Tailoring Tertiary Education and ICTs for sustainable development in LCDs: Challenges and Opportunities

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Abstracts

Within a very few years, Information and Communication Technology (ICT) has turned out to be an effective technology which promotes relevant positive changes in Least Developed Countries (LDCs) in various crucial domains essential for sustainable development. ICT may have the potential to provide to the LDC societies the capabilities to face their enormous challenges, in particular regarding the real base of development: the education. With the complexity of the implications that brings, ICT demonstrates interesting perspectives in improving teachers’ design work, facilitating access information, enhancing the roles of students and teachers in the learning process and helping them to create a collaborative learning environment. Although ICT has these potentialities to improve the educational system to a great extent, developing countries are far from reaping these benefits because of certain barriers.

The aim of this paper is to present a review of the relevant international cooperation framework relating barriers encountered when introducing ICTs in LDCs with a specific focus on tertiary education issues. The paper underlines the crucial role of general public awareness on LDCs’ educational priorities and recommends an active role for universities and to create a new devoted bridge/cooperation between hard sciences and humanities to effectively improve the current international projects effectiveness. The paper does not offer a universal reference for reforming higher education systems, but it does provide a starting point for action. The greatest desire is to catalyse dialogue in countries around the world on how higher education is no longer a luxury: it is essential globally to ensure political, social and economic development.

Il rafforzamento delle risorse educative nei Paesi in via di sviluppo attraverso l’impiego di innovati strumenti basati sull’ICT è al centro di crescente attenzione nei progetti internazionali da più di dieci anni, tuttavia l’impatto sull’educazione non è ancora significativo. Lo scopo di questo lavoro è quello di presentare una revisione del quadro di cooperazione internazionale sulle opportunità e sugli ostacoli emersi nelle esperienze progettuali tese all’introduzione dei sistemi ICTs nei Paesi in via di sviluppo, con un focus specifico sulle questioni legate all’istruzione terziaria. Il documento non intende fornire un punto di riferimento universale per riformare i sistemi di istruzione superiore mediante l’ICTs, ma fornire un punto di partenza per rafforzare l’efficacia delle attuali attività progettuali in materia. Il fine ultimo è quello di sensibilizzare i decisori pubblici, le università, i ricercatori che operano nel campo della cooperazione internazionale e mass media verso una maggiore consapevolezza diffusa sul ruolo dell’istruzione superiore quale chiave necessaria ed imprescindibile per un reale sviluppo sostenibile, capace di garantire solide basi per la lotta alla povertà e per il dialogo democratico ed interculturale a livello globale.

Key words
ICTs policy implementation; Least Developed Countries; International Higher Education Cooperation; Mass Media; University Networks; UNESCO; World Bank; Education for All.

Parole chiave
Implementazione sistemi ICTs; Paesi in via di sviluppo; Istruzione terziaria; Cooperazione Internazionale in materia di istruzione superiore; Banca Mondiale.
Summary

Introduction; 1 General framework; 1.1 The Current Situation; 1.2 Background. Data of references; 2 Challenges. What can be done? Education as unique and real empowerment to face LDCs’ challenges; 2.1 ICTs and the Access to Higher Education; 2.2 The potentialities and key role of information technology - Health, smart cities, education (+ e-learning); 3 A focus on ICTs based tools replicability and the perspective on eLearning platforms - Focus on ICTs for tertiary education enhancement; 3.1 Opportunities - Resuming the state of the art seeking interdisciplinary Research and the Public Interest; 3.1.1 University-Industry Cooperation; 3.2 A Worldwide Issue: Main obstacles to adoption; 4 Conclusions and recommendations.

Introduction

Starting with a data analysis of the current situation in addressing LDCs sustainable development, the paper focuses on the underestimate potential value of ICTs deployment in higher education policies to face the major LDCs challenges and reports relevant international projects’ experiences testifying how teaching and learning through ICTs has given best practices example results and attracted global investments and interventions during the last years.

However, due to the fragmentary and isolated character of these interventions, the result remains to be seen and realized. Various complex factors such as ICTs adoption and penetration within local culture/tradition, ICTs infrastructure-equipment and professional development to enhance education using ICTs have been limited.

The state of the art provides a framework where there is an urgent need to give primary attention to the topic to come out with new appropriate interdisciplinary methods of design international cooperation project interventions, combining the competences of both humanities and in hard-science addressing innovative devoted strategy for each of the LDCs context.

The author believes that strengthening higher education through ICTs is a rational and feasible way for many countries to mitigate or avert further deterioration in their relative incomes, while positioning themselves on a higher and more sharply rising development trajectory.

ICTs adoption and higher education cannot be developed to the exclusion of other policy initiatives. The development of infrastructure, better governance, public health improvements, trade reform, and financial market development, all these intervention and others will be needed. The benefits of higher education require a long gestation period. There may be shortcuts to establishing educational infrastructure, but influencing people to understand and convey higher education values and best practice will take decades, as opposed to a few years.

For this reason the author urges and concludes that while the benefits of higher education continue to rise, the costs of being left behind are also growing, so policymakers and donors, public and private, national and international, should work on ICT’s potentialities with educational leaders and other key stakeholders to reposition higher education in developing countries.

1 General framework

The Utopia of the weak is the strong ones’ fear.
Ezio Tarantelli (1941-1985)

Currently, two billion people live in the world’s low-income countries. Their average income has a purchasing power of less than one-sixteenth of the average incomes of the richest billion. Even more astonishing is the ratio of the average income of the poorest and the richest one billion people on the planet: it is conservatively in the region of 1 to 80. The disturbing truth is that these enormous disparities are still poised, in 2015, to grow even more extreme, impelled in large part by the progress of the knowledge revolution and the continuing brain drain.1

Although developing countries contain more than 80 percent of the world’s population, they account for just half of its higher education students, and for a far smaller proportion of those with access to high-quality higher education. Overcoming these gaps is a daunting challenge that will require a concerted effort between developing and developed countries.3

1. The Current Situation
1.1 Background. Data of references

At present, there are 48 countries designated by the United Nations as LDCs. These are: Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, the Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao People’s Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, South Sudan, Sudan, Timor-Leste, Togo, Tuvalu, Uganda, United Republic of Tanzania, Vanuatu, Yemen and Zambia.

Observing the current situation firstly we notify that given their dependence on external economic conditions, LDCs could not escape the slowdown in the overall global economy since 2008, a slowdown experienced by both developed and developing economies. Slugish global output growth of 2.3 per cent in 2013 continued to affect them. Although there were some signs of improvement during the second half of the 2013 (mostly due to a revival of economic activity in developed economies), global recovery and international cooperation effort remain largely insufficient in combating the poverty trap that is continuously affecting them.3

Poverty is the principal obstacle to development and it has a multiple faces and consequences often defined as the base for a circuit within crime low democratic accountability and that has been described by experts from all fields, from sociologists to economists. The UN and the World Bank both rank crime high on the list of obstacles to LDCs development. This means that governments trying to deal with poverty often also have to face the issue of crime as they try to develop their country’s economy and society.4

Indicators

The list of LDCs is reviewed every three years by the United Nations Economic and Social Council (ECOSOC), based on recommendations of the Committee for Development Policy (CDP). The following criteria were used by the CDP in its most recent review of the list in March 2012:

(a) Per capita income, based on a three-year average estimate of the per capita gross national income (GNI), a threshold of $1,190 for graduation from LDC status;

(b) Human assets, involving a composite index (the Human Assets Index) based on the following indicators:

3 Ibidem
4 Ibidem
5 Ibidem
benefited all LDCs. Contrary to emerging and other countries from the South, the LDCs face certain initial disadvantages, such as high export concentrations and low-value exports, as well as severely limited financial, physical, human, technological and institutional endowments. Their inability to derive substantial gains from global economic integration and trade openness is seen in weak growth and extremely limited poverty reduction during the last decade.\(^8\)

The interdependence of human and economic development in LDCs

Although the existence of the universe of NGOs and International Cooperation Agencies with a huge number of charitable organizations active world wild, poverty traps are still likely to require urgent international effort and a new cooperation framework policies, such as to assist the poor in acquiring assets that can improve their future income and mitigate the risk of intergenerational poverty. These policies would likely include social protection programmes, such as health education and other forms of protection.\(^9\) Moreover, LDCs governments need to ensure that efforts to enhance domestic revenue are designed in appropriate ways that reduce inequality.\(^10\)

The high exposure of the LDCs to climate vulnerability and its disproportionate effects on them in terms of their human and economic development including their locations, low income, low institutional capacity and greater reliance on climate-sensitive sectors like agriculture have serious implications for the fight against extreme poverty. Indeed, factors like desertification, land degradation, melting glaciers, droughts, floods, cyclones, coastal degradation and other natural and man-made disasters call for national and international actions to help the LDCs achieving the necessary level of know-how to reduce the current poverty

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In this context, education at all levels is needed if economies are to climb from subsistence farming, through an economy based on manufacturing, to participation in the global knowledge economy. During the past two or three decades, however, attention has focused on primary education, especially for girls. This has led to a neglect of secondary and tertiary education, with higher education in a perilous state in many, if not most, developing countries. With a few notable exceptions, it is underfunded by governments and donors. As a result, quality is low and often deteriorating, while access remains limited. Higher education institutions (and whole systems) are politicized, poorly regulated, and sometimes corrupt.

The present paper argues that a more balanced approach to education at all levels is needed. The focus on primary education is important, but an approach that pursues primary education alone will find us dangerously unprepared for tomorrow’s world challenges.

2.1 ICTs and the Access to Higher Education

As knowledge becomes more important, so does higher education. Countries need to educate more of their young people to a higher standard; in developed world a degree is now a basic qualification for many skilled jobs. The quality of knowledge generated within higher education institutions, and its availability to the wider economy, is becoming increasingly critical for sustainable growth and competitiveness.


Improving higher education in Africa and other developing countries had until recently been overshadowed by programs focusing on national economic and infrastructure development. Recently, however, important investments by governments and donors are being made to expand the number of schools and student enrolment including in secondary education. In conjunction with this, the modernization of secondary education to produce a workforce capable of leading countries into globalized, knowledge-based economies has become a key goal in LDCs. Many new policies and international cooperation projects have begun to introduce information and communications technologies and related teaching approaches, known collectively as electronic or eLearning, into schools. The expectations for these projects to affect student achievement and national economic development are often high. They are being introduced into educational systems that are experiencing critical challenges such as poor infrastructure, a lack of teachers and learning material, and poorly prepared students. The state of science, technology and innovation in the LDCs remains extremely poor. Limited research and development capabilities render these countries dependent on new technologies from abroad. With modern technologies, the LDCs can reverse the current trend of ‘exporting wealth and importing poverty’. A greater focus on a dedicated technology transfer mechanism for the LDCs is thus vitally important.

More than 60% of students who qualify for University or tertiary education in the developing countries are not able to join due to limited physical infrastructure. The World Wide Web and advances in open source software have led to an eLearning revolution, where students can access a plethora of learning materials, easily and conveniently.

The key question is how eLearning approaches can help address LDCs major challenges, and provide students a leap forward in their school learning and in their future employment opportunities. As discussed below, eLearning programs in Africa and in other developing countries are still often small, experimental pilot projects with little documented history of their successes and impacts. Nevertheless, a body of literature is emerging that analyses eLearning programs.

Analysing the current literature of reference, of all spending on tertiary education, when measured in US$ adjusted for local purchasing power, 61% occurs within North America and Western Europe. At the other extreme, the total tertiary education spending in all of Central Africa and South-eastern Africa was 1.5% of the total worldwide spend.

2.2 The potentialities and key role of information technology

In general, economic development is associated with a more refined division of labor, and higher education institutions have an essential role to play in imparting necessary skills. The increasing importance of knowledge makes this range of advanced skills in wider demand than ever.

The availability of ICTs and network based services offer a number of advantages for LCDs society. ICTs applications, such as eHealth, eEducation, eGovernment, eCommerce and eEnvironment, are considered crucial elements of universal value and as enablers for socio economic development, particularly due to their ability to

Tertiary Education and LDCs: Challenges and Opportunities

In the knowledge economy, highly trained specialists and broadly educated generalists will be at a premium, and both will need to be educated more flexibly so that they continue to learn as their environment will be based on the intercultural dialogue worldwide. Advances in information technology, meanwhile, have made this ever-increasing volume of knowledge an useful base as concrete opportunity with more accessible, effective, and powerful potential results addressing sustainable growth.

Indeed, today’s developing economy needs not only civil servants, but also a whole host of other professionals such as industrial engineers, pharmacists, and computer scientists. Higher education institutions are adapting and new ones are emerging to provide training and credentials in new ICTs related areas. As societies accept modern medicine, for example, they establish not only medical schools, but also schools of pharmacy.

The labor market also creates a demand for graduates who have undergone ICTs training of different types and intensities. The UN and World Bank experts recognize, in their most recent reports, that there are many difficulties in achieving these aims, including the plethora of competing demands for public money by emerging educational institutions. International cooperation, therefore, will need creativity and persistence acting in this topic. A new vision of what higher education can achieve is required, combined with bet-

Tertiary Education and LDCs: Challenges and Opportunities

is driven by cost alone, it is likely to abet the provision of low-quality education. So-called garage universities sometimes disappear as quickly as they appeared, leaving students with severe difficulties in establishing the quality of their credentials. Knowledge acceleration trend continues, the income gap between industrial and developing countries will widen further. Thus, universities and higher education institutions active in international domain, as the prime creators and conveyors of knowledge, must be at the forefront of efforts to narrow the development gap between industrial and developing countries.

3 A focus on ICTs based tools replicability and the perspective on eLearning platforms ICTs for tertiary education enhancement

Education is not the filling of a pail, but the lighting of a fire.
W. B. Yeats (1865–1939).

Educational systems in LDCs are looking to eLearning programs to face their main challenges and to improve the quality and content of their education. Integrating eLearning into existing tertiary educational system can, however, be a major challenge. Higher educational systems in developing countries are undergoing rapid change, particularly an increase in the number of institutions and rise of student enrolment.

A consequence of this development, being experienced in Tanzania and elsewhere, is a significant shortfall in the number of teachers, particularly subject-specialty teachers, a declining student/teacher ratio, a lack of learning materials, and declining or stagnating test scores. Infusing technology into this context

32 Ibidem
could be powerful method to partially address these shortfalls.

Investment in eLearning is not an alternative to investment in education generally; the two should be seen as being complementary. Integrating eLearning programs into existing educational systems can promote a positive contribution to the needed transformation. Implementing a comprehensive eLearning program would mean changes to the curriculum, infrastructure, teacher professional development, textbooks, and exams. A major benefit of integrating eLearning into governmental educational systems would be, however, a long-term commitment to growing and maintaining the program, with fewer eLearning initiatives ending when donor funding stops. Many studies of eLearning programs have concluded that the key to ensuring successful outcomes is to blend more traditional classroom approaches with those that use technology.\(^{35}\)

Moreover, as complex systems, eLearning platforms are a broad term that encompasses many teaching approaches, types of technologies and administrative practices. A challenge in analysing eLearning is that the technologies and their educational applications are developing extremely rapidly. An additional challenge is that its newness and the excitement around their utility are leading to many suggestions for how to use technologies in and outside of the classroom.

eLearning approaches should be treated as a powerful tool that teachers can use, but teachers themselves need to learn how student learning changes with e-learning, and how to alter their teaching methodologies with pedagogical approaches that take advantage of the opportunities afforded by eLearning platforms. A blended approach mixing face-to-face classroom methods with technology-mediated activities seems to provide the highest learning outcomes.\(^{36}\)

In African countries where secondary teachers have little prior experience with computers or similar technologies, all this can be a significant aspect to understand and analyse.\(^{37}\)

Some of the important potential contributions of eLearning programs that are collected in literature on LDCs educational systems include:

1. the shortage of teachers, especially science and other specialty teachers. It can do this by providing high quality teaching materials, such as videos, interactive software or information from a “cloud” on the Internet or a local computer. In a distant classroom or video conferencing approach, the number of students who receive live instruction from teachers in specialty subjects can be much larger;

2. the shortage of learning material such as textbooks for students. The material could be made available on hand-held devices such as e-readers or mobile phones. Interactive features such as quizzes or games could improve the level of learning and understanding;

3. the quality of education by providing improved informational content and learning approaches. Interactive, communicative eLearning may promote the development of skills in students (so called “21st Century Skills”) such as critical thinking and problem solving, communication, collaboration and creativity;

4. the students information and communications technology skills. The graduates will be better equipped to contribute to the knowledge-centered globalized economy of their countries;

Identifying and understanding the actual impact that eLearning programs have had on students, schools and their countries is, however, difficult. The newness and diversity of the programs

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Tertiary Education and LDCs: Challenges and Opportunities

The economic impact of eLearning can be examined by first, identifying the impact of eLearning and improvements in education on the workforce and employment, and second, the effect of a high tech workforce on the national economy.

a. An improvement in education positively affects economic growth, both in terms of an increase in GDP and an increase in income for workers. This is clear in both developed and developing countries.

b. As technology and knowledge spill overs are the foundations of modern economic growth, it is important to ensure that the workforce has the skills to meet the need of these 21st Century jobs.

c. The average increase in annual income for each additional year of schooling, especially secondary education, for an individual is 10%. The affect is stronger in developing countries than in developed countries.

The impact on society of eLearning programs is similarly difficult to separate out from the multitude of other factors affecting society. The potential impacts of eLearning providing underserved-groups access to quality education, for example, can be important.

What is known about the impacts in developing countries include:

a. The “digital divide” between those people and countries with access to digital technologies and those without, is narrowing as information and communications technologies become increasingly available and less expensive.40

African countries are catching up fast, but from a lower base than other developing countries. Some of the widest digital divides are within countries: between rural and urban centers and between rich and poor communities.41

is unfortunately parallel to statistics of student enrolment in higher education carrier. eLearning has the crucial potential to address this gap by bringing quality education to rural and other underserved schools, but poor infrastructure and other challenges are greater in those areas than in the better served urban areas, and experience to date is that these areas are underserved with eLearning as well. eLearning programs that overcome these challenges thus have the potential to have large impacts on learning.

b. eLearning technologies could potentially play an important role in reducing the gap in access to education and in achievement by girls and other underserved communities in developing countries. Currently, the gap in access to education of girls and underserved students is mirrored by a gap of them using the Internet and other ICTs technologies, partly due to societal norms and partly due to their economic situation. Introducing eLearning technologies into schools can assist girl and other underserved students improve their ability to participate and thrive in schools. Governments and international organizations are designing eLearning programs to deliberately address the gender gap.

c. Language proficiency can be an impediment for students and teachers to take full advantage of eLearning’s benefits. Off-the-shelf educational software and most websites are in English or another global language, and students in Tanzania and elsewhere whose main language is not a global language may need to become proficient in a second (or third) language.

The ubiquity of English on the Internet has been found to be a strong motivator for young people in many countries to learn English. In schools where a global language is not the language of instruction, however, it is important to customize educational software.

d. The prevailing pedagogical culture in countries mediates how eLearning is adopted. In Eastern countries, for example, eLearning approaches run against educators’ preferences for expositive teaching and authoritative delivery, in which case computers are simply used to deliver content. The potential transformative role of eLearning to develop 21st century skills in many countries may require, thus, integrating eLearning into the system from curriculum development to teacher professional development.

Moreover, while recent developments in communication technology and computers have vastly increased the technical viability of distance education, economic viability is still an issue in many countries because of costly and extensive infrastructure requirements. In many parts of Africa, for example, the telephone is still a luxury and long-distance calls are extremely expensive. Efficient distance learning will require affordable telephone and Internet access for this part of the world. In the past, distance learning has been seen mainly as a cost-effective means of meeting demand, with policy makers paying inadequate attention to ensure that it provides comparable quality to traditional modes of delivery.

Innovative curricula can be combined with indigenous traditions, Internet-based technology, traditional educational media such as television and print, written materials, and direct contact with tutors. It needs, however, to be thoroughly integrated into the wider higher education system, subjected to appropriate accreditation and quality standards, and linked to the wider global higher education system. The growth in eLearning has been driven primarily by the demand for higher education and the need for quality education at an affordable cost.

45 Ibidem
the outside world. Research into how this can be achieved, and how distance learning can fulfill its potential, needs much greater attention.

3.1 Opportunities. Resuming the state of the art seeking interdisciplinary research and the public interest

Based on research and intensive discussion and studies conducted over a decade, the World Bank devoted Task Force has concluded that, without more and better higher education dedicated policies, developing countries will find it increasingly difficult to benefit from the global knowledge-based economy.

As a result, higher education systems in developing countries are under great strain.

They are chronically underfunded, but face escalating demand (approximately half of today's higher education students live in the developing world!). Faculty are often underqualified, lack motivation, and are poorly rewarded. Students are poorly taught and curricula underdeveloped. Developed countries, meanwhile, are constantly raising the stakes. Quite simply, many developing countries will need to work much harder just to maintain their position, let alone with their higher educational needs and challenges. There are notable exceptions, but currently, across most of the developing world, the potential of higher education to promote development is being realized only marginally.

The World Bank and UN Task Force is united in the belief that urgent action to expand the quantity and improve the quality of higher education in developing countries should be a top development priority.

Concretely, developing countries need higher education to:

- provide increasing numbers of students, especially those from disadvantaged backgrounds, with specialized skills, because specialists are increasingly in demand in all sectors of the world economy;

- produce a body of students with a general education that encourages flexibility and innovation, thus allowing the continual renewal of economic and social structures relevant to a fast changing world;

- teach students not just what is currently known, but also how to keep their knowledge up to date, so that they will be able to refresh their skills as the economic environment changes;

- increase the amount and quality of in-country research, thus allowing the developing world

Figure 3
World Bank Data, The state of the art on ICTs and digital divide in 10 main pillars, 2014

Since the unity of the world and the consequences of the poverty in a planetary level, this poses a serious challenge to the international cooperation in developing world. Since the 1980s, many national governments and international donors have assigned higher education a relatively low priority. Narrow and, in the author view, misleading economic analysis has contributed to the view that public investment in universities and colleges brings less returns compared to investment in primary and secondary schools, and that higher education magnifies income inequality.

48 Ibidem
higher education in developing countries was characterized by few students and graduates, with the students frequently in training for either the (colonial) civil service or a few professions. Today, however, there has been a dramatic shift from class to mass, with half of the world’s students of higher education living in developing countries. As more and more children complete their primary and secondary education, many wish to continue to gain a degree. Developing countries have also seen real incomes rising, bringing further education within the reach of an increasing number of families.54

Expansion has produced a variety of consequences. In many instances, existing institutions have grown in size, transforming themselves into mega-universities; in other cases, traditional institutions have been replicated by public or private means.55 An even more creative response has been seen in differentiation, a process whereby new types of institutions are born and new providers enter the sector.

Moreover, in a comparative perspective, the “knowledge revolution” has seen exponential and continuing increases in knowledge in advanced countries since World War II. Many indicators confirm this, including the number of new patents, databases, and journals, as well as research and development expenditures.56 Nearly all industries have been affected, from biotechnology to financial services, with the nature of economic growth changing since “tinkerers” and craftsmen guided the early technology of the industrial revolution. Systematic knowledge has gradually replaced experience in furthering technology, with industrial protagonist in educational systems to select, absorb, and create new knowledge more efficiently and rapidly than it currently does.

Despite the numerous eLearning models and technologies available, a few key, common elements in successful eLearning programs have emerged.

Case studies and the literature provide clues to what has and has not been successful. For example, countries that successfully integrated a sustainable eLearning have executed a multi-level program from the national policy level to the classroom that included developing eLearning related curriculum, teacher standards, and infrastructure56. Case studies and the authors’ experience indicate that there are some particular activities in eLearning programs that are remarkably successful and encourage educators to sustain and expand their use of eLearning.52 The activities that have been found to work well include:

1) the full integration of eLearning into the curriculum, textbooks and tests

2) a strong program of training teachers to both use and teach with technologies

3) the establishment of a pedagogical foundation for eLearning to assist teachers in integrating it into their teaching

4) providing on-going support for teachers

5) educators joining a community of practice.53

All are now powerful influences in developing countries, challenging policymakers to look afresh at their systems of higher education and think creatively about what they can achieve from ICTs deployment.

The described context, as mentioned above, is a result of the tremendous increase in the number of students. In the 1940s and 1950s, higher education in developing countries was characterized by few students and graduates, with the students frequently in training for either the (colonial) civil service or a few professions. Today, however, there has been a dramatic shift from class to mass, with half of the world’s students of higher education living in developing countries. As more and more children complete their primary and secondary education, many wish to continue to gain a degree. Developing countries have also seen real incomes rising, bringing further education within the reach of an increasing number of families.54

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and sophisticated and theoretical knowledge being now the predominant path for technical as well as social and political progress.57

3.1.1 University–Industry Cooperation

Compared with investment in the production of goods, investment in the production of new knowledge yields potentially higher economic returns, but entails higher risks.58 For example, designing and marketing the best computer-operating system in the world is enormously lucrative; the second- and third-best systems are far less profitable.59 This would not necessarily apply in the case of steel mills, oil refineries, or food processing plants. The winner-takes-all character of investment in knowledge demands a high level of existing knowledge and skills even to enter the fray.60 However, as referred below with relevant data, few developing countries possess this knowledge.

In this way, the knowledge gap will effectively preclude many upper-middle-income developing countries from participating in, and enjoying the benefits of, a growing and highly profitable set of economic activities.61 This issue is less relevant to low- and lower-middle-income countries, whose focus will be on developing the capacity to access and assimilate new knowledge.62 So, in particular regarding the LDCs future, the international cooperation framework should provide clear policy orientations and identify opportunities for public-private collaboration.


The conjunction of University-Industry, as demonstrated by relevant international project deployment, facilitates the identification of areas where policy intervention, through investment including public-private partnerships, smart regulation, or the provision of incentives, could boost the impacts of ICTs in LDCs educational systems.63 This is important because the development and general uptake of ICTs depend on the capacity of a country to provide an institutional framework with reliable and efficient rules and regulations; favourable business conditions for the founding and growth of new (social and commercial) enterprises; an innovation-prone environment, capable of developing and absorbing new knowledge; and an ICTs-friendly government policy design.64

While ODA plays a central and catalytic role, additional resources are needed, including through innovative financing mechanisms that can provide more stable ICTs resources for development, and are based on new partnerships between countries at different levels of development, and between public and private actors. Specific mechanisms could be suggested and operationalized in the post-2015 development agenda to mobilize additional resources for sustainable development65.

Development partners can support channeling more investment to the ICTs in higher education in LDCs. The international community could consider operationalizing an international investment support centre for the LDCs as proposed in the Cotonou Agenda and endorsed by the United Nations Secretary-General.66 It would serve as a one-stop service by facilitating access to negotiating skills and preferential financing programmes, such as those related to export credits, risk management, co-financing, venture capital and other
lending instruments, and private enterprise funds for investment in the LDCs context.67

3.2 A Worldwide Issue: Major Obstacles to ICTs Adoption

The experience of higher education in developing countries has been disappointing to date.68 Its contribution to social and economic development has not mirrored its accomplishments in developed countries. The signs of this failure are most apparent when judged by international standards as demanded by the emerging world economy. Poor educational quality, a dearth of significant contributions to knowledge, and a failure to advance the public interest are all too common. Strategies for addressing these problems need to proceed from an understanding of their underlying roots69.

All the ICTs related opportunities and advantages described in this paper have not trickled to the majority of the population in developing countries. Many developing countries don’t have high speed internet access, due to a myriad of factors including but not limited to intermittent electricity, use of expensive low bandwidth satellite technology, and inadequately trained personnel. Internet access is less than 10% in Africa alone.

Fortunately many countries have started deploying nationwide backbone with ICTs infrastructure, built on high speed fiber cables.70 Several countries in East and Southern Africa have also invested in undersea cables to tap the global Internet super highway. In order for developing countries to accrue the benefits associated with e learning, they need to think of innovative ways to deliver online content on the national backbone, instead of relying on the unreliable and expensive Internet. Private institutions such as banks are already using the backbone to inter connect different branches country wide for their transaction processing needs.

As commented regarding the teaching approach to eLearning adoption, technology does not stand alone, but encompasses political, cultural, social and economic values that can serve as barriers that impede the diffusion or transfer of technology (see Figure 3). The barriers to technology transfer exist for all innovations, but some transfers are more affected by the barriers than others.71

Social barriers. It is important to recognize that transfer occurs within a social system. The social system defines the boundary or limits within which the innovation will be transferred and diffused. Most transfers assume some sort of societal judgment. An individual will not recommend a technology to neighbours if it is detrimental to them or not of substantial benefit. Similarly, news of a new technology will not be printed in a scientific journal unless its benefit has been adequately proven.72

Political barriers. The influence of political barriers on transfer was evident in a problem that occurred in India, where a near-famine situation prompted the development of an agricultural research system and the reform of the bureaucracy that had driven the peasants to poverty.

Before the development of the new technology, the colonial government was interested solely in increasing the production of exportable cash crops. In this case, the political agenda largely ignored the needs of the citizens between 1947 and 1965.73 The political barriers to transfer were not broken until an influential change agent gained a high level position.


69 Ibidem


73 Ibidem
in the government. This change agent pushed the technology through the political barriers by creating partnerships between the government and research institutions that ultimately helped to avert the famine and created an infrastructure in which the technology could thrive.

Personal barriers. An individual’s particular concerns about a given technology seems to be an influencing factor in the degree of acceptance. Individuals have different concerns about innovations and proceed through various stages before they fully accept the change. Moreover, a very small percentage of the population, called innovators, constantly seek out new innovations. This group is followed by a larger group called early adopters who are generally eager to test new technologies. This group influences those around them and is often sought out for advice. This is a key group for change agents working to transfer a technology to identify because they can have a strong impact on their peers. Following this group is the early majority who tend to wait until they receive positive feedback from the early adopters about the technology before they become interested in adopting. Nearly half of the population trails behind these groups and has been classified as late majority and laggards.

Cultural barriers. Cultural barriers also play a key role in technology transfer. In many cases, the culture in which a technology is designed is different from that where it is ultimately used. Thus, it is important for designers to communicate with and understand the receiving culture. This communication will help assure a solution that is appropriate for the culture and acceptable to social norms and values. In developing countries, equipment should be small-scale, rugged, and require minimal training for successful operation. These features should not be limiting, however, as the technology should have the potential to expand as a country’s needs and resources expand. Until now, little attention has been paid to accommodating technological design to cultural traits; instead emphasis has been placed upon adjusting societies to machines. As systems become more automated, those in charge of technology tend to believe that more computer power will make their processes more efficient. In pulling manufacturing and design toward automation, the tendency is to give as much power as possible to the machine and leave the remaining job tasks to the worker. This automation philosophy discounts the knowledge and intuitive capabilities of workers and pushes them to resent the technology. A better approach is to design systems around the workers, which offers the workers a change from mechanistic job tasks to higher-level tasks.

Moreover, the process of technology transfer is not achieved through the simple movement of technology to a new environment; it requires the development of a process and infrastructure that will help the technology “break through” the barriers described above. In some cases the technology is needed so desperately that the end user will help the technology break through the barriers. Other innovations have to be pushed through the maze of barriers to the end user by the current “owner” of the technology. The degree to which the end user wants and/or needs the new technology will determine whether the technological potential or the social constraints will prevail, and the speed with which the innovation may travel from the original source to the end user.

77 Ibidem
78 Ibidem
Communication is a key element in the transfer process. If a new product is available but the public is not made aware of it, the technology will never reach its intended market. Transfer requires human intervention for a technological innovation to become part of a larger system. The communication channels that support the transfer process include the printed word (e.g., journals, books, newspapers), personal correspondence (e.g., letters, conversations), scientific societies, formal instruction (e.g., universities, research institutions), travel and exploration, mass media (e.g., public information promotions, demonstration programs such as the model farm), bureaucratic and institutional reform, and research (e.g., adaptive research, agricultural research stations). Other, more specific, examples of transfer vehicles include personalized training and open dialogue inter-industry communication; education and training; management techniques and timing; an ex-ante sociological research that communicate with and understand the receiving culture. This communication will help assure a solution that is appropriate for the culture and acceptable to social norms and values and stressed that designers should consider the characteristics of the labor force and the resources available in the receiving country\textsuperscript{80}.

Local, Regional, and International Cooperation

This kind of holistic analysis of higher education systems has rarely been attempted.\textsuperscript{81} It does not mean reverting to centrally planned systems, far from it. Instead, it offers the ability to balance international cooperation projects strategic direction with the diversity now found in higher education systems across the developing world. This diversification can be also a reaction to increased demand has brought new providers (especially from the private sector) into the system and encouraged new types of institutions to emerge. It promises increased competition and, ultimately, improved quality. To fight for common interests requires both humanities and technical-scientific competence within all the nations engaged in the trade regime\textsuperscript{82}. Attracting direct foreign investment relies on the ability to negotiate successfully with international business, which is likely to be attracted by a high-quality, professional workforce. It is the educated people of a nation, even of a poor nation, who will assert their nation's interest in the increasingly complex web of global economic, cultural, and political interactions. Without better higher education, it is hard to imagine how many poor countries will cope\textsuperscript{83}.

Improving higher education is therefore in every country's interest, and has legitimate claims on public funds. Its also underscore the responsibility of international donors to redress current imbalances in research capacity across regions, so that every region can participate in international efforts to address key global challenges. Their improvement deserves urgent consideration, an initiative that could be greatly facilitated by advances in information technology.

The globalization of higher education can have damaging as well as beneficial consequences. It can lead to unregulated and poor quality higher education, with the worldwide marketing of fraudulent degrees or other so-called higher education credentials a clear example. Franchise universities have also been problematic, where the parent university meets quality standards set in the home country but offers a substandard


education through its franchised programs in other countries. The sponsoring institution, mainly in the United States or Europe, often has a “prestige name” and is motivated by pecuniary gain, not by spreading academic excellence to developing countries.\(^{84}\)

**Higher Education and Democratic Values**

Higher education has, from the author point of view, the additional role of reflecting and promoting an open and democratic world society. Civil society is neither state nor market, but is a realm that links public and private purposes. Within this realm, higher education promotes values that are more inclusive or more “public” than other civic venues, such as religious communities, households and families, or ethnic and linguistic groups. Higher education is expected to embody norms of social interaction such as open debate and argumentative reason; to emphasize the autonomy and self-reliance of its individual members; and to reject discrimination based on gender, ethnicity, religious belief, or social class. The best higher education institution is a model and an impetus for creating a modern civil society. This is an ideal that is not often realized, but is nevertheless a standard against which to measure national systems.\(^{85}\)

More generally, a society, wherever qualify as develop or in developing phase, that wishes to build or maintain a pluralistic, accountable democracy, will benefit from a strong higher education sector in two respects: the first is the task of research and interpretation. A society’s understanding of what form of political democracy will best suit it can be advanced on the basis of debates and research that start in universities and colleges. This is primarily the responsibility of the social sciences, so humanities also have a key role to play.\(^{86}\)

Higher education in the humanities is home to the most careful reasoning about the ethical and moral values important to world society. It joins the other disciplines in its respect for objectivity and for testing ideas against observation, with the experience of all societies, across history, upon which to draw. Second, higher education helps to promote the enlightened citizens who are necessary for a democracy. It achieves this by instilling the norms and attitudes crucial to democracy in its own students, who then become the teachers, lawyers, journalists, politicians, and business leaders whose practices should promote enlightened citizenship across society.

Higher education also contributes insofar as it demonstrates pluralism, tolerance, intercultural dialogue between nations, with reasoned argument, and other values that are as critical to world peace as they are to the educational process.

### 4 Conclusions and recommendations

The goal of improving the educational quality and economic impact of higher education is coming to the front in many developing countries as their efforts to expand the number of schools and students are bearing fruit. Improving quality and gaining impact is, however, more difficult as it may require a transformation of the educational system itself. Many countries in Africa and elsewhere are turning to eLearning programs to assist with this transformation, and to fill some immediate gaps in their educational systems.

The field of international development is littered with good ideas that have yielded no fruit. Only rarely does the policy design process adequately anticipate the harsh and unforgiving realities found in the field. Projects routinely fail because they do not take adequate account of the competence and experience of the staff who will be relied upon to administer the policy or manage the project.

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86 Ibidem.
Other projects fail because they do not involve stakeholders early in the planning process.

The current debate on ICTs in higher education must be shared with the general public and be informed by historical and comparative knowledge about the contribution of higher education to social, economic, and political development but also should take clear account of the challenges the future will bring. It should establish for each LDCs higher education system clear goals that policy makers can use to review the higher education sector.

Equally important is a careful examination of ICTs potentialities in ways to reform tuition and fee structures that currently exclude candidates from poorer backgrounds. And finally, measures are required to stamp out corruption in awarding places in universities.

In pointing out these ambitious public responsibilities, the author is not so naïve as to presume that they are practiced always or everywhere. Higher education institutions in developed world have been home to moral cowardice as well as to moral courage. A critical social science was sustained in despotic Latin American and Africa countries only when its intellectual leaders fled universities and established independent research centers. Universities in South Africa collaborated with apartheid, and universities in Nazi Germany with anti-Semitism. Such instances of moral failure recur across time and place, not often, but often enough to remind us that universities have to earn the right of moral leadership.

This kind of universities leadership is vital for world society and should be more active in creating synergies and contribute to the maximum public awareness on the fact that without improved human capital, LDCs will inevitably fall behind and experience intellectual and economic marginalization and isolation. The result will be continuing, if not rising, poverty. Thus, the strengths of all players (public and private) must be used, with the international community to provide strong and coordinated support and leadership in this critical areas as it is the ICTs based tools replicability in LDCs higher educational system.

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