

Geomatics Education in Ghana

Edward Eric DUNCAN, Ghana

SUMMARY

This paper is aimed at providing an overview of Geomatics education and how this is being developed at the Western University College of the Kwame Nkrumah University of Science and Technology (KNUST) and in Ghana in general. The evolution and development of Geomatics training in this institution and the current status of the programmes that have been developed so far will be discussed. The start of this growth, planned direction, expected results and impact on the Geomatics profession and associated disciplines in other institutions in Ghana will be explored. Various strategies being employed and the challenges facing some Geomatics institutions will be discussed.

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1. INTRODUCTION

The term Geomatics is an acronym formed by “geo” meaning Earth, information and information and “automatics” (Bedard et al, 1998). This is the modern term used to describe an integrated approach to the acquisition, analysis, storage, distribution, management and application of spatially referenced data. These are the challenges facing the Surveyor in this digital age.

Various Surveying or Mapping disciplines are involved in various levels of Geo-Information Systems with other disciplines such as Computer science, Information technology engineering, Planning, Geography, Environmental studies and Mathematics.

Geomatics has become a necessary technological tool in almost all science-based courses and some art-based courses all over the globe.

Geomatics education is multi-disciplinary, covering a wide range of activities such as Planning, Land Administration, Land Surveying, Geodetic Surveying, Engineering Surveying and Mapping, new technologies have also boasted up geomatics education such as Geographic Information Systems (GIS), Digital mapping and Global Positioning Systems (GPS). This paper seeks to highlight surveying and mapping education in Ghana.

2. SURVEYING AND MAPPING EDUCATION IN GHANA

Currently a few tertiary institutions in Ghana offer training in Surveying and Mapping either as a fully disciplinary field or as a part to some other allied programmes. These include:

1. Kwame Nkrumah University of Science and Technology (KNUST) - Department of Geodetic Engineering.
2. Polytechnics in Ghana - Department of Civil Engineering
3. The University of Cape coast - Department of Geography and Tourism
4. The Remote Sensing Centre of the Department of Geography of the University of Ghana.
5. The Survey School of the Survey Department of Ghana.
6. Kwame Nkrumah University of Science and Technology's Western University College (KNUST-WUC) - Department of Geomatic Engineering.

1. KNUST

The KNUST'S Department of Geodetic Engineering has been offering Diploma, degree and postgraduate certificates since the 1970's. Currently the Diploma programme has been phased out and enrolment for the degree programme reached its highest for the 2003/2004 academic year with about 97 students enrolled. The postgraduate degree was dormant in the

eighties and nineties but this has been revamped since the late nineties and now admits 2-4 students for each academic year.

2. The Polytechnics in Ghana

There are ten polytechnics in all the ten regions of Ghana, Six of these polytechnics have Departments of Building and Civil engineering where courses like Land Surveying and Engineering Surveying are offered at the Higher National Diploma level. Out of the six its only Kumasi Polytechnic which has a fully functional department of Geodetic engineering at the HND level.

3. Department of Geography and Tourism, University of Capacoast

This department offers training in Land surveying, Cartography and GIS at the undergraduate level The UNDP has supported the Department to set up a GIS training centre to support teaching, training and research in the department.

4. Department of Geography, University of Ghana

This department has been running a Remote Sensing center since the 1980's to support teaching and research in the department. It has been also servicing other department such as the department of agriculture. The centre is also actively involved in research at the postgraduate level.

5. The Survey School of the Survey Department of Ghana

The Survey Department is the survey organization of the Republic of Ghana. For some years now it has been training its own personnel and certificated them. Quite recently it has admitted students to offer surveying at the Higher National Diploma level..

3. THE WESTERN UNIVERSITY COLLEGE OF THE KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY (KNUST-WUC): THE GENESIS OF THE GEOMATIC ENGINEERING EDUCATION AT KNUST-WUC

3.1 The Genesis

The Western University College started as Tarkwa Technical Institute (TTI) in 1952 under the Ghana Education Service. The name was then changed to the Tarkwa School of Mines to reflect the Mining programmes which were introduced with support from the government of Ghana (GoG), Canadian International Development Agency (CIDA), United Nations Development Programme) and Gesellschaft fuer Technische Zusammenarbeit (GTZ).

With the Diploma in Mine Surveying mounted the GoG decided that a university needs to certificate it, previously this was being certificated by the City and Guilds institution of London, thus the TSM became affiliated to KNUST in 1976, then the TSM became the KNUST School of Mines (KNUSTSM).

In 2000 the University council and the Institute of Mining and Mineral Engineering (IMME) proposed the merger of the two schools of mines namely TSM and the University's School of Mines at Kumasi. These changes also brought about the need to change the names of certain departments to reflect current trends, thus the Mine Surveying Department became the Department of Geomatic Engineering to reflect the current changes in the surveying profession. Hitherto our students with Mine Surveying certificates found it difficult to obtain jobs outside the mining industries thus the name change will greatly enhance their chances of obtaining jobs in other areas apart from the mining industry.

3.2 Justification

Ghana being a developing country requires Surveyors in almost all the sectors of its economy and in line with the vision of the WUC, the Diploma programme in Mine Surveying was scrapped and replaced with the BSc program in Geomatic Engineering to reflect the current trends and developments in the industry.

Rapid advancement in Computer Science and Information Technology and Instrumentation has brought in its wake great improvements in Survey and Mapping techniques. The surveying industry is now nearing a fully automated and IT based profession in which spatial data will be at the 'heart' of the profession. The Geomatic Department of the WUC of KNUST cannot afford to be left out of this advancement.

Various tertiary institutions have on their drawing boards the idea of starting the degree programme in Geomatic Engineering to be able to capture a society, which is in dire need of geomaticians to help rebuild the country's infrastructure.

The advent of Geographic Information Systems, Global Positioning Systems and Remote Sensing satellites has made the geomatician a multi-disciplinary profession and there is the need to train such professionals to help in the developmental agenda of the country.

3.3 Objectives

The following objectives were enumerated;

- To provide a broad based, analytical and intellectually developed geomatician capable of working under any rapidly changing environment.
- Impart a high knowledge of skills in the application of the necessary technologies, methodologies and equipment that may be required.
- Good management and entrepreneurial skills.
- To provide a professional knowledgeable in some advanced key areas and basic research skills.
- To provide a professional who is confident and sound and can proof himself or herself in any field that may require the services of the geomatician.

3.4 Curriculum design

This was designed to meet the above objectives and can be classified into six broad areas;

- i. Science – Mathematical analysis and algebra, solid geometry, calculus etc
- ii. Language – English in Literature, Communication skills etc
- iii. Computing – Introduction to Computing, Computer programming, Computer applications in Geomatics.
- iv. Technical – Surveying, Surveying instrumentation, Geodesy, GIS, GPS Remote Sensing etc.
- v. Management courses – management skills, Entrepreneurship
- vi. Others – Geology of Ghana, Land Law, Law of Contract and Tort, Land Information Systems Mining Laws and Regulations, Soil and rock mechanics etc.

The degree programme has as a backbone, key computing skills and this is to be developed from the first year through to the final year. The BSc degree programme in geomatic Engineering at WUC of KNUST is a four year degree programme and candidates are supposed to have gone through a minimum of 120 credits to qualify for the award of the BSc degree in Geomatic Engineering.

The table below shows a classification of the credits allocated to each of the six broad areas described above.

Table 1: Credit distribution for the six areas identified.

AREA	TOTAL CREDITS ALLOCATED
Sciences	23
Language	8
Computing	7
Technical	70
Management	12
Others	20

Final year students are given the option of an in-depth study from any one or more of the technical core courses: Geographic Information Systems, Surveying, Global Positioning Systems and Land Administration.

This program has been designed for those who have gone through 6 years of primary education, 3 years at the Junior Secondary School (JSS) and 3 years at the Senior Secondary School (SSS) to qualify for admission. For admission, candidates must have passes in three core subjects i.e. English, Mathematics and Integrated Science and passes in the three science subjects i.e. Physics, Chemistry and Mathematics or Physics, mathematics and geography.

Students gaining a minimum of 120 credits and passing all required courses in addition to the completion of a supervised project in the final year will qualify for the award of the BSc honours degree in Geomatic Engineering if a cumulative weighted average of more than 50.0

is achieved. The first group of students were admitted in the 2000/2001 academic year and are currently in their final year.

3.5 Problems

The include:

- Current modifications in courses in the profession
- Teaching facilities and personnel
- Graduate placements in the industry
- Marketing the profession

3.6 Solutions and strategies adopted

- Undertaking a marketing drive to highlight the course and creating awareness for services in the geospatial industry.
- Collaborative efforts with other leading universities in geomatics in the world (any collaboration after this conference will be very much appreciated)
- The WUC of KNUST has opened its doors to employing well-qualified staff in the geospatial industry in Ghana, highlighting the need for our Lecturers to having tremendous field experience before being employed as full Lecturers. Currently our Lecturers were educated at some of the leading universities in the world.
- The university and members of staff are sourcing the necessary funds to obtain up-to-date equipment and software to add to the limited equipment in the department now.
- Proposals are also underway to improve Land Administration in the country and funds are being sourced to help the department to set up such a centre and other centres for some of the new technologies coming up.

4. CONCLUSIONS

An in-depth study of Geomatics education in Ghana with special emphasis on geomatics education at the WUC of KNUST has been provided.

There is no doubt that rapid advancements information technology has revolutionised the Geomatics education which a few years ago could have been described as a dying profession. These advances has placed a great demand on curriculum review and update almost on a yearly basis.

The challenges for this program are enormous, training of Lecturers, updates on these new technologies and equipment with the necessary current software are becoming a great challenge to most of the geomatic institutions in Ghana.

It's hoped the graduate of this program will be a refined geomatician who is confident in outlook, skilled, current and adaptable to these rapidly changing technologies.

REFERENCES

- Anon, Report of the Curriculum review committee, 2004, unpublished.
- Bedard Y, Gagnon P, Gagnon, P. A. Gagnon, 1988. Modernizing Surveying and Mapping Education: The programs in geomatics at Laval University. Canadian Institute of Surveying and Mapping Journal, Vol. 42, No 2, 1988, pp 105 – 144.
- Surveying and Land Information Systems, Journal of American Congress on surveying and Mapping, Vol. 53 No. 4, December 1993, pp 250 -255.
- Technocrat, Magazine of the Kwame Nkrumah University of Science and Technology, Vol. 1 No. 2 2003, pp 4 - 6.

BIOGRAPHICAL NOTES

E. E. Duncan holds a BSc degree in Geodetic Engineering from the University of Science and Technology, Kumasi, Ghana and an MSc degree in Topographic Science (Surveying) from the University of Glasgow, UK. He worked on a UNICEF mapping project of the Northern regions of Ghana in 1993 as a Surveyor. In 1996 he joined the UST School of Mines (now the Western University College of KNUST) where he now lectures in GIS, GPS, Geodesy, Remote Sensing and Least square adjustments. He is currently affiliated to the ICES and an academic member of FIG. He was also a DFID scholar whilst at the University of Glasgow.

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