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Work Integrated Learning (WIL) Employer Survey in the Geomatics Programme at the Durban University of Technology

Avidesh Raghubar, Dhiren Allopi
Faculty of Engineering and the Built Environment, Department of Civil Engineering and Geomatics, Durban University of Technology, Durban, KwaZulu-Natal, South Africa

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Abstract

The Durban University of Technology (DUT) phased out the National Diploma: Surveying and the B-Tech: Surveying qualifications and introduced a new qualification, Bachelor of the Built Environment (BBE): Geomatics in January 2018. Work integrated learning (WIL) has been recognised as an integral part of the teaching and learning pedagogy within the surveying profession at a national diploma level across many of the technikons and universities of technology (UoTs) nationally, where it has become widely acknowledged as the cornerstone of student development. WIL has now been excluded from the new BBE: Geomatics qualification, which seeks to be more academically oriented. The lack of Workplace learning (WPL) could possibly result in a graduate who exhibits deficiencies in practical knowledge and work-related proficiencies when compared to the traditional technician/technologist that industry has become accustomed to.

The aim of this study was therefore to evaluate the relevance of WIL in the Geomatics programme through interactions with Surveying and Geomatics practitioners in the KwaZulu-Natal (KZN) region, to increase our understanding of industry's perspectives on WIL, and in so doing, to assist in terms of informed decision-making and best practices. Data were collected through interactions with industry practitioners within the Surveying and Geomatics fraternity. The study was conducted by employing a mixed-methods approach incorporating quantitative and qualitative methods. The quantitative method was, however, the predominant technique since it constituted a significant part of the study. The qualitative method involved analysis of employer comments from the open-ended questions on the questionnaire survey. The findings confirmed that there is significant consensus from industry regarding the importance and relevance of WIL in promoting an enriching career-focused education, and in facilitating the acquisition of discipline knowledge, practical proficiency, graduate attributes, employability skills, and core competencies that will culminate in an all-round holistically thinking graduate to meet the needs of industry and to sustain a knowledgeable, modern, and skilled workforce for the built environment.

1. Introduction and background to the study

Work integrated learning (WIL) has an emphasis on workplace learning, which encompasses a career-focussed educational strategy, and is inclusive of classroom-based and workplace-based forms of learning that are appropriate for the professional qualification. According to Sattler (2011), "the term 'work-integrated learning' is often used interchangeably with work-based learning, practice-based learning, work-related learning, vocational learning, experiential learning, co-operative education, clinical education, internship, practicum, and field education, to name but a few". Co-operative education is an integration of theoretical classroom-based education and actual practical work experience delivered in a structured manner. Some practitioners regard classroom industry-oriented projects as WIL, but purists are dismissive about this notion, as the work is not conducted in an industry-controlled setting. As such, simulation is currently not greatly favoured by some experts. The Council on Higher Education (CHE) has identified numerous advantages for students who engage in WIL, namely:

- Academic benefits, including improved general academic performance, enhancement of interdisciplinary thinking, and increased motivation to learn;
- Personal benefits, such as increased communication skills, teamwork, leadership and co-operation;
- Career benefits, such as career clarification, professional identity, increased employment opportunities, development of positive work values and ethics; and
- Skills development, including increased competence and increased technical knowledge and skills.
- (Winberg *et al*., 2011)

WIL has now been excluded in the BBE: Geomatics qualification as the programme appears to be more academically oriented. This could possibly result in a graduate who may exhibit deficiencies in practical and work-related proficiencies in contrast to the traditional survey technician/technologist that industry has become accustomed to, which may have detrimental consequences for the associated stakeholders. Table 1 illustrates the prerequisite qualifications to register with the SAGC in the specified categories. Eligible candidates require mandatory post-qualification work experience under the supervision of registered Geomatics practitioners. It is worth noting that post-qualification work experience is not actually WIL, and cannot, therefore, add direct value to the qualification since it does not bear an academic credit and is a separate component external to the qualification.

Table 1: Geomatics degree registration categories

Qualification	SAGC Registration category	NQF level	SAQA No	Remarks
BBE: Geomatics	Geomatics Technician (GTc)	Level 7	101432	Structured post-qualification work experience required for registration purposes
	Geomatics Technologist (GTg) or			
	Engineering Surveyor (Technologist) (S) or (ES)			
BBE (Honours): Geomatics	Geomatics Professional (GPr) or	Level 8	Pending	
	Professional Engineering Surveyor (PS)		Approval	
MBE: Geomatics	Geomatics Professional (GPr) or	Level 9	96844	
	Professional Engineering Surveyor (PS)			

2. Research Aim and Objectives

The aim of this study is to evaluate the relevance of WIL in the Geomatics programme at the DUT through interactions with industry practitioners within the Surveying and Geomatics fraternity in the KwaZulu-Natal region. The key objectives of the research, based on the perceptions of the industry, are as follows:

- To determine whether the absence of WIL will influence the type and quality of graduate entering the industry sector and whether they will be perceived to be lacking substantive practical knowledge, skills, and expertise to cope with the demands and expectations of industry.
- To establish whether the absence of WIL will create a vacuum of knowledgeable, technically skilled, and competent technicians/technologists in industry, thereby affecting industry productivity, workflow, output, and economic growth.
- To determine whether the absence of WIL is perceived as an inhibitor to student’s personal growth and professional development; and whether this will affect the employability skills, graduate attributes, employment opportunities, and job prospects of the graduates.

3. Brief Literature Review

3.1. WIL in the higher education sector

The role of higher education institutions (HEIs) has always been to educate and train graduates to become productive professionals who will contribute to social cohesion, economic growth, and the creation of a quality workforce through the development of relevant knowledge and skills.

International trends indicate that since classroom-based instruction alone does not generate future-fit graduates who are adequately equipped for industry, WIL and education-industry partnerships are on the increase in HEIs. The importance of WIL in the formation of the ideal graduate profile cannot be overstated. A graduate's competency profile should comprise both discipline-specific knowledge, skills, and attitudes, as well as general cognitive, behavioural, and technical abilities, attributes, and qualities (Govender and Taylor, 2015).

Kramer and Usher (2011) and Peach and Gamble (2011) (both cited in Ngwane, 2016), explained that the WIL strategy has expanded substantially in recent years and is currently used in major universities around the world with the goal of combining learning opportunities with real-world experiences in one integrated package. Universities are increasingly emphasising not only the acquisition of pure academic information, but also the development of relevant skills that can assist students in achieving success in real-world circumstances (Ngwane, 2016).

3.2. WIL at a University of Technology (UoT)

Universities of technology (UoTs) were established in the year 2003 with a specific role to play in the higher education landscape. Their primary goal is to enhance technical and vocational education and deliver “work-ready” graduates with the latest relevant skill sets and knowledge, to make a smooth transition to the employment sector. Du Pré (2009) provided an appropriate narrative of what UoTs should be focusing on. HEIs such as UoTs specialise in making knowledge useful and constitute a dynamic and appropriate higher education system for South Africa. He explained that UoTs should provide more learning opportunities for students, such as addressing student requirements to become more skilled, competent, and employable, being more employer-centric, providing continuous upgrading through short learning programmes and courses, bringing the institution into the workplace, and liaising directly with employers on a regular basis to ensure that students receive a relevant education.

4. Methodology

The study was conducted by employing a mixed-methods approach incorporating quantitative and qualitative methods. A combination of both research techniques provided a holistic and rigorous approach to achieving the aims and objectives of the study and added credibility to the findings.

The quantitative method was the predominant technique since it constituted a significant part of the study, which involved the administration of a structured closed-ended questionnaire. This method was used to quantify participants’ responses and to generalise results and findings from the sample population. A combination of the nominal, ratio, Likert, and semantic differential rating scale types were used to obtain a series of scaled responses, as well as to measure and analyse the varying degrees of opinion of the respondents towards the concepts being measured. Appropriate statistical techniques of the numerical data were conducted using *SPSS* data analysis software. The measurable data were used to fulfil the aims/objectives, and evaluate the objective data, which were subsequently presented in both tabular and graphical formats, to make recommendations based on the findings.

The qualitative method was the secondary technique since it constituted a smaller component of the study and was used in analysing the employer responses from the open-ended questions, which allowed respondents an opportunity to express their views, opinions, and experiences pertaining to WIL. The qualitative data were collected to complement and support the findings in the quantitative study where applicable. The nature of the research approach was deductive and objective: it endeavoured to make a positive contribution to the higher education and training sectors. The study pertained to the BBE: Geomatics programme at the DUT, Durban campus. Other HEIs and programme offerings were excluded from the study and therefore no comparative studies will be reported on.

Table 2: Population and sample

Data Sample	Description	Approx. Target Population size	Sample Size	Sampling method
Sample 1	Industry partners, employers	n= 185	n= 150	Simple
	and stakeholders			Random sampling

Table 2 reflects the population and sample figures. The target population comprised the various industry employers and stakeholders from the public and private sectors which included Surveying/Geomatics practitioners, local municipalities, Eskom, DRDLR, KwaZulu-Natal Department of Transport and the civil engineering and construction industry within the KZN region only. An appropriate sample size was selected. It used the simple random sampling method to select members from the various industries to make statistical inferences and draw conclusions in terms of the generalisability of the findings. Practitioners and companies/organisations outside KZN were excluded from the study.

5. Data collection

The survey instrument employed was an online electronic survey questionnaire administered through the use and application of Google forms. Data collection was therefore simplified, and the information gathered was typically stored via the automated system in a spreadsheet format for further evaluation and analysis. The instrument focused on perceptions rather than on actual performance. The data collection process yielded a result of 124 respondents out of a sample size of 150, resulting in an 83% response rate. The numerical data from the questionnaires were coded, processed, and analysed in *SPSS* software. A summary of the results is discussed under Data Analysis and Interpretation.

6. Data Analysis and Interpretation

Table 3 reflects the employment sector and registration categories of the members, displaying the frequency and corresponding percentage figures. The majority of employers who provided WIL opportunities were registered with the necessary professional membership bodies.

Table 3: Employment sector and member registration categories

Item	Categories	Frequency N (%)
Employment sector	Private practitioner (e.g., Land Surveyor / Eng. Surveyor / Geomatics practitioner	55 (44.4%)
	Land Surveying company	12 (9.7%)
	Engineering Surveying company	16 (12.9%)
	Geomatics / Geoinformatics / Geospatial company	2 (1.6%)
	Civil Engineering / Construction / Built Environment company	10 (8.1%)
	KwaZulu-Natal Municipality (e.g. Ethekweni / Msunduzi / others)	10 (8.1%)
	Eskom Land Development (KwaZulu-Natal)	3 (2.4%)
	Department of Rural Development & Land Reform (DRDLR) / NGI	3 (2.4%)
	KwaZulu-Natal Department of Transport	2 (1.6%)
	Other Government agencies or organisations	2 (1.6%)
	Retired practitioner	6 (4.8%)
	Other	3 (2.4%)
Member of SAGI	Yes	86 (69.4%)
	No	38 (30.6%)
Member of SAGC	Yes	105 (84.7%)
	No	19 (15.3%)
Member Registration Status	Professional Land Surveyor / Geomatics Professional	47 (37.9%)
	Professional Engineering Surveyor / Geomatics Professional	11 (8.9%)
	Engineering Surveyor / Geomatics Technologist	31 (25.0%)
	Engineering Survey Technician / Geomatics Technician	16 (12.9%)
	Not applicable	14 (11.3%)
	Other	5 (4.0%)

Table 4 addresses questions pertaining to industry's awareness about the exclusion of WIL and their agreement/disagreement thereof. Most industry employers (78%) were not aware of the exclusion of WIL in the Geomatics qualification. Further, when asked whether they agreed with the exclusion of WIL in the degree, a significant percentage (86%) responded 'No'.

Table 4: Industry's awareness on the exclusion of WIL

Item	Frequency (%)		N	P-value
	Yes	No		
Were you aware that the BBE: Geomatics qualification did not include a WIL/ Workplace learning component?	27 (21.8%)	97 (78.2%)	124	<.001*
Do you agree with the exclusion of WIL/ Workplace learning in the BBE: Geomatics qualification?	17 (13.7%)	107 (86.3%)	124	<.001*

* indicates significance at the 95% level

6.1. Impact of excluding WIL

The questions have been grouped into Theme 1 as it assesses the impact of excluding WIL and how these questions are perceived by the employers in terms of the implications for the graduate and the industry sector.

Findings reveal that all mean values are > 3 and that there is a substantial agreement that the exclusion of WIL may have a detrimental impact for the student and the industry sector. The quantitative data is complemented by legitimate concerns expressed by employers in the form of some direct quotes, which highlight their perspectives and the notion that the exclusion of WIL may not be beneficial to stakeholders.

6.2. Relevance of WIL

The questions have been grouped into Theme 2 to evaluate the importance and relevance of WIL which is the broad aim of the study. However, the overall results are represented in separate tables and figures since two different question types were employed (i.e., the Likert scale and the semantic differential scale). Table 5 reflects a mean value of 4.22. A total of 87.9% of respondents were in firm agreement that WIL may be relevant for the Geomatics qualification in developing graduate profiles required by the work sector.

Table 5: Relevance of WIL in developing graduates

Item	Responses as Frequency (%)					n	Mean (SD)	t	df	P-value
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree					
WIL may be relevant in order to: develop responsible, productive and accountable graduates, enhance theoretical knowledge and practical skills acquisition, effect knowledge and skills transfer, increase work readiness and student competence for the competitive work sector.	1 (0.8%)	3 (2.4%)	11 (8.9%)	62 (50.0%)	47 (37.9%)	124	4.22 (0.771)	17.587	123	<.001*

* indicates significance at the 95% level

7. Summary of Findings and Discussion of Results

Comprehensive data analysis has addressed and fulfilled the aim of the study and the key objectives through the use of applicable themes. At the outset, it was established that a substantial majority (86%) disagreed with the exclusion of WIL in the degree. This is significant as it reveals that employers are in support of a WIL component in the new qualification. Below is a summary of the findings.

7.1. Impact of excluding WIL

This theme revealed the potential impact of excluding WIL from the Geomatics programme. It was established that there was significant consensus that the exclusion of WIL would have a detrimental impact on the student and the industry sector. The results revealed that 89% of respondents agreed that the absence of WIL might have a significant impact on the type and quality of graduate, and they might be perceived as lacking sufficient practical knowledge and skills to cope with industry expectations. It was also apparent that 76% agreed that the absence of WIL might create a vacuum of knowledgeable, skilled, and competent technicians/technologists. Further, it was determined that 86% agreed that the exclusion of WIL might disadvantage students in terms of their growth and professional development; and negatively impact on their employability skills and career opportunities. In addition, 89% agreed that the exclusion of WIL might disrupt students' ability to link and integrate theoretical knowledge with practice-based knowledge. Data also indicated that 76% agreed that the absence of WIL might contribute to an unexpected increase in the unemployment rate amongst graduates, while 79% agreed that it might have an indirect impact on the productivity levels of practitioners, who depend on technologists for the execution of field operations and facilitating deliverables. It is apparent that there are negative outcomes that are likely to emanate from the exclusion of WIL. In contrast, some beneficial impacts of including WIL in an academic programme have been reaffirmed by Smith, Ferns and Russell (2014) who stated that the Organisation for Economic Co-operation and Development Centre for Educational Research and Innovation viewed WIL as a mechanism for linking the theoretical and practical components of professional knowledge producing a well-rounded employee with the aptitude to apply knowledge and skills in a range of various contexts.

7.2. Importance and relevance of WIL

In this theme, it was established that there was significant consensus regarding the importance and relevance of WIL in delivering a professional career-focused educational approach that could facilitate the development of productive, competent, and accountable graduates in the various sectors.

The results revealed that 88% of respondents were in firm agreement that WIL is relevant for the Geomatics qualification in developing graduates with the necessary attributes, skills, and proficiencies required by the competitive labour market. Furthermore, the data indicated that the majority agreed that WIL is an essential component for a modern-day Geomatics graduate in terms of its contribution to the many facets of professional development, including developing employability skills, graduate attributes, competencies, and work-readiness skills for the evolving labour market. This is evident from the mean values, which were all > 5.8 on the seven -point semantic scale.

8. Conclusion and Recommendations

The findings reaffirm that there is significant consensus that WIL is highly valued by industry in terms of its importance in promoting an enriching career-focused education as a tool for facilitating the acquisition of discipline-specific knowledge, practical proficiency, graduate attributes, and transferable skills that will culminate in a modern holistically-thinking graduate who is responsive to the requirements of the Geomatics, Engineering and Built Environment sectors. Arising from the study, some of the following recommendations have been formulated to support informed decision-making and best practices going forward:

8.1. Implementation of a six-month WIL programme

The introduction of a formalised WIL component comprising six months of mandatory industry practice incorporated into the project module, *Survey Project 3B* (32 credit) is proposed. Refer to the Table 6 reflecting the current Year 3 modules. In the current degree, Survey Project 3B is offered in Year 3 – Semester 2. However, it is proposed that this be moved from Year 3 – Semester 2 to Year 3 – Semester 1 and converted to an annual module. Programme re-curriculation will be necessary to accommodate this component and allow for core academic modules to be covered.

Table 6: Current Year 3: Geomatics degree modules

Name of module	Study level	NQF level	NQF credits
Year 3 – Semester 1			
Geodesy 3A	3	7	16
Cadastral Surveying 3A	3	7	12
Theory of Errors and Network Adjustment 3A	3	7	20
Geographic Information System 3A	3	7	12
Computer Applications 3A	3	7	12
Town and Regional Planning: Layout & Design 3A	3	6	12
Total Credits for Semester 1:			84
Year 3 – Semester 2			
Project Management	3	7	8
The Global Environment	3	6	8
Survey Project 3B	3	7	32
Total Credits for Semester 2:			48

8.2. Increase in industry engagement and collaboration

While increased collaboration is not a new phenomenon, it is far more pertinent now due to growing calls from all sectors of society as it is apparent that the relationship between HEIs and employers appears to be lacking in terms of active and constructive engagement. Smith, Ferns and Russell (2014) indicated that relationships between universities and industry and community partners should be "structured, intentional and resourced". There should be an increase in WIL industry engagement by establishing and maintaining ongoing collaborative partnerships, including public and private sector employers, business forums, civic and community organisations, and other stakeholders to better prepare the workforce of the future. Since no formal agreements exist between the department of Civil Engineering and Geomatics and industry sectors, strategic partnerships should be formalised through official contracts or MoU so that all entities understand their roles and responsibilities in working towards the fulfilment of the objectives of the WIL programme.

8.3. Implementation of WIL simulation methods

In the absence of Workplace learning (WPL), the department of Civil Engineering and Geomatics should consider other alternate means of incorporating WIL modalities successfully into the programme. While WIL simulation methods do not yield the same level of impact and success as actual Workplace learning (WPL), it does provide some benefits that cannot be overlooked. Smith *et* *al.* (2014, cited in Sachs, Rowe and Wilson, 2016) confirmed that high quality work placements have been found to have a greater influence and impact on student employability outcomes than simulation and other 'non-placement' forms of WIL. Meanwhile Edwards *et al*. (2015) are of the view that WIL strategies can be authentic or simulated, and can take place in the workplace, at the university, virtually, in person, or through a combination of the above. With constructive engagement, planning and co-ordination, WIL simulation, including Work Directed Theoretical Learning (WDTL), Project-Based Learning (PJBL) and Problem-Based Learning (PBL), can be embedded in the curriculum design to cover a variety of industry-orientated projects from first year to final year level to mimic the traditional aspects of Workplace learning (WPL) through the process of simulation. The projects should be co-developed with industry practitioners and module specialists and designed so that they align with the categories of training and work experience as per the SAGC training schedules, to ensure a smooth transition for the student from university to the workplace. According to Winberg *et al.* (2011), PJBL can aid in the acquisition of an extensive, integrated knowledge base on which students can draw and apply to the analysis and solution of problems. The projects are a mechanism of engaging students in complex, work-related problems, through which they can develop and transfer their knowledge and skills.

8.4. Establishment of a survey camp

The suggestion of a survey camp is not intended to replace WIL, but to supplement other WIL modalities through interventions that can support the acquisition of relevant industry knowledge and skills during vacation or recess periods. The department of Civil Engineering and Geomatics should consider introducing a two to three-week intensive survey camp in Year 2 and Year 3 of the degree, in partnership with public and private sector practitioners. The camp should cover a range of current survey methodologies and be incorporated as a module which constitutes an academic credit towards the qualification. Students will gain valuable industry exposure and increase their proficiencies alongside seasoned industry professionals and experienced academics to integrate content knowledge and workplace practices into a final year capstone project that will determine students' competencies and address any deficiencies prior to entering the workforce. Local municipal agencies can be approached to establish a collaborative partnership whereby students can be seconded out to acquire experience on real municipal projects in the built environment under the supervision and mentorship of industry experts. These work experiences can be translated into a final year capstone project, perhaps in *Survey Project 3B,* including an essay component covering the professional and ethical aspects of Geomatics practitioners in the workplace.

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