Fifty Years of Geomatics Education: The University of Technology, Jamaica

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Key words: Curricula, Education, Geoinformation, History, Professional Practice, Young Surveyor

1. SUMMARY

The University of Technology, Jamaica, recently celebrated sixty-five (65) years as a tertiary institution, which started as a college in 1958 and earned University status in 1995. Coinciding with the University's 65th celebrations, in 2023, the Land Surveying & Geographic Information Sciences (GIS) course of study, ticked off its 50th year of existence, starting as a three (3) year diploma programme in 1973 and transitioning to a four (4) year Bachelor's Degree in 2002. As this is a significant milestone, this paper will reflect on the achievements of the course of study, drawing on the results of a mixed methodology research on the status of recent graduates, who are Young Surveyors in their own right, but have not yet achieved legal professional status.. The paper will reflect on the overall accomplishments of the course of study, in terms of its output of graduates and the disciplines and positions of influence within which they are employed. The paper will also highlight the geographic spread of our graduates or young surveyors and their level of job satisfaction. Readers will also get an overview of the course of study, some of the strengths, weaknesses, opportunities and threats faced in its delivery, as well as an insight into efforts being made towards the modernization of the programme. The areas of improvement for both the course of study and industry, as proposed by our graduates, will also feature in the study.

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2. INTRODUCTION

Geomatics education involves the delivery of courses of study that encompass the science and application of geomatics. This environmental-based field involves the mastery of approaches to collecting, analysing, interpreting, and presenting data related to various phenomena associated with the Earth's surface.

Geomatics education, at both undergraduate and graduate levels, encompasses various fields of study, including but not limited to: land surveying; mapping; geographic information sciences; analysis of geospatial data; remote sensing; cartography; and land information management systems. Its goal is to equip students with the necessary competencies, knowledge, skills, and abilities to collect and manage geospatial data; analyse and interpret spatial information; display and communicate geographic data; and apply modern geospatial technologies to solve real-world problems in fields such as: urban planning and development; environmental resource management and monitoring; transportation; civil infrastructure; emergency response; climate change and disaster risk management.

It is a very important area of study as it has numerous applications, some of which impact safety of life, for example: Disaster Response and Recovery; Climate Change Adaption & Mitigation; Infrastructure Development/Environmental Management; Location-Based Services for Ambulances, Police and Fire Services; as well as Smart City Initiatives.

At the University of Technology, Jamaica (UTech,Ja.), we offer an undergraduate degree in Land Surveying & Geographic Information Sciences (LSGIS), as well as a specialization in Geomatics/Geoinformatics, as part of our Master of Science in the Built Environment. The University is a public university located in Kingston, Jamaica and is regarded as the national Science, Technology, Engineering and Mathematics (STEM) University.

The university was established in 1958, when it was originally founded as the College of Arts, Science and Technology (CAST). University status was gained in 1995. The institution offers over one hundred (100) undergraduate and graduate degrees in various fields, including engineering, science, information technology, business, healthcare, mathematics, hospitality, law and the arts. In 1973, after intense lobbying of the government and CAST by the Land Surveyors Association of Jamaica (LSAJ), a Diploma in Land Surveying saw its first intake of twenty-five (25) students and in 1974, twenty-three (23) students were admitted into a Certificate program for Land Surveying Technicians. The LSAJ continued to work closely with the University in the delivery of the courses of study and thirty (30) years after the

commencement of the Diploma course, the Bachelor of Science degree was rolled out in 2003. (Newsome 2006).

Through its School of Graduate Studies, Research and Entrepreneurship, the University has a strong focus on research and innovation, with an emphasis on solving local and regional problems. The University benefits from very strong industry partnerships, both in the delivery of its courses of study, as well as support for its co-operative education programme, were students are engaged in short internships to boost the university's mandate of producing practically oriented, work-ready graduates.

The University boasts a diverse student population of approximately 12,000, from various parts of the Caribbean and spread across eight (8) colleges/faculties. Within these

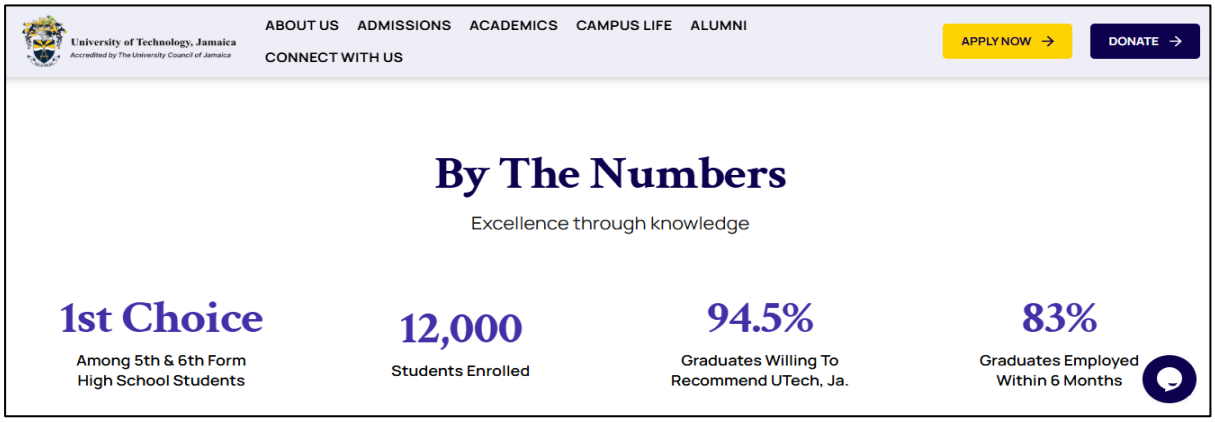

Figure 1: The UTech, Ja numbers (
Source: https://www.utech.edu.jm/ accessed October 26, 2025

Total Enrollments by Faculty	Academic Years				
Faculty	**2020/1**	**2021/2**	**2022/3**	**2023/4**	**2024/5**
COBM	4,520	4,481	4,354	4,194	4,391
COHS	1,701	1,710	1,717	1,662	1,606
COPHS	669	655	633	622	661
FELS	906	774	674	583	580
FENC	2,630	2,747	2,850	2,953	3,398
FOBE	979	973	988	981	1,004
FOLW	195	162	163	179	216
FOSS	451	419	404	335	321
Grand Total	**12,051**	**11,921**	**11,783**	**11,509**	**12,177**

Figure 2: Student numbers by Colleges/Faculties
Source: https://www.utech.edu.jm/intranet accessed July 25, 2025

colleges/faculties are eighteen (18) Schools, spread across ten (10) locations as well as online. All graduate programs are delivered online. Undergraduate programs are delivered by the face-to-face and hybrid modalities. The University is accredited by the University Council of Jamaica and is recognized by regional and international bodies. In addition to enjoying the benefits of our institutional accreditation, some courses of study also boast program accreditation from both local and international professional organizations. The students are encouraged to be involved in community outreach and engagement, through a mandatory work and study programme, where voluntary service is rendered in social and community organizations, thereby contributing to Jamaica's development and at the same time cultivating a spirit of volunteerism and community support.

The Philosophy of the University is "*We integrate strong academics with practical, experiential learning. We are a STEM – science, technology, engineering, and math focused institution. We aim to foster a dynamic research environment. We produce work-ready future proof graduates. We cultivate an entrepreneurial mindset among our students. We are committed to the total education of the individual. We empower students to become lifelong learners. The vision of the university is and mission: UTech, Ja. aims to be a leading university in the Caribbean, fostering innovation, entrepreneurship, and academic excellence",* while its Mission is to" *To positively impact Jamaica, the wider Caribbean and elsewhere through high quality learning opportunities, research and value added solutions to government, industry and communities*" and Vision2025 is *"We are the premier University in the Caribbean for work-ready leaders, committed to transforming students and society through high quality teaching, research and value added services".*

The purpose of this paper is to reflect on the achievements of the course of study and the status of recent graduates, who are Young Surveyors in their own right, but have not yet achieved legal professional status. The paper will reflect on the overall accomplishments of the course of study, in terms of its output of graduates and the disciplines and positions of influence within which they are employed. In general the paper will highlight contribution of the course of study to the local and regional land surveying & geographic information science communities and industries, through its very diverse curriculum, while also providing an overview of the course of study, looking at some of the strengths, weaknesses, opportunities and threats faced in its delivery, as well as an insight into efforts being made towards the modernization of the programme. The areas of improvement for both the course of study and industry, as proposed by our graduates, will also feature in a mixed methodology study.

3. OVERVIEW OF GEOMATICS EDUCATION GLOBALLY

In their research leading to the development of a Global Inventory on Academic Education in Land Surveying/Geomatics, (Casanova, Todorovski, & Collado, 2024), it was determined that courses of study exists in 37 countries around the world. The objectives of the study was: to gain more knowledge and a better understanding of Land Surveying/Geomatics disciplines

worldwide; to analyse the learning contents of the various curriculums and other academic issues; and to strengthen FIG's professional and academic networks. The study was conducted by way of an online survey of faculty members around the world. The results indicate that most (30%) of the courses of study go by the name Geomatics Education, 20% use the name Land Surveying and about 27% are named Geoinformatics. The courses of study ranged between less than 3 years (1.4%) to more that 5 years (9.9%). 38% of the courses of study lasts for 5 years, while 35.2% are for 4 years and 15.5% are 3 years in duration. Land Surveying Methods; Geodesy and Map Projections; Cartography; Cadastre; Land Administration and Management; 3D Surveys (LiDAR/SONAR); 3D Modelling; Geography and Geoinformation; Geoinformation Processing (Programming); GIS and Databases and Geospatial Analysis/Geostatistics, commands the highest levels of relevance in the syllabi of the courses of study. The participants (86) to the study indicated that they have a low number of students (44%), compared to those (46%) who have an adequate and satisfactory number students, with 10% having an excessive number of students.

The extent to which the student numbers were dwindling in the Bachelor of Surveying and Geoinformatics at the University of South Australia (UniSA), that course of study was discontinued in 2006 (Nietschke, Corcoran, Bruce, & Allen, 2016). However, in 2010, through the instrumentality of the Surveyors Board of South Australia (SBSA), and in collaboration with the University of South Australia, and the kind support of the industry, in development, delivery and direction, a Master of Surveying commenced. The two years long course of study, is the final step in that jurisdiction's pathway towards two years of professional training, before becoming qualified for a licence to practice land surveying.

Faced with a declining number of Geomatics students at the undergraduate level, the Spatial Information Sciences Group at the at the Dublin Institute of Technology, Ireland, developed a MSc in Geospatial Engineering, aimed at preparing innovative graduates, armed with specialised skills and deep knowledge, to be highly competent producers, managers and users of geospatial data (Martin, Mooney, & McGovern, 2014). At the Czech Technical University in Prague, master degree courses in geodesy, geodetic surveying and cartography were a feature among their offerings, before they developed a new program called "Geoinformatics", which was to place emphasis on the collection, analysis and exploitation of land related data (Cepek, 2005). The course have since progressed to include GIS, 3D Laser Scanning and programming. Having taking note that, especially in developed counties, interest in traditional surveying is deceasing and many courses of study are closing down or have reduced capacity, coupled with the FIG's recognition of changing priorities in the land surveying profession, from measurements and computations to land administration, ITC in Enschede, The Netherlands opened the first University of Land Administration in 2007 (Osskó, 2009).

Low student enrolment was one of the six triggers for the review of the BSc Geomatics at the University of Cape Town in South Africa (Hull, et al., 2024), which saw the renaming of the

degree to Geospatial Science and Surveying, with two streams: Geospatial Surveying and Geospatial Data Science, both sharing a common first and second year. The Universiti Teknologi Malaysia boasts four (4) undergraduate degree programs: Bachelor of Engineering (Geomatic); Bachelor of Science (Geoinformatics); Bachelor of Science (Property Management); and Bachelor of Science (Land Administration and Development), as well as a suite of MSc and PhD degrees, which provide for advanced studies in inter alia, the specializations from the undergraduate level. Professional courses of study are also offered in Hydrography (Othman R. , Omar, Mardi, & Din, 2014)

The University of New South Wales in Australia, continues to maintain some of the traditional surveying techniques (digital levelling, resection, leapfrog EDM height traversing, EDM distance measurement), so that students can appreciate factors which contribute to high precision distance measurement (Roberts, 2022). GNSS Rapid Static and RTK techniques have replaced long line EDM baseline measurement. Not too dissimilar, is the Land Surveying & Geographic Information Sciences course of study at the University of Technology, Jamaica, where traditional surveying modules feature prominently. Modules such as Plane Surveying, Geodetic Surveying, Cartography, Engineering Surveying, Topographical Surveying, Electronic Surveying Instrumentation, Photogrammetry, Hydrographic Surveying, Cadastral Surveying, form the core of the course of study, and delivered around conventional data capture techniques, while at the same time incorporating contemporary approaches, such as satellite surveying, unmanned aerial vehicles and GIS (University of Technology, 2025).

4. GEOMATICS EDUCATION IN JAMAICA

After 50 years of delivery, we pause to reflect on our journey, as we contemplate yet another iteration of the programme, in an effort to keep the programme relevant and remain on the cutting edge of modern geomatics education. On reflection, we acknowledge our strengths, weaknesses/challenges, opportunities and threats.

Strengths:

- The programme is tailored for the land surveying industry across the Caribbean, whereby it satisfies the needs of prospective licensed surveyors, who are required to have an undergraduate degree, before being eligible to take their professional examinations, hence a guaranteed market for students.
- The delivery is grounded in traditional techniques, thereby providing students with a deeper understanding of the principles of surveying, before taking them on the path of modernization.
- The programme offers a sufficient number of credits in Geographic Information Science (GIS) to make graduates very proficient in this field, to the extent that many progress to become GIS professionals.
- Strong linkages of staff with industry, some serve on professional association executive committees and as President.

— The practical orientation and problem solving nature of the course of study, producing work-ready graduates.
— A very committed and dedicated cadre of staff, who often make great sacrifices to create the best out of the limited resources available, to the extent that they on occasions, utilise their own resources.

Weaknesses/Challenges:
— Cost of delivering the programme, given the high cost of equipment.
— Shortage of modern equipment to support delivery.
— Less than adequate computer laboratories.
— Limited staff with terminal degrees
— Limited budgetary support

Opportunities:
— Our graduates continue to be of a high demand, both in the public and private sectors, as migration of graduates to developed countries is also high.
— A number of industry sectors rely on geomatics expertise
— Many of our graduates who are now in influential positions in their respective territories, continue to send students to enrol on the programme. This also includes former students who send their children to take the course of study.
— A very supportive Land Surveyors Association of Jamaica. Members contribute equipment and assist our students with cooperative education.

Threats:
— Cost of tuition
— Low intake of students
— Aging University infrastructure
— Limited Government subvention and resources

The Bachelor of Science course of study has produced 524 graduates, while the Associate Degree programme graduated 300 students after 50 years of existence. Out intake is drawn from several territories across the Caribbean – Antigua & Barbuda, Anguilla, Bahamas, Barbadoes, Belize, British Virgin Islands, Cayman Islands, Dominica, Grenada, Jamaica, Montserrat, St. Kitts & Nevis, St. Lucia, St. Vincent & the Grenadines, Trinidad & Tobago and the Turks & Caicos Islands. Our graduates can be found in many parts of the world, from Botswana to Dubai, Europe, The Americas and the Caribbean. While the majority stick to core disciplines of Land Surveying (Cadastral), firstly and Geographic Information Sciences, secondly, graduates are also excelling in Engineering Surveying, Hydrography, Photogrammetry and Remote Sensing. Yet, there are many others who have used the foundation laid by this course

of study, to pivot into other fields, including Civil Engineering. Graduation numbers have fluctuated over the years, dipping to a low of six (6) in 2019. Notwithstanding, the University has kept faith in the programme and so unlike other Universities, has not culled the course of study. Instead, the matriculation requirements have been relaxed, with a more stringent student selection process to be implemented.

5. CONSIDERATIONS FOR COURSE REVISION

In order to receive feedback from our graduates, regarding their experience and alignment of the course of study with the requirements of their employment. Graduates were also asked to make suggestions for improvements.

The research took on a mixed-methods approach, whereby both quantitative and qualitative data was collected. The sampling was purposive, as a sixteen (16) questions questionnaire was sent to eighty-six (86) recent graduates (2007 -2023), in Jamaica and overseas, who would have taken the course in its current form. The questionnaire included a university approved informed consent form. Assurance was given of the anonymity and confidentiality of the research. Twenty-five (25) of the graduates completed the questionnaire.

6. FINDINGS

In response to questions posed to graduates of the course of study, the following feedback was received:

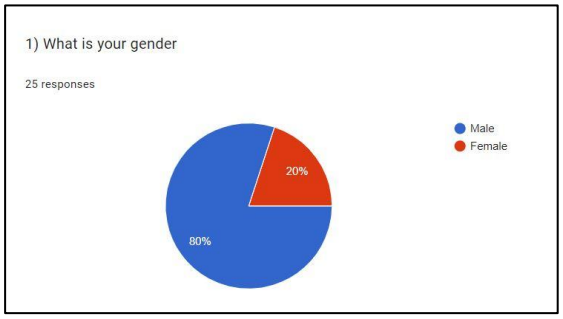

Figure 3: Participants Gender

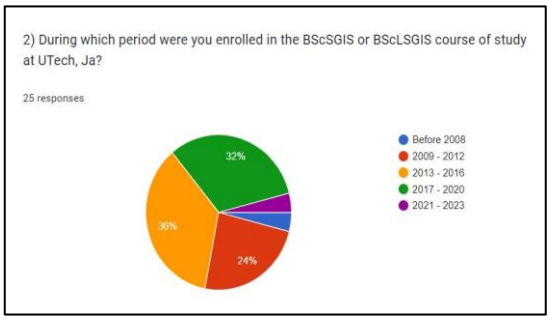

Figure 4: Participants' year of enrolment

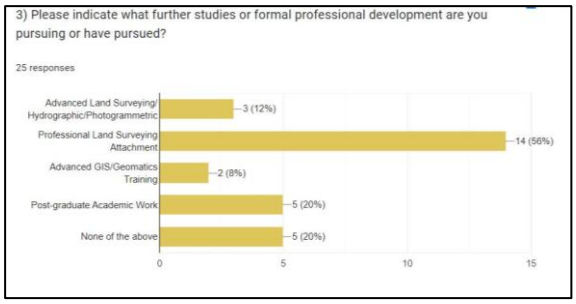

Figure 5: Post Bachelorate Studies

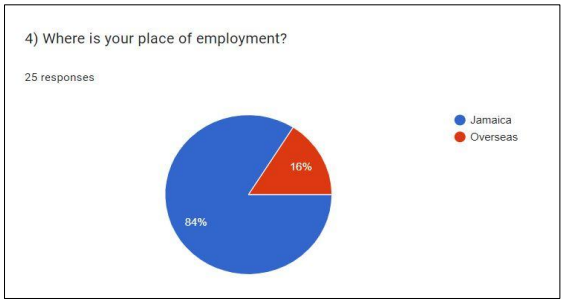

Figure 6: Place of employment

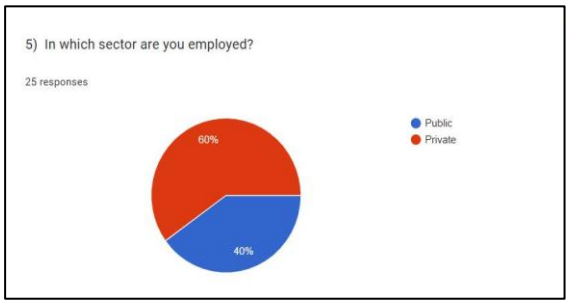

Figure 7: Sector of employment

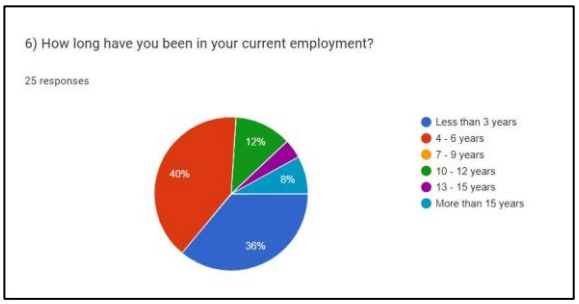

Figure 8: Period of employment

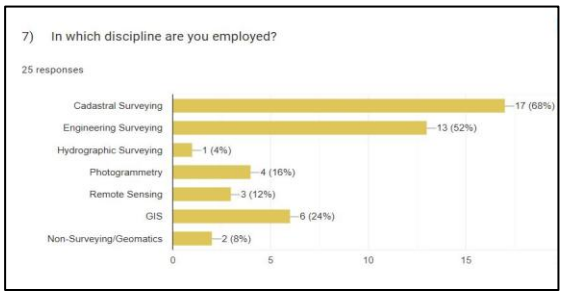

Figure 9: Discipline of employment

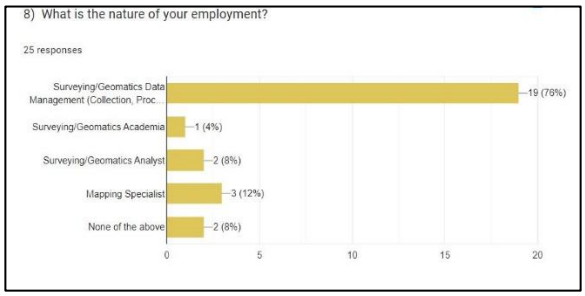

Figure 10: Nature of Employment

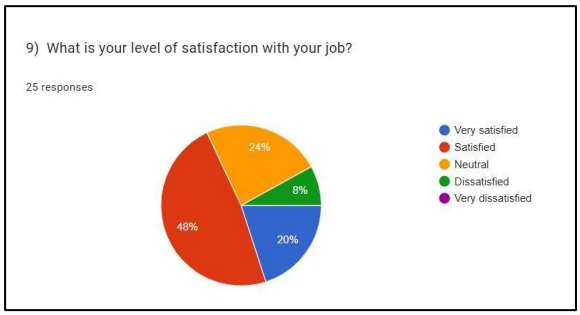

Figure 11: Job Satisfaction

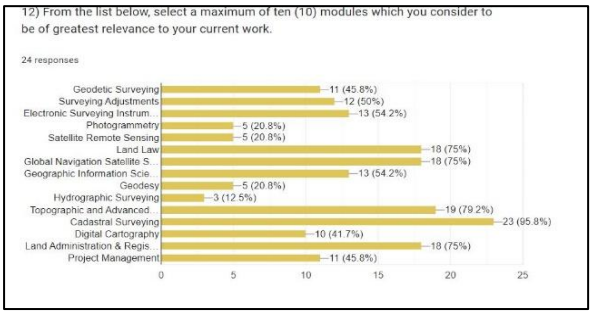

Figure 12: Course Module Significance

11) What changes or improvements would you recommend to the course curriculum, which you consider would improve your skills, to suit your current employment?

Among the changes or improvements which the participants to the study recommended are: an increase in professional practice, commencing at Level 2 (2nd Year), rather than at Level 4 (4th Year); incorporate modern surveying application to enhance understating of real-world applications; enriching the land administration module by including data analytics and statistical methods and embracing software such as R and Python and foster data sharing collaborations between state agencies and departments; include database management systems such as PostgreSQL and PostGIS; align students with industry professionals and associations which would set them on a better path upon graduation; modernise equipment inventory; increase Cadastral, Topographic & Engineering practicals; use CAD software such as MicroSurvey and Civil 3D; increase work experience across both private and public sectors; more emphasis on business management or entrepreneurship; accreditation of the project management module to partially satisfy requirements for Project Management Professional (PMP) qualification; offer online modules and more flexibility with face-to-face sessions; introduce major and minor options; access to modern geospatial software, especially for GIS; unlimited access to CADD lectures online, even after graduation; and improving the Land Law modules, to include some practical applications.

12) *What other changes or improvements would you recommend for the Course of Study?*

Other changes or improvements recommended by participants, include: adding a module on business manage for land surveyors; add content to the module Electronic Surveying Instrumentation to include guidance in servicing instruments; pursue RICS accreditation; add AI, Deep Learning and Google Earth Engine for Remote Sensing; broaden the scope of ArcGIS; increase instrument training and facilitate summer internships; teach Civil 3D at Level 1 and not just basic CADD; incorporate surveyors of high integrity and knowledge to share experience in strata, subdivisions, site surveying and drone surveys; spend more time on laws that affect the practice of surveying; add business administration and finance; create a survey

school similar to Norman Manley Law School, to replace the attachment process and make it available to graduates from other jurisdictions; professional practice for GIS Major; perge the course of study of unnecessary modules to reduce students' workload; and increase practical sessions.

13) What changes would you recommend to your employer to improve your current conditions of employment?

Participants put forward the following recommendations for their employers, that could improve their current conditions of employment: better financial management; allow for an open door policy, allowing staff to express themselves without fear of reprimand; offer guidance to student surveyors in furtherance of their professional pursuits; inproved salary and health insurance; doing more with data, more data analysis, creating more data driven solutions for clients; more investment in surveying equipment and hire more staff; diversify the practice; improve technical infrastructure to facilitate growth; improved professionalism, open evaluation sessions for development; a healthier workplace culture to include employment recognition, open communication; career advancement opportunities; and more in-field protection.

14) In what ways do you think the Land Surveyors Association of Jamaica can assist in your career development?

The following suggestions were made for the Land Surveyors Association of Jamaica to assist in graduates' career development: establish a sub-sector for student surveyors; host conferences and workshops, example skills training with modern instrumentation; encourage all surveyors who employ students to obtain the "Approved Surveyor" status; constitute a cadre/panel of surveyors to whom graduates can direct questions; develop a structured mentorship programme for student surveyors, generally, outside of principal/student relationship; more clarity on the Land Surveyors Board Examination process; audit approved surveyors, thereby maintaining ethical standards and best practices; lobby for improved compensation for associate members; use an online magazine/newsletter to share field experiences; create sub-groups within LSAJ for GIS, Planning, etc.; and an acknowledgement that seminars and meetings are being of assistance in their development.

15) In what ways do you think that your place of employment can assist in your career development?

Participants opined that continued learning/development, as well as providing more exposure to those areas of the practice that are prerequisite to making a student surveyor become not just a surveyor, but a better surveyor.

7. DISCUSSION

The course of study continues to attract a high number of females. Many admit that they joined the course of study for the GIS offering, but developed a love for surveying and go on to offer themselves for employment in that discipline. The majority of female participants in the study are employed in GIS. It is noteworthy that nine (9) of the fifteen graduates in 2024 are females. It is noticeable that most of these graduates are employed in Land Surveying jobs. By far, the majority of our students who pursue studies beyond the undergraduate level, embark on the pathway to becoming Commissioned/Professional/Licensed Land Surveyors, with those pursuing academic work trailing second. Most of the participants to the study work in Jamaica, although this is unlikely to be indicative of the full population of graduates, as there is a high level of migration of Jamaican citizens. In fact, many are Professional Land Surveyors or hold senior positions in Land Surveying or GIS, in other countries, with the majority working in the private sector. More than 75% of our graduates who participated in the study, have been at their current place of employment for up to 6 years, while less than 25% are in their current employment for in excess of 10 years, with a third of those remaining for more than 15 years. The majority of our graduates work in the disciplines of Cadastral and Engineering Surveying and are mainly involved in data management (collection, processing, storage & retrieval). A minority of our graduates seems to be dissatisfied or very dissatisfied with their jobs, although some express a desire for improved compensation and health insurance packages.

The course of study is currently under review, having last being revised in 2019. Close attention will be paid to those modules which participants consider to be of greatest relevance to their work (Figure 12). The land surveying modules, in particular cadastral, continue to be most relevant for most graduates. Not surprizing, considering that most of our graduates aspire to become Commissioned/Professional/Licensed Land Surveyors. There are currently 120 Commissioned Land Surveyors in Jamaica, more than 100 are graduates of the programme, nine (9) of which are females. Although Jamaica is an archipelagic state, and although small, has a reasonable scope for hydrographic surveying. But outside of a small unit of hydrographers (6 - 8), at various levels, at the National Land Agency, only two or three private practitioners offer hydrographic services and employ graduates in that discipline.

Participants to the study are calling for more professional practice/internship and cadastral/topographic/engineering surveying practical sessions. In a programme which has a necessarily strong academic focus, it is almost impossible to increase any of these components. Although desirable, as students would benefit from greater exposure, this would have the effect of increasing the course of study credits and therefore cost of tuition. Part of the focus in the new dispensation, is to reduce the total credits from 138 to a figure closer to the recommended 120 credits. One of the strategies to be employed in helping to reduce the credit burden to students, is to introduce two pathways – Geomatics and Geoinformatics, after Level 2 of the course of study. Our experience is that many of our students enjoy the luxury of studying both Land Surveying and GIS, to a high proficiency level, in one course of study. However, the course of study credits is high and has cost and intake implications. Introducing the two streams,

also means that on the Geoinformatics side, a higher concentration of spatial analysis tools can be implemented, while on the Geomatics side, the focus on modern mapping technologies and the study of contemporary trends in, for example, land administration, can be strengthened, in line with our participants recommendations.

Other changes or improvements recommended by our participants are likely to be given strong consideration in the course of study review process. The University will continue to work closely with the Land Surveyors Association of Jamaica and employers of our graduates and all our stakeholders across the Caribbean, in an effort to streamline those recommendations which will have the effect of enhancing our graduates' chances of becoming licensed professionals in a shorter time, post graduation.

8. CONCLUSION

The University of Technology, Jamaica, has served the professions of Land Surveying and Geographic Information Sciences, very well over the last 50 years. It has produced land surveyors, GIS professionals, hydrographers, educators, photogrammetrists, which can be found in may places around the world. Truth be told, many pivot into other areas, not related to the course of study, but the foundation received through taking this course of study, they will tell you, has prepared them well for other fields.

This study, though limited in the number of graduates responding to the questionnaire, is rich in terms of the quality of the responses and therefore provides much food for thought in the current process of restructuring and re-imaging the course of study, to make it more attractive to new entrants, improve the quality of our graduates and have better prepared candidates for professional examinations, in their chosen field, whether in Jamaica or other parts of the world.

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BIOGRAPHICAL NOTES

Glendon G. Newsome is an Associate Professor in the Faculty of the Built Environment, University of Technology, Jamaica. He holds a PhD from University of the West Indies in Surveying and Land Information. He graduated from the University of New South Wales with a M.Eng.Sc. in Geomatics Engineering and from the then North East London Polytechnic now University of East London with a B.Sc. (Hons) in Surveying & Mapping Sciences. Dr. Newsome is a member of the Royal Institution of Chartered Surveyors and is a Commissioned Land Surveyor in Jamaica. He has presented twice (2006 – Munich and 2018 – Istanbul) at the International Federation of Surveyors (FIG) Congresses, and has several other publications to his credit. Dr. Newsome also contributes to the national discourse on public issues related to the Built Environment through his national news media.

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