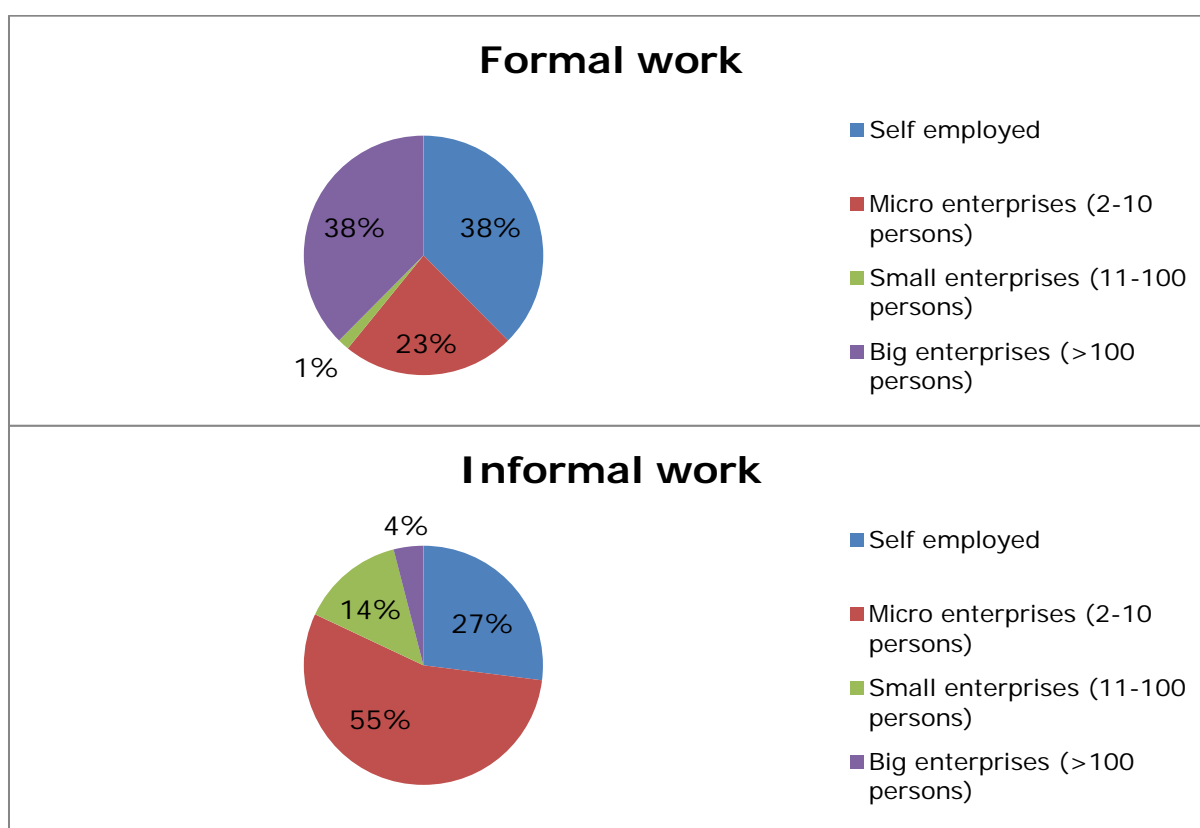
<sup>21</sup> Blunch (2001); p. 3

<sup>22</sup> Blunch (2001); p.9

informal sector is micro enterprises, accounting for more than 55% of all informal work (see figure 2). The job of people working in the informal sector is very instable and their revenue is very tight and irregular. But still this does not mean that every person working in the informal sector is poor and every person in the formal sector escapes poverty.<sup>23</sup> Further on, the Senegalese informal market is characterized by<sup>24</sup>:

- very easy access to activities,
- use of local resources,
- work in familiar networks,
- use of simple techniques and work in very small or individual enterprises,
- use of qualifications acquired outside the formal educational system or "informal process of acquiring skills"<sup>25</sup> and
- principal occupations are commerce, agriculture and fishing.

**Figure 2: Size of enterprises in the formal and informal sector**



Source: Agence Nationale de la Statistique et de la Démographie; Enquête 1-2-3; World Bank (2007)

Note: a/ Informal work is defined according to the largest definition, that is to say who is taking place in the production unities inscribed in the commercial register

To understand the existence of an informal sector of a country one has to understand it "in the context of the specific historical, political and social aspects"<sup>26</sup>. The high vulnerability to poverty of many Developing countries as Senegal somewhat calls for a

<sup>23</sup> Conférence internationale du Travail (2002); p.1-4

<sup>24</sup> Organisation Internationale du Travail (OIT)/Wikipédia : secteur informel au Sénégal

<sup>25</sup> Blunch (2001)

<sup>26</sup> Blunch (2001); p. 8

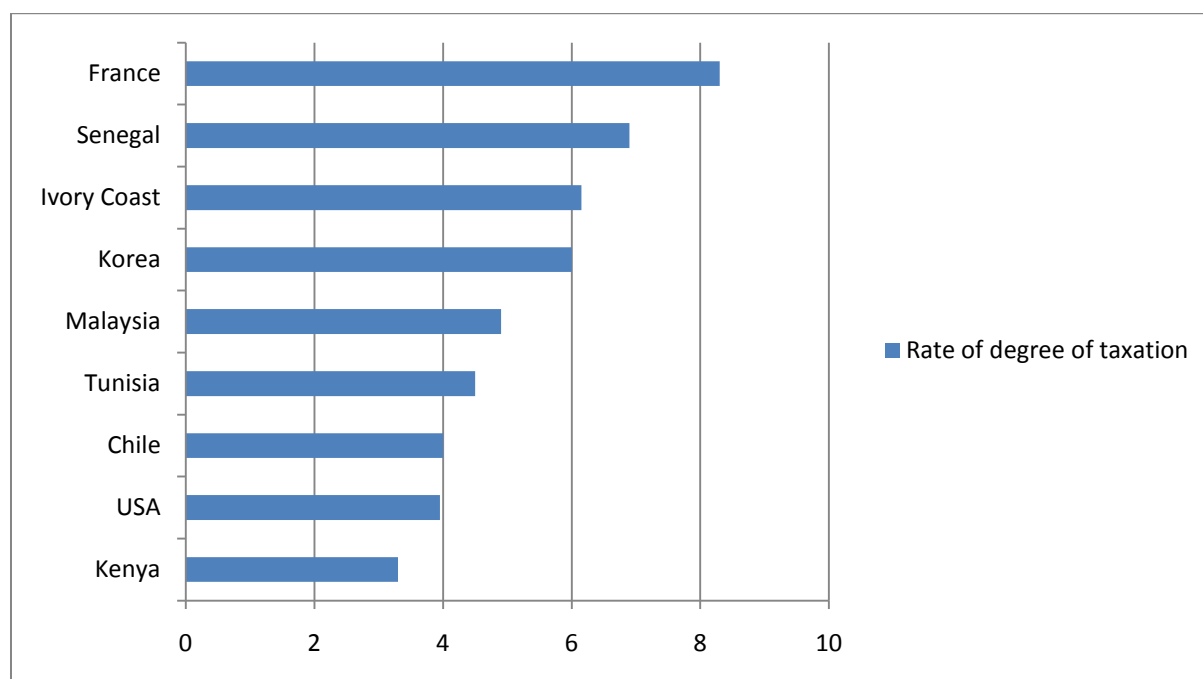
certain formalization to minimize the danger to fall into poverty.<sup>27</sup> In their Policy Research Working Paper for the World Bank Levenson and Maloney point out that even though social gains of participation maybe high it can be a rational choice to stay informal if one takes to account that “access to mechanisms that ensure property rights, pool risk, or enforce contracts become more important as firms grows”<sup>28</sup>. In General “informal firms tend to remain small and have high rates of mortality, and lower productivity”. That holds especially for Senegal, where most firms in the informal sector are individual, micro or small enterprises (see Figure 2: Size of enterprises in the formal and informal sector). Also strong social and familial networks are able to substitute old-age and health insurances.<sup>29</sup>

### 3.1.2 Attributes of the formal sector

In Senegal the formal sector integrates all enterprises that have a NINEA (Numéro d’Indentification Nationale des Entreprises Agréés) or a tax number.<sup>30</sup>

According to Loayza, in general, the “informal sector arises when excessive taxes and regulations are imposed by government that lack the capability to enforce compliance”<sup>31</sup>. That also holds for Senegal where the strong regulations partly are due to its colonial past.<sup>32</sup>

**Figure 3: The weight of the ancillary labor costs of formal Sector workers in Senegal can only be compared to France**



Source: Calculation of the World Bank on basis of national data; World Bank (2007)

<sup>27</sup> Canagarajah (2001)

<sup>28</sup> Levenson (1998)

<sup>29</sup> Levenson (1998) ; p.3

<sup>30</sup> World Bank (2007) ; p.28

<sup>31</sup> Loayza (1997); p. 1

<sup>32</sup> World Bank (2007); p. 61

The main reason for the low participation of enterprises in the formal sector is the high ancillary labor costs (see figure 3) that are affiliated with a public registration of the business. These regulations should serve to protect the worker from possible abuses of the employer and should guarantee the worker an assurance in case of illness, accidents as well as to finance their retirement. Unfortunately these regulations prevent the formal enterprises to take up workers according to the economical conditions. Hence, to keep up with the high costs of labor, the productivity of the workers in the formal sector has to be higher than in the informal sector (marginal costs should equal the marginal return) and formal firms in Senegal are more likely to substitute human capital with physical capital.<sup>33</sup> Even though a worker in the formal sector is 10 times more productive, because of the high ancillary labor costs (which raise higher-than-average with increasing productivity of the labor force), it was not possible to formal enterprises to profit on the gains which were caused by important gains of productivity.<sup>34</sup> For this reason also international competitiveness cannot be reached where also high costs of recruitment and dismissal of personnel and the big importance of public holidays (20 more days than in China or America and 10 more days than in France) play an important role.<sup>35</sup> For the analysis in this work it is, above all, important to understand the affect such regulations have on the formal Senegalese labor market. Because of the high labor costs Senegalese formal enterprises prefer to invest in physical capital than in their human capital, which lead to a stagnation of the recruitment of personnel in the formal sector.<sup>36</sup> Thus the decision of being or staying informal can be considered as a "rational one"<sup>37</sup>. For example "informal firms in Thailand, by ignoring labor-protection laws, save about 13 to 22 percent of labor wages."<sup>38</sup>

Another important point is that less women are employed in the formal sector which is partly due to the fact that their educational status is much lower than the educational status of men in Senegal, as it was already described in part one of the essay.

### **3.1.3 The influence of the dual labor market on the investment of the Senegalese population in Human Capital**

As almost every developing country Senegal has a fast growing population. Today almost half of the Senegalese population is under 20 years old<sup>39</sup> which means that every year around 100 000 work seeking<sup>40</sup> haste on the labor market. These developments cause tensions that should be regulated by the government. Already today we can see the consequences which are the high youth unemployment rate and the emigration of skilled labor and desperate youth in industrialized countries.<sup>41</sup>

Almost all the labor force is absorbed by Senegal's informal sector which is the major employer in Senegal. 93,8% of the labor is occupied in the informal sector.

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<sup>33</sup> World Bank (2007); p.60

<sup>34</sup> World Bank (2007)

<sup>35</sup> World Bank (2007); p.58-59

<sup>36</sup> World Bank (2007)

<sup>37</sup> Loayza (1997); p. 3

<sup>38</sup> Loayza (1997); p. 6

<sup>39</sup> World Factbook (2009)

<sup>40</sup> World Bank (2007); p.15

<sup>41</sup> World Bank (2007); p.14 ;15

**Table 1: Evolution of the active occupied population per sector of activity from 1995 to 2004**

Occupational Field	Share in work (%)	Share in 2004 (%)	Annual average growth 1995-2004 (%)	Contribution to growth 1995-2004 (%)
Agro-sylvan-pastoral	51,1		1,9	36,1
Fishing	2,3		1,4	1,2
Industry	13,1		2,6	12,4
Construction	2,1		3,5	2,6
Commerce	19,1		5,9	34,5
Services	8,2		3,7	34,5
APU (education and health included)	4,2		1,7	2,6
Total	100%		2,8%	100%
<i>Formal sector</i> <sup>1</sup>	6,2%		1,1%	2,7%
<i>Informal sector</i>	93,8%		2,9%	97,3%

Source: National Accounts and World Bank ; World Bank (2007)

Note: the formal sector is defined as (a) the ensemble of production unities with a NINEA number or a tax number or (b) when the entrepreneur and the workers have their own account along with their own accounting

But how does the existence of an informal sector influence the investment of the population in education and hence in their productivity?

**Table 2: Characteristics of the qualification of labor in Dakar**

	Formal sector	Informal sector
Number of years of education (median)	11	4
Without education (% of all workers)	9,2%	52,8%
Primary (% of all workers)	19,45%	35,3%
Secondary (% of all workers)	37,6%	10,15%
Superior (% of all workers)	33,8%	1,7%
With a formation (% of all workers)	39,2%	
Number of experiences in the same job (median)	10	
Scientists/ Technicians (% of all workers)	29,1%	

Source: Enquêtes 1-2-3 and ICA (Investment Climate Assessment); World Bank (2007)

There are some reasons that are directly connected to the existence of an informal sector which are majorly the direct return accruing from education (whereas the indirect reasons will be discussed in the part about poverty and information asymmetries). The monetary direct returns are embodied in the possible earnings that may accrue from a

certain investment in education. Studies of the World Bank showed that the level of income increases by 4,9% in the formal and 3,2% in the informal sector for every supplemental year of education. But seemingly there is no linearity in the increase of the income. Important growth of the income can only be reached with a post secondary level of education which means that the income is 70% higher than for a person who did not study at all. For those who acquired primary or secondary education these expected increases of income (in compare to people who never went to school) are much lower. These gains are not higher than 12% and 30% in the formal sector and 15% and 23% in the informal sector.<sup>42</sup>

Those results are not surprising considering that the gain in productivity with each added year of education is higher in the formal sector (7,5%) than in the informal sector (5,3%). For the informal sector those gains in productivity exist only for enterprises whose productivity already has reached the average productivity of the modern sector.<sup>43</sup> One reason for these differences lies in the high complementarities of higher skilled human capital with the existing stock of physical capital, which is much higher in the formal sector. In the informal sector these complementarities could only be observed in the commercial and in the service sector.<sup>44</sup> The other reason lies in the fact that the knowledge that qualifies a worker for a job in the informal sector is mostly a certain skill set that is acquired outside the educational system. However it has to be underlined that the complementarities of physical and human capital in the formal sector still are not high enough to compete with industrialized countries where this factor is translated in incomes twice as high with every supplementary year of education.<sup>45</sup> This is also a reason why many people, especially university graduates leave in the industrialized countries. They expect a higher income or higher returns to education as the working environment in industrialized countries is in general more favorable to their productivity.

If one adds the fact that the formal sector represents only 6,3% of the Senegalese economy it is not surprising that even though the average income in the formal sector is almost three times higher, the majority of the Senegalese population does not invest in higher education (as it is shown in table 3 below). Given a Senegalese worker decides to invest in education, he should not only take into account the higher average income for a person with tertiary education (in the formal sector) and the indirect cost which are accruing from the opportunity costs, he also has to factor the probability to receive a job with a high income. And this probability is majorly determined by the share of the formal sector in the Senegalese economy and the information asymmetries which will be discussed later on. It should be mentioned that also in the informal sector people are able to earn money above the sectors average, which also mitigates the effect that the expected income in the formal sector could have on the investment in education. In general "survey findings also suggest that the earnings of self-employed in the informal sector compare favorably with wage-earners in the formal sector, often being considerably higher than legislated minimum wage levels, while the earnings of wage-earners tend to be near or below them. For example, across countries in Africa, the

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<sup>42</sup> World Bank (2007); p.49;50

<sup>43</sup> World Bank (2007); p.48

<sup>44</sup> World Bank (2007); p.48

<sup>45</sup> World Bank (2007); p.50

average earnings of the self-employed ranged from 1.5 to 5.8 times the minimum wage level, compared to 0.6 to 1.7 times for wage earners (Charmes 1998).<sup>46</sup>

**Table 3: Monthly wage per worker (mean value in thousands of FCFA)**

	Formal sector	Informal sector
<b>Total</b>	<b>100,6</b>	<b>34</b>
<b>Sector</b>		
Primary	93,9	106
Industry	110,4	40
Commerce		26
Services	91,1	37
<b>Dimensions</b>		
Independent operation		32
Small enterprises	85,8	40
Big enterprises	105,2	
<b>Structure of capital (majority of capital)</b>		
National	97,6	
Alien	169,1	
<b>Total</b>	<b>100</b>	<b>32</b>
<b>Age</b>		
Less than 21 years	30	13
Between 21 and 40 years	90	35
More than 40 years	134,4	42
<b>Experience within the enterprise</b>		
Less than 5 years	87,5	25,3
Between 5 and 10 years	100	33
More than 19 years	125,3	47
<b>Education</b>		
No school attendance	80	28
Primary	71	35
Secondary	95	37
Superior	190	49
<b>Gender</b>		
Man	97,6	40,5
Woman	127,1	22

<sup>46</sup> Blunch (2001); p. 13



Type of work		
Permanent	115	34
Temporary	60	20

Occupation		
Boss		174
Independent worker		9
Wage-earner		35,6
Paid apprentice		20
Familiar help		0
Participator		26,5

Source: Agence Nationale de la Statistique et de la Démographie; Enquêtes 1-2-3 and ICA (Investment Climate Assessment)

### 3.2 The influence of the high poverty on the investment of the Senegalese population in Human Capital

Another factor limiting the investment of the Senegalese population in education is the high poverty. With a GDP per capital of only (current US\$) 820<sup>47</sup> Senegal is one of the poorest countries in the world. A lot of economists share the opinion that the only thing generating economic growth in a country in the long term is their investment in human capital. Unfortunately, poor people are generally more vulnerable to risks which force them to abandon their studies.<sup>48</sup> The major reasons for this vicious circle are the indirect monetary costs or the opportunity costs of education.

Many factors determine the importance or weight of these opportunity costs. Positively correlated with the size of the opportunity costs are mainly:

- the economic prosperity of the environment of the individual,
- the income of the family and
- the dominance of a welfare state.

These factors obviously are strongly connected to each other and hold especially for the rural areas in Senegal, where the educational status of the people is the lowest and where more than 70% of the population is living<sup>49</sup>. In rural areas, where the informality of the economical environment is almost universal<sup>50</sup> most of the economic activities are concentrated around the primary sector. Job opportunities are very scarce and only little determined by the level of schooling. As the government in Senegal is not able to assure a certain standard of living by social transfers, many people live below the poverty line, which holds especially for the rural areas, as well. Also the activities in the rural areas are very precarious as most employed people are seasonal workers. Therefore it is not surprising that every member of the family has to give full support to assure survival. This is just one more reason people have to stay active longer than in the urban areas to maintain a minimum living standard. Almost every second child under 15 has already

<sup>47</sup> World Bank (2009d); Employment to population ratio, ages 15-24, total (%)

<sup>48</sup> World Bank (2007)

<sup>49</sup> World Bank (2009e)

<sup>50</sup> World Bank (2007); p.29

joined the labor market and 9 out of 10 persons over 64 continue to work.<sup>51</sup> In the urban regions on the other hand, even within the informal sector, the fields of activities are much more diversified because of commerce and service. The existence of a formal sector diminishes the tensions on the labor market.<sup>52</sup> Additionally the adult literacy rate is much higher, so that parents understand more the importance of an educational basis. But still the low school completion rates show that people even in urban areas are very vulnerable to dropping out of the educational system which is in almost the same manner due to poverty and the possibility to enter the informal labor market without much education acquired.

### **3.3 The influence of information asymmetries on the investments in Human Capital**

How is it possible that in a country with 48% of the population unemployed enterprises complain not to find the labor they need?<sup>53</sup> The main problem is that information asymmetries are segmenting the market. Still the use of a formalized intermediate to bring together offer and demand of labor is not common use. In Senegal exists an incremental scarcity of information about work, which is also the reason why 60% of workers and employers report that they feel forced to use informal or family networks.<sup>54</sup> This is why enterprises take a long time (ca. 6 weeks) to find qualified or even non-qualified (ca. 4 weeks) labor.<sup>55</sup> Thus it is not surprising that the Senegalese population invests only little time and money in education as they do not know which opportunities exist in their own country and how to get access to them outside informal networks.

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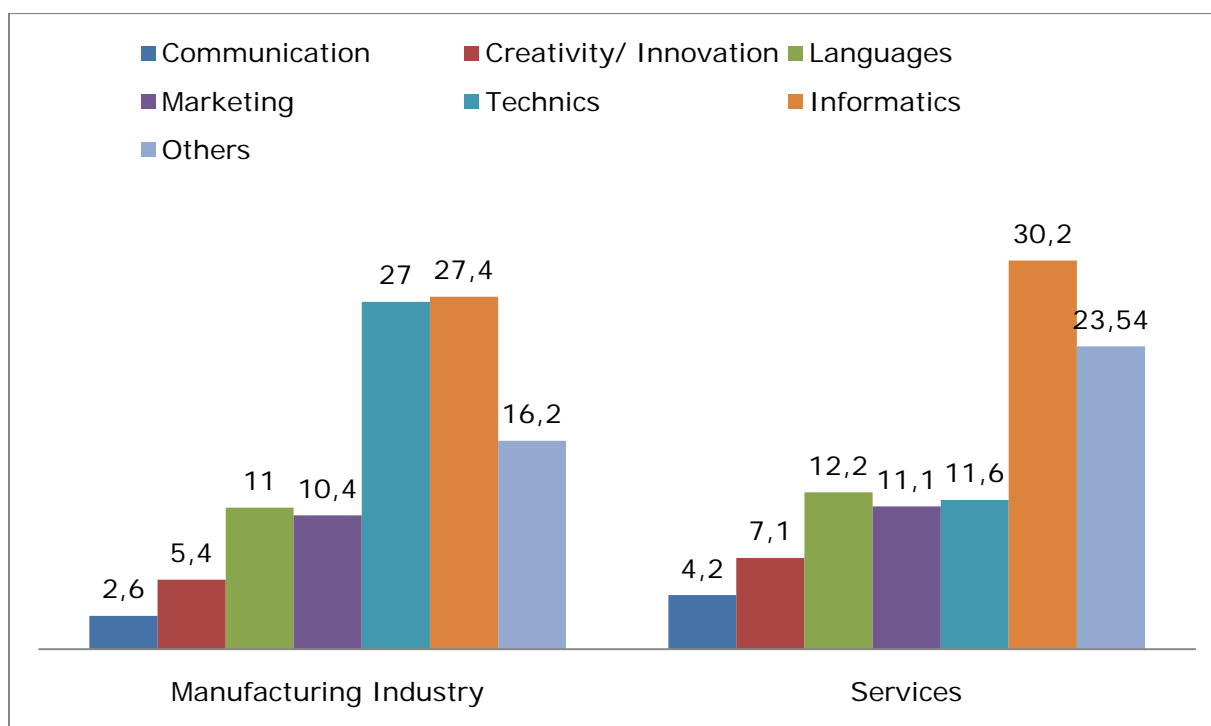
<sup>51</sup> World Bank (2007); p.20

<sup>52</sup> World Bank (2007); p.21

<sup>53</sup> World Bank (2007); p.61; 62

<sup>54</sup> World Bank (2007); p.62

<sup>55</sup> World Bank (2007); p.62

**Figure 4: Formation needs (expressed by employers in Senegal)**

Source: Enquête 1-2-3 Climat des Investissements au Sénégal ; World Bank/ Agence Française de Développement ; World Bank(2005)

Another problem emerging from information asymmetries is that the actual demand of enterprises for a talented workforce and the actual qualified talent available does not match. Employment agencies mention their difficulties to find technicians and engineers, while there is an oversupply of clerks and commercial agents.<sup>56</sup> This is another indication that students are not adequately informed about the current demand of the labor market. For example the majority of students in upper secondary education choose literature or law as course of studies which does not reflect the demand of the market.<sup>57</sup> On the other hand companies complain about not finding the adequate labor in areas of business and middle management.<sup>58</sup>

Latest developments show that the majority of employees in Senegal (according to a study of the World Bank) express the need to be formed in informatics,<sup>59</sup> which is majorly a positive development. It shows that Senegal becomes more and more aware of the demand of the world market and the significance to become competitive.

One can conclude that the major constraint to a sustainable growth of the productivity of the Senegalese economy is the insufficient investment of the population in human capital. As it is shown in this discussion paper the reasons for this development are majorly dysfunctions of the Senegalese labor market. Firstly the existence of a dominating poorly productive informal sector, within its major gains of productivity does not accrue from knowledge that is acquired in the educational system and what diminishes the investments of the population in education. Secondly the high poverty prevailing in Senegal increases the weight of opportunity costs of education, as every

<sup>56</sup> World Bank (2007); p.63

<sup>57</sup> World Bank (2007); p.52

<sup>58</sup> World Bank (2007); p.63

<sup>59</sup> World Bank (2005); p.52

foregone income is lowering their capacity to survive. And thirdly information asymmetries enable students to form according to the demand of the labor market.

In corollary, the only way for Senegal to find its way out of its economic isolation is to give the people the incentive to rebuild their human capital and to continuously update their skills. That mainly means to give an incentive to people who dropped out of the school system to search further education and to enhance the quality and access of education for students who are still enrolled. As will be shown in the next chapter, the only way to achieve those aims is the holistic adoption of a lifelong learning vision.

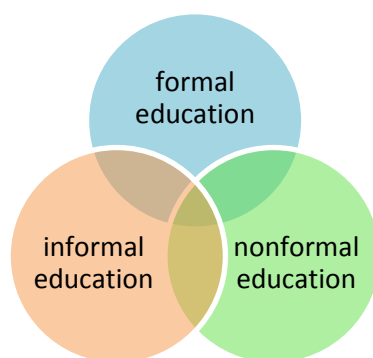
#### 4 A Lifelong learning visions - an opportunity for Senegal

The knowledge-based economy with its “new opportunities for generating and transferring information”<sup>60</sup>, “the rapid proliferation of scientific and practical knowledge, the shortening of the useful life of knowledge because of the continuous production of knowledge and the growing influence of science and technology”<sup>61</sup> and its shortening product cycles<sup>62</sup> is requiring new skills of the labor face. Main pillar of a sustainable development of the economy of a country is “an educated and skilled population to create, share and use knowledge”<sup>63</sup>. To stay up to date in the fast changing environment of the knowledge-based economy the application of a lifelong learning vision within a state is of growing importance.

Lifelong learning includes formal, nonformal and informal education and training:

- Formal education and training are programs that are provided by the formal education system. Within formal education and training the learner is able to acquire approved certificates
- Nonformal education and training are programs outside the formal education system and which are not nationally recognized. Apprenticeship training programs and structured on the job training are frequent examples of nonformal education and training.
- Informal education and training is all unstructured learning and not bound to a certain place and time. It can *take* place in every possible setting and is therefore not formally approved.<sup>64</sup>

**Figure 5: Components of Lifelong Learning**



According to Hans G. Schuetze<sup>65</sup> there are basically three major notions explaining lifelong learning. Lifelong learning should be ‘life-long’, ‘life-wide’ and learning and ‘learner-centered’.

<sup>60</sup> World Bank (2003); p2

<sup>61</sup> World Bank (2003); p2-3

<sup>62</sup> World Bank (2003); p.2

<sup>63</sup> World Bank (2003); p2

<sup>64</sup> World Bank (2003); p. 3

<sup>65</sup> Schuetze (2007)

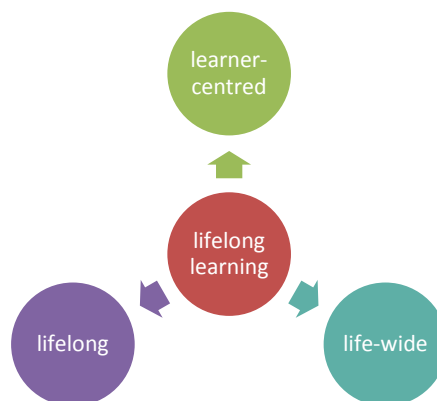
First of all lifelong learning should be 'life-long', which implies a fundamental restructuring of the post-compulsory or post-secondary part of education. As more emphasis is put on the continuation of learning after the compulsory part, especially organized learning in non-formal settings gets special consideration. One main characteristic of post compulsory learning in the formal sector lies in the fact that it mostly has only one access and exit point and dead-ends (mostly because of failure) are possible. On the contrary non formal education is mostly distinguished by his comparatively smoothness. Since the lifelong long aspect of lifelong learning stresses especially this attribute of learning activities "the structure and interrelationships between (the) different sectors of the educational system" should maybe be reconsidered.

'Life-wide' is the second notion Schuetze illustrates as being defining for lifelong learning. In a system that allows various forms of further learning activities, a functioning mechanism of "assessment and recognition of knowledge learned outside the formal education system" must be in place. Thus knowledge and abilities are no more acquired once for a lifetime (by diplomas or titles) but should be constantly updated and assessed to enable an egalitarian treatment of knowledge independently from the way it has been acquired.

The third item to the concept is that lifelong learning should be learning and learner-centred. With this definition, the author stresses the distance of lifelong learning to the classical image of educational learning, which means "a shift from a supply-led to a demand-based system". Hence the learner is responsible for time, place and content of its learning units as they should fit to his individual profile.

But which opportunities are lying in the lifelong learning notion for a developing country like Senegal?

**Figure 6: Requirements to a lifelong learning concept**



The 'life-long'- notion is very meaningful for the Senegalese problem of many students dropping out of the educational system. Sometimes these people drop out because of the upper discussed problems of poverty or the difficult final exams. The formal system did not allow access to high quality vocational or professional training without passing by the formal system. With increasing age the opportunity costs to go back to school raise and hence further education becomes not feasible even though people might be willing to go back to school, especially when it is not directly connected to a professional career. 'life-

long' learning could help people to acquire knowledge without passing by the formal system, which is an enormous gain in time and efficiency.

'life-wide' learning can be of high immediate importance for the whole economy. It does not only mean that formal learning outside the formal educational system has to be acknowledged but also learning outside any formal systems should be recognized. Thus a validation of learning acquired in the informal sector in informal jobs could or should take place. This means that enterprises of the formal sector would be able to choose amongst a bigger pool of qualified candidates for a specified vacancy and achieve a more detailed image of a person and its knowledge even though the person does not dispose of any formal diplomas.

That learning in a lifelong learning vision is 'learner-centered' again means a big gain in efficiency. Now the learner can also decide the exact quantity of learning. Thus the learner becomes manager of its own labor force and can decide how much time he or she is able to sacrifice to gain in productivity which exactly is the aim of the Human Capital model.

Those requirements stress new roles of the participants in formal and nonformal learning processes:

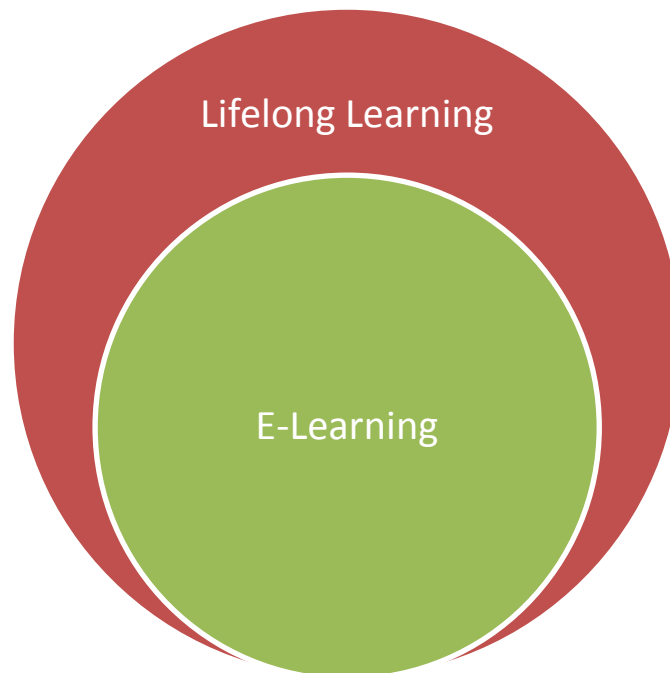
1. The learner changes its role from passive recipient to manager of its individual learning process.
2. The educator is no longer sole source of knowledge. As active participant of the knowledge-based economy he acts as guide and tutor to the relevant sources of knowledge and helps to develop individualized learning plans
3. The validity of information and knowledge is not universal anymore and is changing corresponding to the modifications of the economic and social environment.

#### **4.1 E-Learning—the application of a Lifelong Learning Vision**

But why is E-Learning the major tool to implement a lifelong learning vision into the Senegalese educational reality?

E-Learning can be seen as part of the lifelong learning concept. The application of ICT to education allows four major steps towards a lifelong learning system.

1. The use of the new media individualizes the learning and puts the learner into the center of the learning process.
2. The electronic device and the research opportunities within the device are becoming the source of knowledge and information (and not only the educator).
3. The learner himself is able to manage his learning process and to comprise different instances all over the world into it.
4. The learner introduces the devices into his learning process, which he needs to manipulate to act in the global knowledge economy.

**Figure 7: The Relationship between E-Learning and Lifelong Learning**

We already know that the major problem of Senegal is the missing qualification of the human capital, hence a problem of the educational status. But to decide if an E-Learning project, addressing school drop-outs is the right tool to solve the Senegalese upper discussed problems needs some more profound analysis of the aims, the addressee, his knowledge and the existing resources. The practice of E-Learning in developing and developed countries has shown that the use of fancy programs and Medias is not enough to support a sustainable learning process. Also not everything that is technically feasible makes sense to enable a good learning process. "Because E-Learning does not change the way people learn but it can help to learn more effectively."<sup>66</sup> An E-Learning concept for school drop outs in Senegal could be justified if a certain outcome can be generated in terms of reduced costs, time and an enhancement of effectiveness (proportion of costs to benefits)<sup>67</sup>. In corollary, major aims for E-Learning in the African context are:

- the transfer of technology and knowledge into a country,
- Quality-improvement
- to update knowledge and learning entities more easily,
- to facilitate access to information,
- to reduce costs of education,
- to use new media to personalize learning on the individual profile,
- to visualize difficult mechanisms to make learning more vivid,
- to overcome time and space barriers
- to connect with other learners around the globe and
- the development and provision of learning contents for a distant target group

These aims are adequate to generate higher quality and quantity of education as such. But only the assessment and analyze of the addressees features justifies the use of E-Learning and shows if those aims can be reached with this tool

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<sup>66</sup> Niegemann (2008); p.15

<sup>67</sup> Meier (2006)



#### 4.1.2 The competencies needed to act in the global knowledge based-economy

With a literacy rate of slightly over 40 % Senegal has overcome “the threshold level of human capital accumulation beyond which a country may experience accelerated growth”<sup>68</sup> in today’s knowledge economy. But if the human capital accumulation is sufficient for successful human capital building with E-Learning may be in doubt.

Competencies that are needed to act in the knowledge economy can only be built up if a certain level of education has been reached. The World Report “Learning in the Global Knowledge Economy: Challenges for Developing Countries” describes: the mastery of technical, interpersonal and methodological skills as incremental to perform in the global economy and to function in a global society.

- *“Technical skills include literacy, foreign language, math, science, problem solving, and analytical skills.*
- *Interpersonal skills include teamwork, leadership and communication skills.*
- *Methodological skills include the ability to learn on one’s own, to pursue lifelong learning and to cope with risk and change.”*<sup>69</sup>

Even if part of these skills can be acquired outside formal educational settings, most of them require a certain level of formal education. That is also why a secondary level of education is increasingly seen as fundamental to function in the knowledge society<sup>70</sup>. Hence one can say that these competencies which most of the Senegalese workers in the informal sector do not possess have to be acquired to increase the productivity of the Senegalese overall economy and to acquire higher level competencies that can be transferred with E-Learning. In this context especially math and science play an important role but are most of the time neglected by the Senegalese students as it was already mentioned in the part 3 of the discussion paper. These basic competencies may be transferred with E-Learning but especially people who lack basic education often also lack the needed knowledge and intrinsic motivation to learn independently.

#### 4.1.3 Features of the Senegalese E-Learning-user and his influence on the E-Learning concept

In general every person can be user of E-Learning. Features of the user describe to which extend the learning process needs to be instructed and guided and hence the effectiveness of the E-Learning program for the target group. The major features of the user that need to be analyzed in order to create an adequate E-Learning Program are:

1. Previous knowledge and relevant experiences (on the labor market etc.);
2. Learning-history (Experiences with learning in general);
3. Computer literacy;
4. (formal) educational status;
5. Motivation to learn and attitude towards the learning-content;
6. Interests and personal goals;
7. Cultural background;
8. How homogenous or heterogeneous is the target group?

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<sup>68</sup> World Bank (2003); p. 5

<sup>69</sup> World Bank (2003); p. 5

<sup>70</sup> World Bank (2003); p. 23

When targeting a Senegalese school drop-out, one has to take these features into account. A very cautious estimation would classify the chances of success of an E-Learning program for this target group as mediocre.

### **The role of the previous knowledge and education**

A person who dropped out of the school system is not used to acquiring knowledge independently. A person that has attended school only till an upper primary or secondary level of education has never learned to acquire knowledge without any instruction. Also several years may lie since her or his very last formal learning experience. Those factors are the biggest limitations to an independent learning process. Most of the time E-Learning stresses this autonomy that is linked to the lifelong learning notion. The opportunity to individualize the learning process demands a certain level of:

- a. Self-guided learning
- b. Learner-centered learning
- c. Asynchronous learning<sup>71</sup>.

a. In contrast to unguided learning which more or less accrues from a certain situational need, guided learning sets a frame to the process itself. The frame can be set by the teacher, instructor or by the learner himself, which is the case for self-guided learning. The person thus has to set a frame of what he needs to learn in what time.

b. Learner-centered describes the degree to which the learning matter is communicated or arranged by an instructor. The more the learning process is individualized, the more it is learner-centered. Similarly to the first point, the learner has to be able to define his own aims, in order to adjust the learning process.

c. Asynchronous learning adds the necessary flexibility to the learning process. Asynchronous learning demands a certain degree to which the learning process can take place temporal separately from a class or a teacher. Classical classroom instruction or chat would be in contrary examples of synchronous learning.

The ability to guide a learner-centered learning process requires bigger knowledge. The ability to assess one owns knowledge requires a certain horizon of education and general or specialized knowledge. An instructor has to guide a person to a certain level of knowledge till he is able to moderate his own learning-process. Additionally this form of learning needs a certain motivation. The Learner targeted Senegalese School drop-out hence needs more instruction and a hybrid form of these items in order to enable an efficient learning process.

The individual need has to be diagnosed by an instructive device in order to set the frame of the learning process and the focused target. The device or instructor has to be able to analyze the previous knowledge and motivation of the learner to a certain subject in order to individualize and adjust the learning process. Diagnostic programs can partly fulfill this task through tests introducing to a subject but a certain level of human instruction will still be needed.

A Blended learning concept could be a solution to the situation of the Senegalese worker. It combines the possibilities of individualized training with the computer device with the motivating and instructing advantages of 'presence-instruction'. Targets can be set and

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<sup>71</sup> Meier (2006)

learning groups can be formed, so that the learner gets a better feed-back and is more embedded in a social network.

### **The role of the learning history**

The individual experiences a person has made with formal, nonformal and informal education are very important for the subsequent learning processes. Especially former French colonies have to deal with the heritage of a very rigid learning system.

Especially in developing countries teachers are mostly perceived as authorities who "dictate facts" as "sole resource of knowledge"<sup>72</sup>. Senegalese Students, as most students in sub-Saharan Africa also report violence being a frequent tool of education. In corollary reservation towards formal and nonformal educational settings on the side of the learner may exist. Lifelong learning within the knowledge economy means a huge change of the pedagogical concept. The model of an E-Learning teacher is far away from the traditional learning and his role within older pedagogical concepts. As information growth very fast in today's world the teacher now has to take the role of an educator that guides the students to sources of knowledge and develops individualized learning plans for the students with different educational backgrounds. Also they have to be lifelong learners themselves which mainly stresses a more egalitarian perception of educators and learners.<sup>73</sup> This egalitarian perception and attitude has to be communicated to the learner as well as to the teacher.

### **The role of computer literacy**

One can estimate that at least 99% of Senegalese School drop-outs have little or no experience with computer or web-based learning. Even though between 2000 and 2006 the number of Internet users in Senegal has more than decupled, with 5.4%<sup>74</sup> internet users and only 2.1%<sup>75</sup> of the population with personal computers, the use of ICT can still not be seen as culturally embedded. Especially one can assume that ICT is majorly used by the more educated part of the Senegalese population. This point stresses again the big importance of further instruction for E-Learning programs targeting Senegalese school-drop outs. But when it comes to the technology the usability plays an important role.

Usability describes the adequacy of a product for the needs of a certain user in a certain context.<sup>76</sup> This implies the attributes: learnability, efficiency, memorability, errors and satisfaction.<sup>77</sup> The product thus should fit in the manipulation to the needs, the abilities and the desires of the user.

In General three major features of usability can be distinguished:

1. Effectiveness,
2. Efficiency and
3. Satisfaction.

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<sup>72</sup> World Bank (2003); p. 27

<sup>73</sup> World Bank (2003); p. 29; table 2.3

<sup>74</sup> World Bank (2009c)

<sup>75</sup> World Bank (2009c)

<sup>76</sup> Niegemann (2008)

<sup>77</sup> Nielsen 1993

Effectiveness describes the extent to which the design of a technical device enables the user to reach his aims accurately and completely. It includes the design of the menu, the navigation and the means of orientation. It also describes the amount of cognitive effort that is needed to manipulate the program formally and how many cognitive resources remain for the actual learning process<sup>78</sup>. One can conclude that the formal effort of learning will be bigger, the less learning experience the user has and the more effort the actual learning process requires. For the Senegalese school drop-out who has only little experience with formal learning, the learning process itself will require a lot of cognitive resources. Hence the design of the device needs to be as simple and intuitive as possible to make the learning process comfortable.

Efficiency describes to which extent the deployed resources are proportional to the result. To keep the motivation high, the user has to be able to reach a certain aim without a high effort of time and endurance.

The satisfaction is the extent to which the technical device delivers the expectations. This feature means that the handling and design of the device have to be adapted to the user in order to generate the expected results. 'Overfullfillment' of the expectations should be targeted by the training provider. That is the only way to get a positive attitude of the user towards the device and a positive communication of the product.

Experiences showed that very often not the fanciest E-Learning programs are the most accepted by the target group. Simplicity and adaptation to the needs and the reality of the user are more important to generate satisfaction and success of the program.

### **The role of the motivation to learn and the attitude towards the learning-content**

The motivation to learn a certain subject or content is very significant for a successful use of E-learning. The learner has to know the importance of the subject to motivate himself sustainably to accomplish the program.

A point that is very closely linked to this problem is the upper discussed information asymmetries that prevail on the Senegalese Labor market. Information about the skill requirements and working abilities of the Senegalese labor market are missing. Thus E-Learning should be directly connected to advertising these sets of skills. Information about the opportunities within Senegal can be seen as a high motivator for learning within a country where job opportunities most of the time arise from informal networks. Collaborating with employment agencies like "L'Agence nationale pour l'Emploi des Jeunes (ANEJ)" in Senegal, therefore might be an interesting opportunity to link E-Learning directly to real life and to use it as intermediate to promote jobs.

In chapter 3 of the discussion paper was mentioned that lots of people in Senegal leave school to be active in the labor market. Micro learning entities are an interesting approach for school drop outs. First of all the learner can decide himself the "amount" he wants to learn in one session and is able to continue his work at the same time. Secondly motivation might be higher if immediate learning-results can be achieved, which hold especially or school drop outs who are not used to studying and have to get used to the learning process itself.

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<sup>78</sup> Niegemann (2008)

## The role of the cultural background

Culture can be defined "as the collective programming of the mind that distinguishes the members of one group or category of people from another"<sup>79</sup>. Experiences on the world market show that products that are adapted to local conditions most of the time are more successful than their globalized rivals. The reason is that there is no global reality. Facts and communication change with the region. This holds even more for E-Learning programs. Many companies did not realize yet that E-Learning is not more than an intermediate ore communicator between the learner and the content. To enable a smooth communication process the E-Learning device and the user have to speak the same language. When it comes to the production of E-Learning content, one has to take the cultural background of the target group into account. Hence the language that is spoken, the local and social context, the interaction, the religious and didactical barriers play in important role.

When it comes to an E-Learning project in Africa especially indigenous languages as well as the religion play an important role.

Most of the time, the official language does not correspond to the first language or the language that is most fluently spoken among the population. In the case of Senegal Wolof is the most common language. Most of the people that did not go to school thus do not speak the language that is spoken in administration or television. An adaptation to those local facts is very important. To enhance understanding the incorporation of the language barrier is of incremental importance. Enterprises like xLingua<sup>80</sup> are working on the creation of detailed dictionaries for Wolof-German. The provision of sources in indigenous language can tremendously affect the learning process for the targeted group.

Religion is the second important dimension of the cultural aspects. Over 90% of the Senegalese population is Muslim<sup>81</sup>. Qur'an schools are an important component of the formal education Senegalese attend. Even though a high share of the population does not go to school almost every Senegalese Muslim has attended a Qur'an school, where the lecture in Arabic writing and the understanding of the Quran are taught.

These are all factors that have to be incorporated into an E-Learning project in order to assure the success of the enterprise. If the different aspects are neglected, reality showed that usability cannot be reached.

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<sup>79</sup> Hofstede (2001)

<sup>80</sup> [www.xlingua.de](http://www.xlingua.de) (2009)

<sup>81</sup> World Fact Book (2009)

## 5 The E-Learning Resources in Senegal

To start an E-Learning project one has to analyze the available resources for the project. Those resources are:

- Material and technology
- Human Resources
- Time
- Capital and costs
- Rights<sup>82</sup>

Especially the aspects Material and technology, Human capital and the related costs will now be discussed in further detail. These available Resources need to be classified after three different possible E-Learning scenarios for the project for school drop-outs in Senegal:

1. Use of cybercafés
2. Setup of an E-learning center
3. Corporation with private and public educational institutions

The first scenario would be E-Learning in cybercafés. The people will go into the next cybercafé to attend their courses. The launch of the project would be in one or two cybercafés in the Banlieue of Dakar. We choose the Banlieue or suburbia because of the high concentration of school drop-outs and people active in the informal sector in those areas.

The next possibility is to built up an own E-Learning center in the Banlieue of Dakar. Affiliated to this scenario would be the leasing of the premises and the acquisition of the necessary Technology.

The third scenario is the cooperation with public or private educational institutions in Dakar. The people would attend their courses in those establishments. For the project the existing infrastructure would be updated and a mutual transfer of know-how could take place.

### 5.1 The material and technology for the E-Learning project

Closely linked to the analysis of the technology and the essential ICT infrastructure (hard- and software) is the question of the different system architectures. Three main systems with very different requirements to the ICT-infrastructure can be distinguished:

1. Local systems for the personal computer (CBT),
2. client-server-systems (WBT) and
3. Peer-to-peer-systems (WBT)

Local learning systems describe computer-based-training in its more narrow definition. The provision of the learning programs is via CD, DVD or any other storage device. Today it is difficult to find absolute offline programs. Most of the time those E-Learning programs are provided with some offers in the internet. Local systems are most of the time used for information processing and individual exercises and tests. Local systems run only with the personal computer and without the need of a special server or network.

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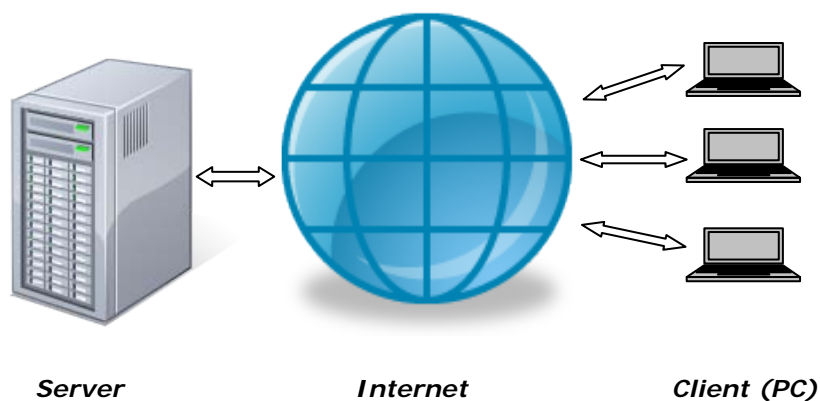
<sup>82</sup> Niegemann (2008)

Thus the User is able to use the device without internet access and the danger of any virus contamination. Disadvantages are poor possibilities of interaction with the learning group and the difficulty to update the contents.

Local systems have to be distinguished from locally installed client-server-systems. Locally installed client-server-systems are solutions where the server is majorly installed on the CD or on the storage device so that the computer can run without heavy load after the learning process.

Client-server systems<sup>83</sup> are solutions where pc-clients use services from one or several central servers via inter- or intranet. Sometimes specially developed software has to be installed on the pc to get access to the contents of the server. Those systems allow the usage of the complex possibilities of the web 2.0. With Client-server-systems the incorporation of chats, podcasts or even complicated learning-management-systems is realizable. The possibilities of such E-Learning systems are almost unlimited. But still it cannot be the only aim to exhaust all possibilities that are given to the new ICT. Too many E-Learning tools can be an excessive demand for an inexperienced E-Learning user. The more the E-Learning competencies advance the more the need for more sophisticated programs with diverse E-Learning tools grows. If one chooses a very simple solution for the beginning of the program, one should comprise during the development of the concept, that a later change is accompanied with high data and information losses. When it comes to the production of an E-Learning solution for Africa one has to take into account that a very complex and sophisticated solution also enhances the requirements of the ICT-Infrastructure.

**Figure 8: Client-Server-Architecture**



source: Niegemann (2008)

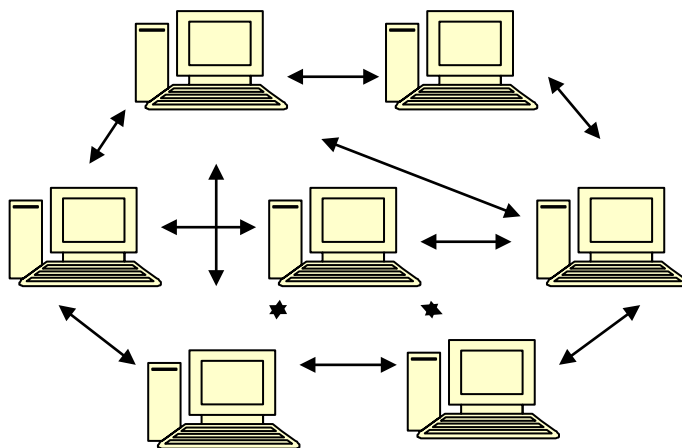
The most frequent use of Peer-to-peer-systems is as communication or file-exchange tool. In a peer-to-peer-system every user is server and client at the same time.<sup>84</sup> Through the redundant diffusion of data and services on every pc-client everybody can function as server of different contents. The advantages clearly lie in the reliable communication and file-sharing possibilities of those systems. At same time the use of peer-to-peer solutions is limited to the extent to which other users are connected to the

<sup>83</sup> Niegemann (2008)

<sup>84</sup> Niegemann (2008)

system. A missing user at same times is a missing server of (E-Learning)-contents. As these system work with the inter-or intranet they strain the speed even though they are not used. Most of the time peer-to-peer systems are only usable with a personalized computer as the software has to be installed to get access to the system. Hence the flexible use of those systems in cybercafés etc. is very limited. That is why these systems are most of the time incorporated to classical client-server-systems in order to allow a central administration of the users and the learning contents. Peer-to-peer-systems like skype, msn or ICQ are used all over the world and installed on almost every pc.

**Figure 9: Peer-to-peer-systems**



*Note: Every personal computer is server and client at same time*  
source: Niegemann (2008)

Every E-Learning-scenario restricts the possible E-Learning Architecture and necessary technology.

### **E-Learning in cybercafés**

As in most Developing countries The ICT Infrastructure is with only 2.1 personal computers per 100 persons<sup>85</sup> more or less poorly developed. But at least in the Cities access to computers (through cybercafés) is very easy. In every district of Dakar a lot of cybercafés can be found but most of the time the poor quality of the Internet connection with a low bandwidth restricts the use of the Internet even though high quality WLAN is provided by telecommunication providers like orange. But the costs still are too high for small cybercafé operators.

If one decides to equip one or two cybercafés in the Banlieue of Dakar for a more or less broad WBT-solution one has to solve the problem of the low bandwidth and quality of internet access. But still, quality of the hardware could be easily updated as the computers only have to be reconditioned to become useful for the provision of E-Learning contents. Learning-Management-Systems and peer-to-peer-system need a high-speed internet solution and a good active store. Hybrid solutions like locally installed client-server-systems may be a way to diminish the handicaps of the internet access in

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<sup>85</sup> World Bank (2009c)



cybercafés but for a more or less open institution, like a cybercafé even this solution is exposed to different risks like robbery and demolition of the data medium.

### E-Learning in a self-constructed E-Learning center

E-Learning in a self-constructed E-Learning center is not very restricted as the whole ICT-Infrastructure will be set-up according to the needs of the project.

The implementation of a web-based-training could assure a certain flexibility to the participants that want to take some of their learning entities at home or in cybercafés.

The only problem of this solution is the high costs of the project. The whole infrastructure has to be purchased as well as the teachers, materials (like chairs and tables) and the location itself.

### E-Learning in cooperation with public and private institutions

The cooperation with schools and universities can be seen as the less costly alternative. Especially numerous private institutions have a very good ICT-Infrastructure and need little updates for the use of any E-Learning scenario. The biggest defiance will lie in the fact that these institutions live from the student fees. Hence it is not sure that they will open their doors to a more or less non-profit program.

**Table 4: ICT Architecture, infrastructure and costs per scenario**

	Possible with no or only little constraints	Possible with constraints	Infrastructure-costs
Cybercafés	Local systems	Client-server-system; peer to peer	middle
Own E-Learning-center	Local system; Client-server-system; Peer-to-peer-system	-	high
Private and public educational institutions	Local system; Client-server-system; Peer-to-peer-system	-	low

## 5.2 Human Resources for the E-Learning project

We already mentioned that school drop outs, who often lack basic skills in education and ICT-use, need a special tutoring when it comes to the use of E-Learning programs. E-learning tutors have a high importance for the success of the project. When it comes to the development of E-Learning-tutors, a very good project management has to be in place. E-Learning with a lifelong learning approach basically means a change in the whole learning culture and the pedagogical concept as it accentuates a new role for an educator.

The educator has to bring a new set of skills. They should themselves have the set of competencies a knowledge economy demands and see themselves more as educators and attendants of the learning process who will guide the learner through learning contents. He has to be ready to update his own skills constantly and has to be capable to assess the skills and skill-improvements of the learner individually.

People holding these competencies are not easy to find in an environment like Senegal, where most educators are not used to ICT as well. Hence the development of well-qualified staff has to be focus of the IT project management within the implementation-process.

Lots of competencies must eventually be acquired before starting the tutoring. This holds as well for the sovereign manipulation of computers and E-Learning contents or problem solving capacities in case of problems with software, hardware or the learner himself. One can assume that an untrained user of ICT may not show the same patience and problem solving capacity as a well-versed user.

The development of qualified staff is an important point that needs special consideration and is very costly. The different scenarios will generate different costs of staff development.

The staff development for E-Learning in cybercafés is not only very costly but also very circuitous. One can assume that most of the cybercafé-operators lack the basic skills to act as a tutor or educator for E-Learning contents. Hence external educators have to be acquired for the scenario. That raises the question of how these educators can be found and developed as well as how the cybercafé-operator can be recompensed for the loss of revenue during these hours (even though that might not be very costly).

The own E-Learning center faces almost the same difficulties. As no staff exists one has to find the educators as well as people who constantly take care of the center. That might not be easy as high confidence is needed for this task. The security issue is another problem that needs to be solved as well as the question how much time per week the E-Learning center should be opened to users. The problem in this case is to find a balance between a sustainable and flexible use of the E-Learning contents in the center and the way the use of the center can be restricted to non-participants of the E-Learning courses. Especially such a center should not be a competition to the cybercafé-operators.

If the E-Learning program takes place within a partnership with some educational institutions the Human capital costs would probably be the lowest. If one gets to convince the institutions from a mutual gain of such a project, educators and the development of the necessary skills would be very low compared to the other two scenarios. The staff in high quality private schools and public educational institutions, like the private economy schools would be perfectly able to educate E-Learning courses without high staff formation costs before the launch of the project. Also the high quality private schools of higher education and public institutions are strongly connected to the government and thus a good possibility to interact with many important stakeholders at the same time. Also the teachers could help in embracing cultural specific items for the development of E-Learning contents. The cooperation with high quality private schools might be the ideal solution but still one has to find partners that are motivated and able to sacrifice time and money to support such a project.

**Table 5: Human capital cost for each E-Learning-scenario**

<b>Scenario:</b>	<b>Human capital costs</b>
<b>Cybercafés</b>	High
<b>E-Learning-center</b>	Very high
<b>Private and public educational institutions</b>	low

### 5.3 The cost of E-Learning for school drop-outs

It is difficult to estimate the exact costs of such an E-Learning project but as the estimates show the cooperation with educational institutions might be the most interesting solution. Not only would the project benefit from the mutual scientific exchange during the conception and preparation but also the technological possibilities and the resources on hand seem more interesting and beneficial for the project.

In cybercafés the costs are high and the possibilities limited. The low technological opportunities and the problem of acquiring qualified staff, restrict the project dramatically.

To build-up an own E-Learning center might even be more costly because of the additional resources that need to be acquired which generate higher permanent costs. We would be constantly in need of human resources to maintain the equipment and to educate the learner. Additionally premises and a lot of furniture have to be bought.

Thus a cooperation with high quality private and public educational institutions would be the most interesting scenario. But still the question of who bears which share is not solved. Besides possible subventions of non-profit organizations, it has to be estimated who takes which stake in the project.

Financing lifelong learning and E-Learning is a broad subject and content of many scientific researches to lifelong learning. One can assume that every part of the Senegalese State benefits from Lifelong Learning with E-Learning. The state benefits when the population gets more employable and the economy more competitive on the world market. The individual benefits in terms of higher income and the private sector benefits when the labor becomes more productive. But still it is difficult to determine a precise share that justifies a determined share in the financing of a Lifelong learning project. Especially the recognition of the different benefits among the different stakeholders is not self-evident.

It is difficult to estimate the stake the learner should hold in his own learning activities. On the one hand a proportionate stake can help the learner understanding the value of his courses. That may lead to a higher appreciation of the opportunity as well as the incentive to learn more effectively. On the other hand the financial burden should not prevent the target group from attending these courses. In case of Senegal and E-Learning entities for school drop outs one has to take the special situation of the target group and his environment into account. High costs already accrue from opportunity costs (foregone income) and also direct costs. In case the learning location is far away from home the learner also has to consider costs of transportation and time that it takes to get from home to the learning location. Especially in Dakar it can take long time to get from one place to another because of traffic jams and bad organized public transportation. These points are already able to keep an informal worker from using learning opportunities. Hence the decision if additional fees should be demanded from the learner has to be closely analyzed as it may prevent a high share of the target group from participating in the E-Learning courses.

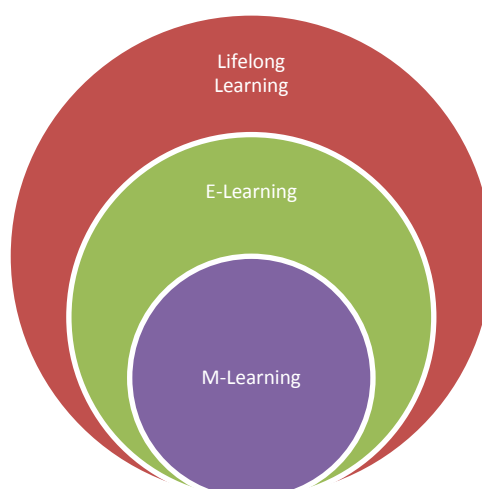
On the contrary subventions from the state and financial support of the private sector should hold an important share in the financing process. Support of private universities in terms of staff and infrastructure is imaginable as well as firms might be interested in staff development or a CSR programs.

## 6 Mobile-Learning – a promising branch of E-Learning

In consideration of the fact that already in 2006 85% of the Senegalese population was covered by mobile phones<sup>86</sup> mobile-learning could be a great opportunity for an E-Learning project with school drop outs. M-Learning could be able to solve the problem of connectivity for the more disadvantaged in the world.

M-learning can be seen as the practical extend to the conversion of a lifelong learning vision. Learning everywhere and just-in-time could be possible for everyone through the use of mobile devices. But still M-Learning is not yet able to stand for itself as concept of learning. The small display and the very low diffusion of high-quality end-devices still restrict the broad use of the mobile phone or PDAs for E-Learning. It hence at the moment works only as an extent to classical or E-Learning. This especially holds for sub-Saharan Africa. Though the mobile phone is widely spread among all parts of the population, the quality is not yet comparable to the one used in western countries. Either the phones are old and outsourced from the western countries or they are plagiarisms without a comparable functionality of the original. Hence M-Learning can only be used for very simple tasks more on a question-answer basis and as a communication tool between educators and student. Successful M-Learning projects excel in the fact that they are more an additional tool to classical or formal education.

**Figure 10: Mobile-Learning as part of E-Learning**



*Note: Mobile-Learning can be seen as another step to the conversion of a lifelong-learning vision*

NOKIA recently launched a M-Learning project in the scope of their CSR efforts. This project targets High-school students in South-Africa. Adapted to the math-class, the students could do exercises with the mobile device. Similar to a game on the mobile phone, the student competed with themselves and could reach higher scores in the different math exercises. Students use it almost twenty-four seven and also the teachers admire to be better able to observe the state of knowledge of their students through the device.

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<sup>86</sup> World Bank (2009c)

This example also stresses the more complementary use of mobile devices for learning. If it is embedded in course it can be interesting but it is not yet able to stand for its own. Maybe in a few years mobile devices will fill in the whole E-Learning world but today they are not yet able to do so.

## 7 Conclusion

The beginning of the paper showed the high need of Senegal to develop its human capital in order to become more competitive on a global scale. The main way to do so is to address the biggest lack in the Senegalese educational system: the high productivity losses to the labor market due to the high school drop-out rate. In order to adequately address the target group the reasons for the humble investment of a high share of the population was analyzed. The result was that the informal sector with its easy access, the high vulnerability to poverty and the significant information asymmetries restrict the investment of the population in education. If one decides to motivate this targeted group with further education these features have to be incorporated into the project adequately.

The paper illustrated that the adoption of a lifelong learning system allows a smoothening of the very rigid educational system in Senegal. The adoption of a lifelong learning vision allows an easier access to education and higher adaption of the learning process to the individual needs, thus everything that Senegal needs in order to address people who dropped out of the school system.

Further was shown that E-Learning is the most adequate tool to adapt such a lifelong learning vision as it is able to incorporate all the requirements of a lifelong learning vision. But before the launch of the E-Learning project the adequacy of this tool has to be analyzed.

The discussion paper pointed out, that special features of the Senegalese school-drop out have to be incorporated in order to fit the program to her or his personalized needs and how the available resources restrict or enhance the architecture and the possibilities of E-Learning.

A detailed analyzes of the resources and costs made apparent that the cooperation with educational institutions may be the most interesting solution for the start of such a project. Especially, as this scenario seems to be the most fertile to the technical possibilities, the costs and the scientific exchange in order to localize the program.

All in all, one can say that the adoption of such an E-Learning project is a huge opportunity for Senegal. What most of the sub-Saharan countries understood till now is, that the implementation of E-Learning projects in their countries may be a tool to reduce the overall divide between the western countries. That means the digital, scientific and social divide between developing and developed countries.

The adoption of a lifelong learning vision would mean for the sub-Saharan countries to use their weaknesses and turn them into their strength.

To recognize how much, human capital wise, Senegal lacks behind the developed world and to see in this weakness the opportunity to establish a whole new learning-vision that is much smoother and adapted to the requirements of today's knowledge-based economy would be a great strength for Senegal in the future. Especially if one takes to account that still the developed countries struggle with the adoption of a lifelong learning vision because of the rigidity of many institutions.

That also introduces why the governmental support is so important for the project. If the government shows the flexibility to respond to the new demand in terms of education

and readjusts its educational system in order to adapt a more universal validation of knowledge, the holistic implementation of the project could be reached.

Closing, one can say that the pilot of a project addressing school drop-outs could be a very meaningful step for Senegal. Especially, this would be the case, when collaborations with important educational institutions could be established. In order to start the project more profound technical, pedagogical, and economic studies have to be done in order to set up a good project management. If all these steps are respected the project could be a promising opportunity for Senegal.

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