

LINKING BUSINESS AND INDUSTRY WITH ACADEMIC DEVELOPMENT AT THE CATHOLIC UNIVERSITY OF ANGOLA¹

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In 1998, the Angola Educational Assistance Fund (AEAF) and the Catholic University of Luanda (UCAN) started a collaborative effort, joined later by the University of Trento (UniTN), to develop a new Computer Engineering Department (CED). The objectives of the CED have been coordinated with the strategic goals of UCAN as well as the specific needs of the business and industry sector. The ultimate goal was to design a program that could offer young Angolans valuable and practical skills needed to be successful in the growing Angolan economy. The first academic year of the CED was inaugurated in March 2001.

Introduction

The Republic of Angola is located on the Atlantic Coast of southern Africa and is bordered by Namibia to the south, Zambia and Zaire to the east and the Democratic Republic of the Congo to the north. It has abundant natural resources, including petroleum, diamonds, agriculture and fishing. Angola covers a territory of about 1.2 million square kilometers, more than twice the size of France, with a population of approximately 11 million people. The 1,600 km-long coastline and its four major ports make it a natural hub for shipments to and from the entire region.

In 1975, Angola ended centuries of Portuguese colonial exploitation. Sadly, a state of civil war quickly followed independence and has been the norm since then [1,2,3,4]. Some progress has been made in recent years in resolving the conflict, and initiatives can now be redirected from emergency intervention to long-term social and economic development. Although often not immediately considered by the government or the multilateral and international aid agencies, the area of higher education is crucial for the future of Angola.

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The Angola Educational Assistance Fund (AEAF, www.aeaf.org) was created in 1996 in order to promote higher standards of academic education and research in Angola. The AEAF is a 501(c)(3) nonprofit organization and is based in Boston, MA. Its main endeavor has been the establishment of the Catholic University of Angola (UCAN, www.ucan.edu), the first non-governmental university in Angola. Based in Luanda, UCAN was inaugurated in November 1999, with the opening of the Department of Law and the Department of Economics and Management. Its mission is to provide human, academic and professional education for the young people of Angola in their own country.

The Angolan economy has suffered from the internal armed conflict, resulting in an increased dependence on the petroleum sector. As a consequence, the vast majority of businesses and industries operating in Angola are: a) oil-related, b) foreign-based and – usually – multinational, c) “closed” businesses, where expatriates occupy all levels of jobs and only a small number of low-level jobs are offered to locals.

Although serious attempts are currently being made by the Angolan government to encourage investments in other sectors and thus diversify the economy, the petroleum sector remains prominent. Given this, it was initially a natural step for UCAN to seek collaborations with oil-related companies. In particular, efforts were made to address some of the critical problems that affect these companies in Angola, including high costs of operations, lack of local educated staff, insufficient on-site training programs and insufficient links with the local non-oil economy.

Areas of collaboration have included oil companies’ direct and indirect funding of UCAN activities, sponsorship of public events held at the university and participation as both presenter and participant at seminars held at UCAN. For example, in January 2000 the Law Department of UCAN conducted a 3-day seminar on a newly approved labor law, which was successfully carried out. Companies were eager to send their staff and were quite supportive of this event. Students and many individuals and staff from small companies were able to attend.

Oil companies have also provided funding for various initiatives directed by AEAF, including a number of English as a Second Language (ESL) courses and computer literacy programs which were organized at UCAN and the shipment of containers of books and computers which are arranged on a regular basis [5].

While the oil industry looks forward to hiring the first graduates of UCAN in 2004, both UCAN and the oil companies continue to develop their collaboration. An interesting opportunity arose in June 2000, when UCAN asked AEAF to help create a Computer Engineering Department. An international team of experts under the guidance of AEAF and the University of Trento developed the academic curriculum and planned the course structure. Classes began on-schedule in March 2001.

Of great significance was the involvement of the private sector. Managers and technical experts from the oil industry were repeatedly interviewed, with their input contributing to the curriculum development. The result is a set of courses that takes into account the medium-term needs of the oil companies operating in Angola and, at the same time, integrates modern topics to allow students to successfully compete in and contribute to the growth in the various sectors of the Angolan economy.

Computer Engineering Department curriculum (CED)

Our approach took into account two essential aspects of Information Technology (IT): fast, continuous change and its growing association with industry and business. The rapid evolution of the discipline has a strong impact on computing education, affecting both content and pedagogy. We have also considered the changing reality of the Angolan economy, with its current dependence on the oil sector (and its need for IT skilled personnel in the near future) and with the necessity of diversification in the long-term.

The model curricula that were used as references, developed by international computing associations [6,7,8] or universities [9], are generally based on common structures and degree programs available in North America and Europe. In order to meet Angola's unique requirements, an assessment of business and industry needs was necessary. As a first step, we focused on the petroleum industry, currently dominant in the Angolan economy, and the banking sector, which is small but in rapid expansion. Questionnaires were distributed among several oil companies and a series of meetings with representatives of the industry were held, addressing both technical and managerial issues. Several companies recognized the importance of their involvement at this stage both as future employers of the graduates of the CED and as significant players in the economic and social development of Angola.

We determined that all companies interviewed would like to hire local workers for new job openings, but that the severe shortages of Angolan skilled labor forces foreign investors to look abroad.

In terms of IT skills, the petroleum companies stated a need for individuals with knowledge of hardware, networking, communication, PC LANs/WANs, MS Office administration, financial systems, database and MIS. In addition to technical skills, the companies emphasized accountability and the ability to communicate effectively as essential requirements. All companies interviewed stressed the difficulty of finding individuals with these skills within the country.

In the banking sector, extensive computerization efforts will soon be required to sustain its expansion. Banks in general are looking to install computerized reliable payment systems, optical readings, long-distance communications and payment clearing mechanisms. However, due to the unique needs of Angola, which include rapidly changing regulatory laws, inflationary economy, and dual currency accounts, the software developed outside of Angola is not always adequately suited to its reality. Many managers would prefer to buy software systems developed locally, but a fundamental shortage of Angolans with adequate programming skills makes this impossible. In addition to some of the requirements listed by the oil companies, several bank managers reported a need for web developers.

The results of this research and the feedback it generated were used in developing the CED program of study. It is structured in three steps. Should students choose to terminate their study for personal reasons, each step provides an “exit point” with an intermediate degree. The highest degree offered requires five years and six months for completion.

- The preparatory year (year zero, Propedêutico) will give students the title of “computer literate.” At the end of the year, a computer literate will have knowledge in and familiarity with the use of information systems and software tools for office automation.²
- The undergraduate degree (3 years, Bachelorato). CED undergraduates will be able to carry out professional and technical activities in the design, organization and management of computer systems and networks.

² For various reasons, the high school system in Angola is currently unable to provide a uniform level of general knowledge and preparation for an undergraduate degree in Computer Engineering. It was therefore necessary for UCAN to introduce a “Propedêutico” (preparatory) year as a prerequisite for students, to be successfully completed before they are able to begin the degree program. The Propedêutico improves the overall cultural background of the students and ensures that a comparable level of preparation exists within the class.

- The graduate degree (one additional year, Licenciatura, plus another six months for the internship program and the thesis). Typical occupations for CED graduates range from pure and applied research to innovation and production development, advanced design, planning and programming and complex systems management.

This structure conforms to the Angolan higher education regulations. By offering intermediate degrees, it will also provide students not able to complete the program with an opportunity to enter the labor market and result in quick transfer of basic IT skills to the economy. A complete list of courses offered is available directly from UCAN [10]. In addition to successfully completing the required courses, the student will need to demonstrate mastery of his or her final research topic (thesis), the ability to operate autonomously and a good level of communication and presentation skills.

Computer Engineering Department activities

A number of measures are currently being planned and implemented in order to build a strong relationship between UCAN and the Angolan industrial sector. The underlying assumption is that most students will work in the industry after (or, in some cases, during) their studies. Today, much of the practical knowledge associated with computing exists in the form of professional practices that are present in the industry. To be successful, students must be exposed to these practices, along with the theoretical aspects of computer science, as part of their education. Daily professional practice also includes several “non-technical” proficiencies, such as written and oral communication, the ability to work as part of a team, the understanding of ethical aspects of the work, and some managerial skills. The importance of these skills will be more clearly understood when placed in the context of the work environment. Partnerships with local companies offer a way for UCAN to introduce these aspects into its course offerings and for the industry to influence the curriculum to match its needs. The focus of collaboration is on the following measures:

- Involvement of non-academic practitioners as teachers or teaching assistants. The interviews carried out during the development of the CED curriculum revealed that companies in Angola have both the competencies and the willingness for this involvement. The active participation of enterprises in the

educational process is widely recognized as a necessary step toward *information systems engineering* [11].

- Internship programs. Student internships in local companies will strengthen the relationship between UCAN and the private sector. The presence of a student in a company has two consequences. First of all, the student will act as a facilitator for the introduction of technological innovation in the company. The second aspect is the feedback that the student (and the academic supervisor) will receive from the practical application of the innovation. This process may also initiate applied research projects (see below). The internship program may also be part of the student's research activity for the final thesis.
- Corporate Advisory Panel for continuous feedback and relationship building. The two measures above (that exploit the bi-directional exchange of knowledge by moving people between the university and industry) must be promoted and managed at the appropriate level. A panel with the participation of all the relevant actors (including the students' representative) is going to be built both for this purpose and for establishing a formal communication channel to bring issues from the industry into the university.

In addition, other activities planned include:

- Visits by students and staff to local industries, organizations and computer-related facilities.
- Professional development programs for industry staff at UCAN.
- Organization of state-of-the-art seminars and conferences.

Conclusions

Given the current state of Angola, with its combination of encouraging signs of progress and formidable challenges, it is obvious that the goals of the CED are ambitious. Nevertheless, both academia and industry understand that stable and durable development has two main requirements. On one side, industry must foster academia, not only to insure that university programs match its needs and to activate an input channel of qualified people, but also because academia can bring technological innovation to the industries operating in Angola. On the other side, academia has to sustain the

development of industry in order to open a sufficiently wide range of opportunities for its students, as well as to sustain research activities with relevant cases for study.

To exploit these research activities and to link the CED to the international research community, we plan to create a joint research center with the participation of other universities (outside of Angola) and of companies in Angola. The research activities will focus on studying technological innovation in emerging countries, digital divide, multicultural work settings, and other relevant topics. In order to promote innovation in Angola, the center will encourage the use of an Action-Research methodological approach [12] and produce both impact and implementation studies. Since innovation requires understanding technological, organizational and sociological issues, the research center will be multidisciplinary.

The recent past of Angola inflicted enormous suffering on its people. Moreover, it halted the development and diversification of the economy. It is somewhat paradoxical to speak of a positive outcome, but this situation could provide a favorable environment for using new frameworks of collaboration between academia and industry. In the process of building the CED and in establishing relationships with the local industry we have encountered familiar issues. However, our experience in Angola over the past 2 years has shown that the lack of a routine and the shared sense of cooperation due to the challenging environment provide a unique opportunity for advancement and progress. Furthermore, since there is no current practice to be revised, there is less resistance to change and more acceptance of experimentation [13].

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