

**POLYGIS CENTRE**  
**A Kenya Polytechnic – VVOB Cooperation, to Support the Departments of Surveying & Mapping, Building & Civil Engineering and Information and Liberal Studies in Offering Better Technical Training/Education in the Concepts and Use of Geographical Information Systems**

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**Key words:**

**ABSTRACT**

**GIS EDUCATION AT KENYA POLYTECHNIC**

It is argued that for Africa to be fully industrialized, technical education is the key solution for the development of ideas, skills, research and innovation. Kenya's national aim for Technical education is to specifically develop practical skills, technical knowledge, vocational skills and professionals. This article examines the aims of the Kenya Polytechnic as a technical institute and the core sponsors of the Centre the VVOB -Flemish Technical Assistance, a Belgian Co-operation organization.

A brief history of the need for Geographical Information Systems (GIS) in various courses in the Department of Surveying & Mapping is looked at and how the lack of hardware and software has hampered technical training. It mentions the incorporation of two other departments: Building & Civil Engineering and Information & Liberal studies and the importance of the Centre to them, especially in offering training in their areas of need.

The objectives of the Centre are outlined and emphasis is put on the strategy applied in fulfilling them. The article further looks at the training strategy used by the Belgian Associates in dissemination of knowledge to the lecturers and technicians who in turn transfer the knowledge to the students. There is a discussion on the available equipment, softwares and their usage in training, especially for project development by the students. It also mentions the source of learning material and how there is a regular update of information in this area through the Internet.

The financial strategy is discussed, especially the methodology and efforts used to set up a sustainable unit while offering training and professional development. The general support of regular and former students is discussed, emphasizing the role of the Centre in attaching students and securing them jobs in organizations using GIS. A discussion on the marketing strategy is included. The main methods used in making the public aware of the existence of GIS-training in the Kenya Polytechnic are highlighted.

The article is concluded with looking at the Centre's achievements since its inception and how a sustainable centre is in place and offering training and professional development. The

various courses that are offered in the departments of Surveying & Mapping, Building & Civil Engineering and Information & liberal studies are mentioned.

## **INTRODUCTION**

It is argued that for a nation to be fully industrialized technical training favoring practical skills and innovation is the key to development. Kenya as a young developing nation needs to increase technical training opportunities for school leavers at post-primary and post-secondary levels. Technical education develops practical skills, which help people to be self-supporting for income generating activities. In Kenya "Jua Kali" sector is the outcome of technical training and vocational skills. Today worldwide technical education has produced skilled artisans, craftsmen, technicians and technologists necessary for manpower development. Kenya as a Nation has not been left behind in setting their priorities right.

### **1. THE KENYA POLYTECHNIC**

The Kenya Polytechnic, established in 1960, is a government-aided institution under the Ministries of Education, Science and Technology. Since its inception the Polytechnic's challenge has been to produce skilled artisans, craftsmen, technicians and technologists both for formal and informal sectors. Training opportunities are offered to school leavers leading to the awards of Diplomas and Certificates. It also offers demand driven Short term Courses and Vocational skills especially for People already in employment. This is in the hope of meeting the National Technical aim of training at post-secondary levels so as to be able to bring out graduates having practical skills and technical knowledge.

The Kenya Polytechnic consists of various Departments namely Building and Civil Engineering, Electrical & Electronics Engineering, Information & Liberal studies, Institutional Management, Mechanical Engineering, Surveying & Mapping, Applied Science, Health Sciences & Biotechnology, Business Studies, Computer Studies, Enterprise Development and Graphic Arts.

The rapid development in technology and industry has required the Polytechnic to adjust in order to cope with the drastic change. In this respect it has involved various foreign governments to help in the technological change. The British government assisted the establishment of a computerized Management Information system. The Canadian government has initiated a project titled "Supporting Environmental Education in Kenya". The Belgian government represented by VVOB is having a joint venture with Kenya Polytechnic and is sponsoring two on-going projects: PolyGIS and PolyCaSE. The PolyCaSE project is involved in Computer Assisted Engineering. It serves the Departments of Computer, Building and Civil Engineering, and Electrical & Electronics Engineering. The two later projects are to promote the introduction of high skill technology geared towards staff development through training.

### **2. VVOB -FLEMISH TECHNICAL ASSISTANCE**

The VVOB is a Flemish Technical Assistance organization under the Belgian government.

The organizations' headquarters are in Brussels, the capital of Belgium. VVOB has offices worldwide managed by country representatives. Founded fifty years ago, the organization has undertaken a lot of projects all over the world. The organization is running projects in the following countries: Botswana, Chile, China, Cuba, Ecuador, Kenya, Netherlands, Nicaragua, Suriname, South Africa, Vietnam, Zambia and Zimbabwe. The Flemish community and DGIS (Directorate of International Cooperation Belgium) currently fund the organization. Last year the organization spent on all its projects worldwide 440.3 million Belgian francs (660m Ksh).

## **2.1 The Belgian visions for aid**

The Belgian government has laid down the following visions for aid:

- a) Attention for human rights, democracy and good governance
- b) Building of cooperation: the developing countries are responsible for their Own development process, priority is given to local capacity building.
- c) Poverty eradication in a concept of sustainable development. Poverty is one of the Causes of environmental problems, corruption, and problems in public health. That is Why sustainable development has to eradicate poverty effectively.

## **2.2 The VVOB vision**

VVOB has a vision of running projects in developing countries, with an aim of showing total cooperation by the participating country. The country needs to have a local interest for implementing the project. A strong dialogue and participation of the local people leading to ownership and cooperation are very important.

VVOB is running projects geared towards the development of education, training and capacity building. It aims at increasing; organizing and coordinating the knowledge transfer between Flanders and the countries abroad.

## **2.3 VVOB Priorities**

- Most projects should concentrate in SubSahara Africa (50%).
- The partner country should be willing to cooperate
- There are on going sustainable development movements in the country
- The country has a policy towards education that is acceptable to VVOB

VVOB actions are situated in the following five sectors:

1. Basic Education
2. Technical Education
3. Teacher Training
4. University Education
5. Applied Research

Two other, supra -sectoral, action fields are:

1. HIV/AIDS awareness
2. Environment

## **2.4 VVOB in Kenya**

Currently VVOB is involved in Higher Technical Education, Museology and Biodiversity, and Public Health.

### **3. THE NEED FOR GEOGRAPHICAL INFORMATION SYSTEMS (GIS) IN THE KENYA POLYTECHNIC**

The PolyGIS name was given to the centre when it was established in 1998 at the Kenya Polytechnic to meet the need for Geographical Information Systems (GIS) in the Department of Surveying and Mapping. To be more market oriented, the Kenya Institute of Education reviewed the syllabus of technical education program. In this review the syllabus of Higher Diploma in Surveying and Cartography was designed to include the teaching of Geographical Information Systems. To run the course, the minimum requirement was the availability of a laboratory with computers, GIS software, digitizer and GPS receivers. The Department of Surveying & Mapping could not fulfill the above named requirements of training in GIS. The lack of computers and software forced the students to only have the theory aspects of the lessons. It was very difficult for the department to organize student visits to organization using GIS and let them have practical hands-on training. The problems of protocol and funds to allow them to have termly or yearly visits came to an end with the PolyGIS Project. It was later extended to the Departments of Building & Civil Engineering, and Information & Liberal Studies, which required the same technology. PolyGIS was to fulfill some of the needs of students undertaking Higher Diploma and Diploma courses in Water Engineering, Highway Engineering and Valuation & Estate Management in the Department of Building & Civil engineering. The Department of Information & Liberal studies has an Environment Resource Centre sponsored by CIDA. The courses offered at the Centre are Diploma in Environmental Resource Management and a certificate course in Application of GIS in Environment resource Management. This centre depends on PolyGIS for staff development, Equipment's, Software, syllabi review and exam moderation. It is envisaged that other departments such as Applied Science and Biotechnology will realise the need for GIS. Figure 1 shows the current need for GIS in Kenya Polytechnic.

### **4. STRUCTURE OF THE PolyGIS CENTRE**

VVOB has deployed two associates to run the Centre. A scientific advisor of the University of Ghent guides the associates. The Centre is to be utilized fully by all the involved departments for training of students and lecturers (capacity building). The work programs suit each department. A laboratory technician helps in running the Centre and maintaining the equipment.

The Kenya Polytechnic Administration is involved in the management of the Centre. A Steering Committee chaired by the Chief Principal monitors the two VVOB projects currently running at the college. This committee consists of the respective Heads of Departments, the VVOB representative for Kenya and the VVOB associates.

On the ground, the PolyGIS Technical Committee runs the Centre. This team consists of lecturers from various departments and the two Belgian associates. They oversee the activities

that are to be run in the centre, plan for them and follow up budgeting issues. They report regularly to the Steering Committee. The centre is easily accessible to the departments involved as show in *Figure 1*.



Figure 1

#### 4.1 Objectives of the PolyGIS Centre

##### Specific objective

Before the Project was started the Department of Surveying & Mapping had one computer for administrative purposes. The challenge was to put up a functional GIS laboratory fully equipped with computers and software in order to offer better training in the field of GIS to students in various disciplines.

These in turn to meet the demand for trained people in the current industry and build a strong resource management.

### Expected results

- Establishment of self-sustainable GIS Centre at the Kenya Polytechnic. The establishment of a self-sustainable GIS lab means the prolonged existence of GIS at Kenya Polytechnic. Sustainability interpreted in the sense that the Centre should be capable to generate its own funds and maintain the equipment.
- GIS awareness in the Kenya Polytechnic both for staff and students.
- Lecturing staff is proficient in GIS (Capacity building- Staff development)
- Offer training to students of Diploma and Higher Diploma in the following Departments Surveying & Mapping, Building & Civil Engineering and Information & liberal studies.
- To raise GIS awareness and encourage the public to develop interest. This would enable an organization with GIS needs to adapt and implement the same.
- External courses offered to the public. The basis is that every organization and individuals in need of GIS knowledge can have access to this education at an affordable price. In the past most GIS training has been expensive.
- Liaison with local and international organizations

## **5. TRAINING STRATEGY AT THE PolyGIS CENTRE**

The transfer of knowledge is crucial in the project. Currently the associates teach Regular Diploma and Higher Diploma students. Lecturers and technicians are however trained at the Centre such that in the future the Kenya Polytechnic can be self-reliant in the GIS discipline. The training program is dubbed Training of Trainers (TOT). The participants of this program are from different departments.

The two VVOB associates offer most of the training and have come up with an interesting approach. Instructor-led manuals, which include the usage of data available locally, have been prepared. The idea is to let TOT members work on real data and Projects. Emphasis is put on self-study this ensures personal delivery, hands on experience and participation in the project. The key to the training is self-motivation, accessibility, initiative and the ability to control one's own learning experience. In-house are held and members present researched topics to fellow colleagues on a weekly basis. Handouts are given to all participants for follow up.

Apart from these, seminars are organized for the lecturers, technicians and students within the Polytechnic. For the hands-on-work approach, workshops are also organized while incorporating field trips. To change the culture of reluctance and fear of collecting data, data entry, data analyses and the use of different software's, the associates have organized field trips to collect data by various means. There is encouragement to lecturers to take up and serious study and research in different software. This is to improve proficiency in the usage of different softwares.

There is provision in the budget to train lecturers in other local institutions and neighboring countries. Special workshops are held to have on-job training in the laboratory. Lecturers are later involved in dissemination of GIS knowledge to the students. The centre is easily accessible for external students and other external organizations as shown below *Figure 2*. A number of students from the local universities have visited the centre for demonstration. Interested organisations are welcome to pay a visit to the centre

## ***USE OF THE CENTRE BY OTHER PARTIES***

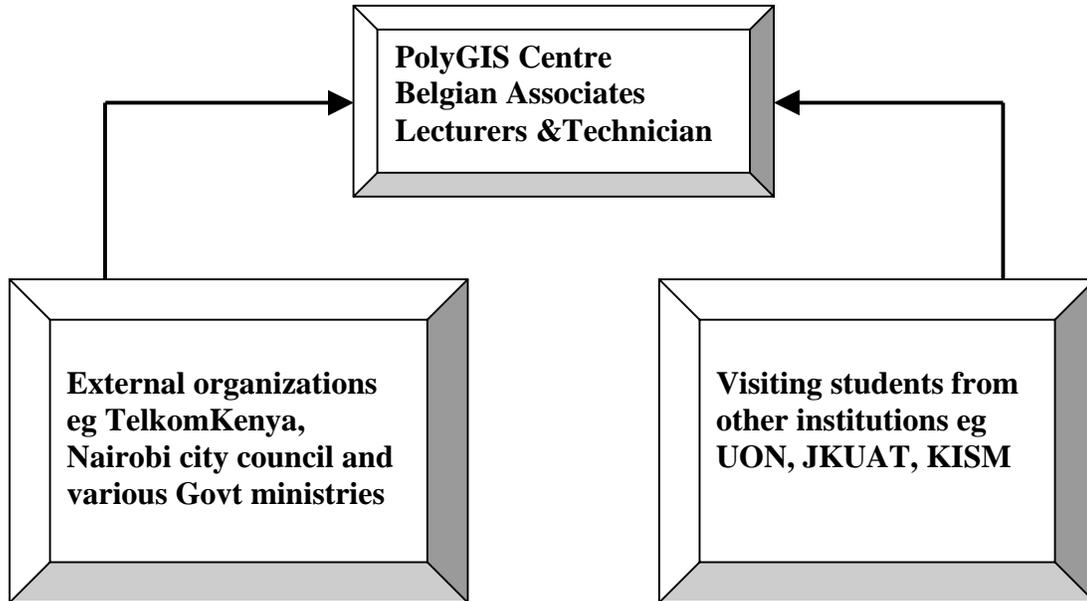


Figure 2

### **5.1 The Available Equipment and Software Used for Training**

The total number of regular students who use the laboratory on weekly and rotational basis is 200. The PolyGIS laboratory has the necessary equipment meeting this demand. For processing, it is equipped with 13 NT workstations, a server and a laptop. There is a Calcomp A0 Digitizer, an A4 scanner and five GPS receivers for input. Two color printers, A4 and A3, are available for output. The GIS based software available is Arcinfo and Arcview 3.2 (with extensions: spatial analyst, 3D Modeling, and Network analyst) from Esri and from Clark Labs: Idrisi 32 and Cartalinx, for cartography purposes MapMaker Pro is available. For electronic communications there is an Internet connection, which makes it easier to download software updates. There are plans to buy a plotter, a bigger scanner, digital imagery, software upgrades and more GPS devices. Students are encouraged to choose projects, which can be done using the available software. This year all students doing GIS projects are using Cartlinx as data builder and Arview to process and output the data. The VVOB associates; the trained lecturers and the Centre's technician are constantly guiding the students. There is a guiding manual using Kenyan data, which the lecturers and students use for practice. Workshops for data input using most of the above mentioned devices and software have been organized.

### **5.2 Learning Materials and the Internet as a Source of Learning Material**

The Centre has a number of books, manuals, magazines and other reference materials. Prof. Van Meirvenne of the University of Ghent as the appointed scientific advisor of the PolyGIS project recommends the books to be used. The two VVOB associates and the lecturers recommend some other books. This has made a small library that is accessible to lecturers and students.

The Internet as a worldwide collection of interconnected computers plays a major role in electronic communication and sharing of information. The hyper media based system enabled the Centre to download for example lecture notes from the NCGIA (National Centre for Geographic Information and Analysis) University of California Santa Barbara, the latest information about GPS-technology and database design. The WWW holds considerable GIS information with certain sites offering geo-referenced data, others online GIS-manuals, software updates, research results or the latest trends and developments in GIS and related disciplines. The Centre uses this as background information to include in lecture notes and to develop short term and tailor-made courses. Some of the information is compiled in the form of manuals and is easily available from the library for lecturers as well as students.

## **6. FINANCIAL STRATEGY**

VVOB is the main sponsor of this project with Kenya Polytechnic under the Ministry of Science and Technology as the collaborators. The Kenya Polytechnic has a memorandum of understanding with VVOB to maintain the lab and employ a technician to facilitate the day to day running of the Centre.

There is a yearly budget granted for the project. An important part of it is spent on staff training, especially on seminars, field trips, workshops, and local training. Another part is used to purchase equipment and reference material for the Centre. For self-sustainability, however, it is necessary to generate some income. Thus the Centre offers external courses and consultancy to interested organizations and individuals. These are offered at reasonable rates. The Polytechnic ensures that funds generated by the project are kept in a separate account and is used to maintain equipment. In future it will also cater for the purchase of new hardware and software, up-to-date reference material and training or refreshment of the personnel. The project is to be funded upto 2002 there after the centre should be self-sustainable.

## **7. SUPPORT FOR STUDENTS**

The Kenya Polytechnic once in while organizes stakeholders day where employers (industries, companies, ministries and organizations) pay a visit to the institution. The PolyGIS Centre takes the opportunity to display some of the projects done by regular and former students from various departments. It also has an open day in which various people are invited and students are given a chance to demonstrate and display their projects. Some of the projects are displayed in the Centre. The student projects are to fulfill the award of Diploma or Higher Diploma administered by the Kenya National Examination Council. There is information available to the students regarding various organizations especially for their industrial attachment. Students sponsored by companies' end up doing important projects for their employers. Once in a while organizations having a vacancy pass information to the centre through the Internet. Currently some students have secured themselves attachment to Taita Discovery Centre, Africa Wildlife Foundation, and Kenya wildlife service for doing their projects. Some organizations provide data on which the students try to work on to produce a project. This has proven as a good strategy for future employment. The local organization Geomaps, has played a big role in taking most of the graduates on short-term basis giving them a chance to enhance their knowledge in the GIS.

These students have showed an interest and are competing well in the market with the other graduates. The Kenya Polytechnic has employed one of its former students of Higher Diploma in Cartography as a technician to help in the daily running of the Centre.

## **8. MARKETING STRATEGY**

To introduce PolyGIS to the outside world, a brochure was developed and sent to a number of organizations using GIS or those thinking of starting GIS activities. The brochure is constantly updated according to the latest development. At the end of the year a quarterly Newsletter will be in place. Interested visitors are given a PowerPoint presentation designed to show the capabilities of GIS. At the Nairobi show 1999 the Centre with other Kenya Polytechnic Departments were exhibiting in the Ministry of Education, science Technology stand.

A general Questionnaire was sent out to the public to know of their demands and requirements in the area of GIS. The questionnaires were analyzed with the help of Prof. Van Meirvenne. Some of the courses running in the Centre are advertised in the local newspapers. There is strong liaison with various organizations. The Centre has made a poster, which is displayed, in the college. There is a GIS team that is in charge of this marketing and is constantly meeting to make new developments. There are visits organized to various institution and organisations. Some of Polytechnic lecturers are involved in the GIS user group.

## **9. THE CENTRES ACHIEVEMENTS BY 2001**

The centre has achieved alot in GIS awareness in the Kenya Polytechnic. Some of the lecturing staff are proficient in GIS and Two levels have been trained. The TOT is producing experts in using Arcview and its extension (3D Modelling, Spatial Analyst and Network analyst), Arcinfo, Idirisi and Cartalinx. One of the lecturers involved in the Training of Trainers program is running the environmental resource Centre in the Department of Information & Liberal studies.

Some of the students have attempted very interesting projects produced at the Centre. One attempted to review the map of Nairobi National Park. Some lecturers are now teaching Computer Assisted Mapping (CAM), GIS and GPS. The centre is constantly busy with students and lecturers.

In the year 2000 the centre organized two public seminars presented by Prof. Van Meirvenne, from the University of Ghent. The seminar received a total of 120 guests who came from various organisations. Some of the guests have then been trained at the centre. A similar seminar is scheduled for November this year.

There are a number of courses offered to the Centre. Tailor made courses for organizations are available on request. These courses are made to suit the needs of interested parties. They are instructor -led courses and are ideal for those who need to learn in the shortest duration.

*Courses offered to the public*  
**Basics of Gis**  
**Arcview Basics**  
**Arcinfo**  
**Idirisi**  
**Database Management**  
**Cartalinx**  
**Workshops**  
**Seminars**  
**Tailor made courses**

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## **Index**

<b>GIS</b>	- Geographic Information System
<b>JKUAT</b>	- Jomo Kenyatta University of Agriculture and Technology
<b>Jua Kali</b>	- Small industry owned and run by local Kenya's
<b>KIE</b>	- Kenya Institute of Education
<b>KISM</b>	- Kenya institute Surveying and Mapping
<b>TOT</b>	- Training of Trainers
<b>UON</b>	- University of Nairobi
<b>VVOB</b>	- Flemish Technical Assistance

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