Surveying Education and Training in Jamaica

Glendon NEWSOME, Jamaica

Key words: Land Surveying, Diploma, Bachelors Degree

SUMMARY

The practice of Land Surveying in Jamaica dates back some three hundred and fifty (350) years. Up until the last few decades the training of Land Surveyors in Jamaica was predominantly by way of an on-the–job (apprenticeship) approach. Few would have the opportunity after becoming qualified surveyors to access formal training in the United Kingdom at the North East London Polytechnic. This paper will trace the historical development of our own formal training programme as well as provide an overview of the modern era of Land Surveying Education and Training in Jamaica, high-lighting the role of the University of Technology Jamaica. An analysis of the accomplishments throughout the programme's thirty (30) years of existence will be made and concluding with arguments on the way forward.

Surveying Education and Training in Jamaica

Glendon NEWSOME, Jamaica

1. INTRODUCTION

Prior to the introduction of two (2) Surveying programmes at the then College of Arts, Science and Technology (now University of Technology, Jamaica), anyone desirous of becoming a professional Land Surveyor would have had to engage in a post high school apprenticeship training system with an approved surveyor. An approved surveyor is one whom the Land Surveyors Board recognizes as attaining sufficient experience (minimum of five years) and has the infrastructure (suitable office and equipment), which provides a suitable learning environment. This period of apprenticeship (at that time, minimum of three years) would have been executed with a private practicing surveyor, whom in the earlier days had to be paid or with the Surveyor General or Director of Surveys at the Government Survey Department. At the expiration of this period, the apprentice's principal (as the surveyor responsible for apprentice training is called), would make an assessment as to whether this student had attained the necessary level of competence to be able to pass the qualifying examination and then go on to practice professionally as a Land Surveyor. "The Director of Public Works, The Surveyor General and an Officer of the Supreme Court comprised the first group of examiners. The successful candidate was represented in the Supreme Court by a Barrister and the Court forwarded its recommendations to the Honourable Colonial Secretary who then, if approved the candidate's qualifications, sent the documents to the Governor for his signature granting license to practice surveying in Jamaica." [1] The student was thereby awarded a commission (license) to practice, hence taking on the designation "Commissioned Land Surveyor". "The Land Surveyors Law of 1944 constituted a Land Surveyors Board and the examining powers were transferred from the Supreme Court to this Board chaired by the Surveyor General or Director of Surveys."[1]

2. SURVEYING SCHOOL - MONA

The apprenticeship system was seen as having served its purpose well, but with the increasing complexities and variety of disciplines in land surveying, the limitations of the system began to be exposed. This gave rise to the establishment some sixty (60) years ago, of what was then regarded as the Survey School which was conducted in a wooden building along Gilbroter Road on the Mona Campus of the University of the West Indies in Jamaica, offering a course in land surveying . This course was delivered on a three (3) month per year basis for three (3) years, so that apprentices would have to take time off from their field surveying activities once per year, to attend this course. The course was started under the guidance of Major. Quinton, a British army surveyor who was in Jamaica as part of the technical support the island had been receiving form the motherland (England) at that time. The Surveyor General then was a Mr. Stanfelt from South Africa. Apart from a few of the surveyors who were fortunate to receive scholarships and study abroad (mostly at the North East London Polytechnic now University of East London, UK) and who would then become

tutors at the Survey School, one period of the history of this facility will record indelibly the role and contribution of one RCW "Bob" Byles of blessed memory. He is to this day regarded as the "father of Surveying" in Jamaica. A completely separately article could be written on this gentleman, but suffice it to say now that his work in training surveyors would easily be described as phenomenal.

Another stalwart of Jamaica's surveying heritage is the late Harry G. Armstrong. A former Director of Surveys, "Sir" Harry as he was often referred to, was a no-nonsense tutor to whom many of the current cohort of surveyors owe their current status.

The Survey School course, though it attempted to fill a gap (academic studies) in the students' training, began to prove to be limited in terms as what it could offer in nine (9) months. Due to a high failure rate of students sitting the Board's examination and with surveying becoming more and more sophisticated, it became apparent that the training methodology needed to be overhauled.

3. THE CAST PROGRAMME

The College of Arts, Science and Technology (CAST) was founded in 1958 and was granted University status in 1995. It was not until 1973, after some intense discussions and lobbying by the Land Surveyors Association of Jamaica (LSAJ) during the late 1960's, that formal tertiary education and training for students who wanted to become Land Surveyors, was made available in Jamaica. The first meeting was between the LSAJ led by President E.G. Rickman and the The Rt. Hon. Edward Seaga then Minister of Planning and Development. The LSAJ was otherwise represented by Vice President G.P. McFarlane and Secretary Donald J. Marks. The LSAJ then met with the Parliamentary Secretary of the Ministry of Education – Dr. Aurther Burt in their effort to whip up support for a Land Surveying course. The final in that series of meetings was between the LSAJ and Dr. Alfred Sangster the then Principal of CAST, to first establish residency for the course at CAST, form an advisory committee and then design a curriculum..
Two (2) programmes were offered. Firstly, a three (3) year Diploma programme for students with the potential to become professional surveyors and secondly a two (2) year certificate course, which prepares students to become competent Land Surveying Technicians. Technicians graduating with a merit certificate or an otherwise good pass along with two (2) years working experience were allowed to matriculate into the Diploma programme.

3.1 The Undergraduate Degree

During the 1980's' the LSAJ was again busy holding meetings, this time in an effort to have the Diploma Programme upgraded to a B.Sc. degree. While on a visit to the region, the then President of the Commonwealth Association of Surveyors and Land Economists (CASLE) Mr. Robert Steele, met with the Presidents of the local constituent bodies of CASLE i.e. Land Surveyors, Quantity Surveyors and Land Economists as well as The Minister of Housing – The Hon. Bruce Golding. The LSAJ was represented by Donald J. Marks who indicated to Mr. Steele that his association would be looking forward to CASLE for assistance with lecturers for the proposed Land Surveying Degree.

Although the College had been granting bachelors degrees since 1988 and obtained University status in 1995, it was not until September 2002 that the first set of undergraduate students to pursue our B.Sc. in Surveying and Geographic Information Sciences were admitted. Although some twenty-five (25) students have so far qualified for this degree by way of taking additional credits having been previously awarded a Diploma, it will not be until May 2006 when our first set of full – time students complete the course. Below is the Programme outline for the Undergraduate Degree.

Year 1

(SGISFT)

Codes	Semester 1	Credits	Codes	Semester 2	Credits
COM 1001	Fundamentals to Communication	2	COM 1002	Oral Communication	2
MAT 1022	Land Surveying Mathematics I	3	SGI 1010	Intro. to CADD for Land Surveyors	2
PHS 1009	Physics	4	MAT 1023	Land Surveying Mathematics II	3
SGI 1002	Elementary Cartography	3	SGI 1004	Environmental Geography	3
SGI 1001	Plane Surveying	4	SGI 1003	Plane Surveying II	4
SOC 1001	Introductory to Sociology	3		**Total**	**14**
INT 1001	Information Technology	3		**Post-Semester 2**	
CSP 1001	CSP	1	SGI 1005	Surveying Practicum I	3
	Total	**23**		**Total**	**17**

Year 2

(SGISFT)

Codes	Semester 1	Credits	Codes	Semester 2	Credits
COM 2001	Advanced Communication	2	LAW 2003	Land Law I	3
SGI 2001	Computer Applns in Surveying I	2	MAT 2038	Surveying in Mathematics IV	2
SGI 2002	Geodetic Surveying	4	SGI 2007	Computer Applications in Surveying II	2
SGI 2003	Surveying Adjustments	2	SGI 2008	Electronic Surveying Instrumentation	3
SGI 2004	Digital Cartography	3	SGI 2009	Photogrammetry I	3
MAT 2028	Land Surveying Mathematics III	3	SGI 2010	Engineering Surveying I	3
	Total	**16**	SGI 2002	Business Communication	2
				Total	**18**
				Post Semester 2	
			SGI 2006	Surveying Practicum II	2
				Total	**20**

Year 3

(SGISFT)

Codes	Semester 1	Credits	Codes	Semester 2	Credits
SGI 3006	Land Admin.and Registration	3	SGI 3001	Land Econ.and Introduction to Valuation	2
SGI 3003	Planning	3	SGI 3007	Engineering Surveying II	3
SGI 3004	Photogrammetry II	3	SGI 3008	GPS Satellite Surveying I	3
SGI 3005	Geodesy	3	SGI 3009	Hydrographic Research	2
LAW 3007	Land Law II	3	RES 3001	Research Methodologies	3
	**Electives I (University)	3	SGI 3011	Land and Geog.Info. Systems I	3

	Total	**18**		**Total**	**16**
				Post- Semester 2	
	** Students select 3 credits		SGI 3010	Surveying Practicum III	3
	from any faculty			**Total**	**19**

Year 4
(SGISFT)

Codes	**Semester 1**	**Credits**	**Codes**	**Semester 2**	**Credits**
SGI 4002	Satellite Remote Sensing	2	SGI 4022	Land Development	3
SGI 4003	GPS Satellite Surveying II	2	SGI 4005	Cadastral Surveying	5
MAN 4019	Principles of Business	3	SGI 4017	Prof.Prac.-The Surveyor & Society (Practical)	1
MAN 4007	Business & Project Management	3	SGI 4019	Prof.Prac.-The Surveyor & Society (Theory)	2
SGI 4004	Land and Geog.Info.Systems II	3		School Electives	3
	Electives II (University)	3	PRJ 4004	Research Project	3
	Total	**16**		**Total**	**17**

3.2 Entry Requirements

Entry to year 1 of the B.Sc. programme requires a minimum of two(2) subjects at the General Certificate Examination (GCE) Advanced Level or the Caribbean Examination Council's (CXC) Advanced Proficiency Examination. These would be drawn from among Mathematics, Physics, Geography, Computer Science and Technical Drawing. A one year Preliminary Course of Study (PCS) in Advanced Mathematics, Physics and Geography is available for Ordinary level subjects holders, who must pass this course with a minimum Grade Point Average (GPA) of 2.30 to be admitted into the degree programme. Certificate graduates with a minimum GPA of 2.70 may also be admitted.

The Diploma programme realized a steady inflow of upwards of twenty (20) students per year for the first six (6) or so years, after which, owing to a fall off in the number of applicants and resource constraints, a maximum of fifteen (15) students have been admitted each year. The programme continues to enjoy, albiet substantially reduced, support in interms of entrants from the wider Caribbean. The following table shows the intake of students since the commencement of the courses

Year	4 Year Degree	3 Year Diploma	2 Year Certificate
1973		25	
1974		24	23
1975		28	27
1976		25	24
1977		22	n/a
1978		23	26
1979		22	24
1980		16	14
1981		10	11
1982		24	22

1983		n/a	16
1984		12	12
1985		9	n/a
1986		12	6
1987		7	n/a
1988		9	n/a
1989		8	8
1990		19	6
1991		8	8
1992		16	6
1993		15	11
1994		16	8
1995		15	13
1996		8	13
1997		17	13
1998		16	13
1999		17	11
2000		11	10
2001		-	8
2002		8*	12
2003	16	12*	14
2004	5	6*	6
2005	4	14*	15
Total	**25**	**474**	**380**

Table 1 – Student intake
(n/a denotes not available, * denotes B.Sc. entrants)

3.3 The Curriculum

In recognition of current trends and so as to appeal to a wider cross-section of high school graduates, (the intension being to increase our intake), we have included six (6) Credits of Geographic Information Systems (GIS) to provide a better and more appealing balance of the course contents. The programme maintains its flavor as a strong Surveying and Mapping Degree, but offers courses in GIS in two (2) components, sufficient enough for graduates to be functional in the GIS industry as well as providing a foundation for further studies in GIS Courses such as Physics retains its relevance in a programme such as this, principally because of the advances in the technology that make up surveying instrumentation. This course lays the foundation for a sound knowledge of the design, construction and operation of these instruments. This is critical to the full understanding of their uses and performance, if the effect of the errors they produce are to be well understood, guarded against, if not modeled, for elimination from our observations.

As was the case in the Diploma programme, all branches of Surveying are covered, albeit with greater depth. The University has a good policy of requiring a minimum of 30 % of the courses to be General Education. This is to ensure that our graduates are more rounded individuals and not just narrowly focussed along the lines of Surveying, Mapping and Measurement Science.

Global Positioning Systems (GPS) Satellite Surveying is also another addition to what was the Diploma curriculum. Our students have the luxury of receiving training on two (2) leading manufacturers systems – Trimble and Thales, the former having made an invaluable donation of a pair of geodetic class GPS receivers.

In addition to the numerous surveying practical exercises to which students are exposed on campus, during the first three (3) years, the students are taken off campus to carryout surveys. In the case of the first year, they camp in the selected locality for the surveys, which for most of the times has been Negril, a world renowned tourist mecca which boast seven (7) miles of white sand beaches and numerous hotels. These practicum includes a Cadastral and Topographic Survey, Route Surveying, Benchmark Leveling and a Control Traverse – first year; Triangulation, Resection and Intersection – second year; GPS Control, Topographic Surveying, Hydrographic Surveying and Aerial Photo Control – third year.

3.4 Course Management

The CAST courses were first headed by an English expatriate Mr. George Russell Brimacombe who was seconded from the Survey Department. He was aided by part-time staff, experienced in related fields. As the student body grew, more staff was recruited from the United Kingdom and they formed the nucleus for the first few years.

These expatriates were employed on contract terms; hence there was a rapid turn over of staff every two years. The need for local staff had always been recognized and so a programme of sending two to three diploma graduates away for further training had been instituted. It was envisaged that on qualifying overseas these individuals would return to the College in teaching positions. This has proven to be the main source of recruitment for staff to date.

Mr. Brimacombe was the course leader for eight (8) years. He helped to establish the courses and had been the main link in the transition from expatriate to local staff. With the expiration of his contract in 1981, he was replaced by Mr. Anthony George Allison, himself a product of the diploma course at CAST, as well as training at the Mona School and also at the North East London Polytechnic. By that time he was also Commissioned as a Land Surveyor.

He was advised by a Technical Co-operation Officer (T.C.O.) supported by the British Government for a period of time to enable a smooth changeover in the administering of the survey programmes from the previous course leader.

In addition to the course leader and the T.C.O., there where five (5) other lecturers, two of whom had received training overseas.

The courses were also supported by full-time staff from other departments within the institution, as well as part-time staff from industry.

Since then, the courses are being managed and taught by locals only, all of whom are graduates of the Diploma programme and received academic degrees overseas. There are a total of seven (7) full-time members of staff, one of whom recently obtained a Ph.D. in Remote Sensing. Two (2) senior lecturers are Commissioned Land Surveyors. The staff is also supported by part-time staff (including Commissioned Land Surveyors) from industry. The courses also have the benefit of an administrative assistant who performs all the secretarial duties. She is also assisted by work and earn students form the University.

Currently the greatest area of need is that of staffing. We are making efforts to recruit highly qualified staff to assist with the upper level (third and fourth year) courses as well as research activities. Since the programme is semesterized we recognize that we may be able to engage such persons on a semester basis rather than in a full-time capacity all year. This would allow for the kind of flexibility that would facilitate persons looking for a place to do their sabbatical or just to experience another culture on a short term basis.

4. EXTERNAL SUPPORT

In running the courses, the College worked in collaboration with the Survey Department, the Ministry of Construction, the Land Surveyors Association of Jamaica, and the then Jamaica Association of Land Surveying Technicians.

The College had also established strong links with North East London Polytechnic. This institution provided assistance in terms of advice, visiting lecturers and opportunities for further training.

Currently, the University receives support from a local GPS/GIS company – Spatial Innovision Ltd. in the form of equipment, software and teaching/training. The professional body is also very supportive of the programmes as they have in the past donated computers. Each year a group of members of the LSAJ participate in the evaluation of the students' practicum work. LSAJ members always avail themselves for supervision and guest lectures in the areas of Professional Practice and Cadastral Surveying.

5. FACILITIES

The Surveying and Geographic Information Sciences division utilizes the facilities offered by the School of Building and Land Management, the School of Computing and the School of Health and Applied Science's Mathematics and Physics Departments. In addition, there is a Geomatics laboratory, a cartographic stores, a surveying equipment stores and a collection of books in the Faculty's library. Here the books available are limited to the various branches of surveying. Books are issued on loan to students for short intervals of approximately 2 – 3 days. Recently this library benefited from a generous donation of books from retired Commissioned Land Surveyors Cecil Phillips and Trevor Carnegie.

6. EQUIPMENT

There is a variety of equipment available in the survey stores. These include Global Positioning System receivers, Total Stations, Electromagnetic Distance Measuring equipment, a range of optical theodolites and levels, a subtense bar, observing targets and the usual pieces of auxiliary equipment.

7. Library

There are a number of books on the various surveying disciplines and other allied subjects in the University's main library. These books are available on short term loan to all University students and lecturers.

8. TEACHING AIDS

Teaching aids available to the lecturers include:

1. Overhead projectors
2. Lap Tops and Multimedia
3. Surveying Equipment
4. Aerial Photography and Satellite Imagery
5. Field visits
6. Practicums

9. OUR GRADUATES

Out of a total of 474 students admitted into the Diploma programme, 234 have recieved diplomas, twenty (20) of which have been so far successful in the Bachelors Degree Post Diploma course. About 50 graduates have gone on to become Commissioned Land Surveyors. This represents some 70 % of the Surveyors practicing in Jamaica today. Whilst other graduates have opted for other fields there are others either on attachment and being prepared to sit the Land Surveyors Board Examination. There are also those who opt not to take the professional examinations, but to continue working at the assistant surveyor level.
The vast majority of surveyors in Jamaica, operate in private practice where the main area of activity is in Cadastral Surveys with Topographic and Engineering Surveys following in that order.

All except one (1) of the nine (9) council members of the LSAJ are CAST graduates. Three (3) graduates have already served three (3) year terms as President of that association.

The Table 2 below sets out the numbers graduated per year

Year	4 Year Degree	3 Year Diploma	2 Year Certificate
1976		8	18
1977		11	n/a
1978		11	38

1979		14	n/a
1980		6	15
1981		9	11
1982		8	5
1983		13	4
1984		1	2
1985		4	5
1986		5	5
1987		4	2
1988		8	3
1989		9	4
1990		2	10
1991		9	6
1992		3	0
1993		14	7
1994		5	1
1995		7	3
1996		4	3
1997		7	3
1998		8	10
1999		14	9
2000		8	8
2001		8	4
2002		14	7
2003		10	5
2004		7	3
2005	20	3	9
Total	**20**	**234**	**200**

Table 2 Graduates per Year
(n/a denotes not available)

10. THE WAY FORWARD

As the programme gets ready to turn out its first set of full-time Bachelors graduates, foremost on the agenda is the issue of accreditation. This will be sought from The University Council of Jamaica and The Royal Institution of Chartered Surveyors.

The resources adopted from the Diploma Programme must continually be strengthened. So far the inventory of equipment has received a boost through the acquisition of new Total Stations and Global Positioning System (GPS) equipment. The fifteen (15) stations Geomatics Laboratory is being steadily replenished with new computers, the staff room accommodation is now inadequate. The academic staff complement needs to be strengthened, if more research, generation of teaching material and facilitating accreditation is to be realized. The programme also needs more aggressive marketing.

The Land Surveying Technicians programme is soon to be upgraded to an Associate degree. This will be pursued vigorously, with a view to timely implementation so as to guarantee for our graduates at this level an acceptable level of recognition within both the regional and wider global community.

10. CONCLUSION

Every effort must now be made to move swiftly and build on the already hard work that has been invested in this programme, if UTech is to maintain its place as a leader in educating and training surveyors. There is always a high demand for our graduates within the Caribbean region. They can be found as far as Bermuda through to the Cayman Islands, British Virgin Islands, Jamaica, Antigua, Montserrat, St. Kitts and Dominica. Yet they hold influential positions in North America, Canada, United Kingdom and other parts of the world. As we have every intension to preserve and build on this legacy, we are committed to the process of constantly re-evaluating our programmes so that the necessary adjustments can be made that will ensure that the high standards our students and their employers have come to expect are never compromised.

REFERENCES

1. College of Arts Science and Technology, The History and growth of CAST, 1980.
2. Wilson, E. H. D., 1972, Education for the Jamaican Land Surveyor, The Jamaican Surveyor, The Journal of the Land Surveyors Association of Jamaica, Volume I

BIOGRAPHICAL NOTES

Academic: B.Sc. Surveying and Mapping North East London Polytechnic, M.Eng.Sc. Geomatic Engineering University of New South Wales.

Professional: Commissioned Land Surveyor

Practical Experience: Cadastral and Topographic Surveying and Mapping, Datum Transformation Parameters (JAD69 to WGS84) determination

Current Position: Senior Lecturer Geodetic, Engineering and GNSS Surveying

Publication: GPS Coordinates Transformation Parameters for Jamaica" URISA Regional Conference – September 2001, Rose Hall, Montego Bay, Jamaica

Membership in Societies: Immediate Past President Land Surveyors Association of Jamaica FIG Commission 5 delegate 1998 -

CONTACTS

Mr. Glendon Newsome
The University of Technology, West Indies
237 Old Hope Road
Kingston 6, St. Andrew
JAMAICA W.I.
Tel. + 1 876 927 1613
Fax + 1 876 702 4965
Email: gnewsome@utech.edu.jm
Web site: www.utechjamaica.edu.jm