Reimagining Work-Integrated Learning Assessment in Geomatics: A Multi-Theoretical Perspective

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Key words: Work-Integrated Learning, Geomatics Education, Experiential Learning, Industry Partnership, Transformative Learning

SUMMARY

In today's higher education landscape, practical experience is increasingly recognised as essential for developing graduates who can navigate complex professional environments. Work-Integrated Learning (WIL) serves as a bridge between academic learning and industry demands, with the Cape Peninsula University of Technology (CPUT) exemplifying this through its Geomatics Diploma program. The Work Preparedness Program (WPP) for third-year Geomatics students has been restructured to strengthen employability through competency-based learning, digital engagement, and comprehensive skill development. Beyond technical training, the program incorporates emotional intelligence, ethics, and professional practice, aligning with broader higher education goals of preparing graduates with the knowledge, skills, and dispositions required for complex workplace contexts.

This paper reflects on the transformation of WIL assessment within the Department of Civil Engineering and Geomatics at CPUT. Moving beyond traditional logbooks, the program now integrates a structured WPP, a project-based Portfolio of Evidence (PoE), and oral presentations, providing students with opportunities for authentic, reflective, and socially situated learning. Grounded in experiential learning theory, authentic assessment, Constructive Alignment, Transformative Learning, and Social Learning Theory, this study examines the rationale, implementation, approaches to student engagement, and observed outcomes of the redesigned assessment. Key findings include enhanced student engagement, improved industry–university collaboration and strengthened soft skills critical for professional practice. The paper highlights how this integrated approach supports the development of reflective, adaptable, and workplace-ready Geomatics graduates who meet both academic and professional standards, as affirmed by the Council on Higher Education (CHE) and the South African Geomatics Council (SAGC).

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1. INTRODUCTION

Work Integrated Learning (WIL) is widely recognised as an approach that purposefully combines academic theory with workplace practice within structured curricula (Winberg et al., 2022). The WIL pedagogy enables experiential learning by providing students with meaningful opportunities to apply classroom knowledge in authentic professional contexts (Mesuwini et al., 2023). By linking education to the practical realities of work, WIL has become an essential strategy for bridging the gap between higher education and industry expectations.

The research was conducted within the Faculty of Engineering and the Built Environment (FEBE) at a University of Technology in South Africa. The faculty offers three-year diploma programs that include a Work-Integrated Learning (WIL) component, typically undertaken in the final year. Due to professional accreditation requirements, especially in fields like Geomatics, it is essential to evaluate WIL to ensure graduates meet industry standards and develop the reflective, socially responsive competencies needed in South Africa. The Diploma in Geomatics, spanning Surveying and GISc streams, features a mandatory six-month WIL module at the end of the fifth semester. Initially, WIL assessment relied on student logbooks or work diaries. However, since 2022, the Department of Civil Engineering and Geomatics (DCEG) has adopted a more comprehensive approach. Students now compile a Portfolio of Evidence (PoE) for an industry-assigned project and present it to academic staff and industry supervisors, strengthening the link between academic learning and workplace practice.

Against this backdrop, the study seeks to explore how WIL assessment practices can be reimagined to go beyond mere compliance with accreditation standards, aiming instead to promote transformative learning and the development of professional identity. In doing so, the research addresses a dual purpose: fulfilling the expectations of professional councils while also advancing the social justice agenda of higher education in one of the world's most unequal societies. This paper offers a multifaceted perspective on these changes from the lecturers' viewpoint, assessing their influence on student learning and examining both the benefits and challenges of involving industry partners more directly in the academic process.

The study's goal is to critically evaluate and redesign WIL assessment practices in Geomatics to better align with professional accreditation requirements and transformative, socially responsive, and authentic learning outcomes. To accomplish this, the study pursues the following objectives:

a) To analyse previous WIL assessment practices within Geomatics and evaluate their capacity to capture the depth of student learning beyond task completion.
b) To investigate how professional accreditation requirements, particularly within Geomatics, shape the design and evaluation of WIL.
c) To integrate theoretical perspectives, including Authentic Assessment, Situated Learning, Transformative Learning, Constructive Alignment, and Social Learning, to develop a framework for best practice in WIL assessment.
d) To explore the role of feedback, reflection, and self-assessment in enhancing student learning, professional identity formation, and societal contribution.
e) To propose an alternative WIL assessment model that aligns with professional standards while advancing higher education's social justice agenda in South Africa.

This study contributes to both theory and practice by offering an empirically grounded framework for work-integrated learning (WIL) assessment. This framework integrates professional accreditation requirements with transformative and socially responsive learning outcomes. By incorporating lecturers' perspectives and the role of industry partners, it provides valuable insights into how WIL can evolve from mere task compliance to authentic, reflective, and socially engaged learning. The findings also have implications for policy and curriculum development within higher education, illustrating how WIL can simultaneously boost graduate employability, enhance professional identity formation, and support South Africa's broader social justice goals within Geomatics profession.

2. THEORETICAL FRAMEWORK

The evaluation of WIL has become increasingly significant in curriculum reform, as higher education institutions seek to align graduate attributes with professional standards. The broader employability agenda provides important context for these initiatives. Employers consistently emphasise work experience as a critical factor in graduate recruitment, often ranking it above formal qualifications (Piróg & Hibszer, 2022). Yet many graduates face persistent barriers to employment, including limited opportunities, skills mismatches, lack of career networks, and insufficient workplace exposure (Baluku et al., 2021; Pianda et al., 2024). In response, higher education institutions are embedding employability-focused components into curricula and expanding opportunities for students to gain practical exposure through placements, projects, and industry collaboration (Herbert et al., 2020; Verhaest & Baert, 2018).

In South Africa, pervasive inequality gives WIL a distinctive social justice orientation, positioning it not only as a pathway to the employability of graduate technicians but also as a societal contribution through their access to educational resources and technical advancements in industry (Spante et al., 2023; Wolff & Winberg, 2022). Scholars argue that, in this context, WIL emphasises education for the public good by addressing societal needs through the theoretical application of knowledge, with community support, rather than individual career

advancement (Scholtz, 2018). Hence, traditional methods of evaluation, such as checking the completeness of logbooks, often lack the depth required to capture the full scope of student learning. This study draws on several complementary theoretical perspectives (see Figure 1), which collectively advocate a shift from basic task recording to active, reflective, and integrated assessment practices within both professional and social contexts. An integrated theoretical framework is crucial for the effective design and assessment of experiential learning.

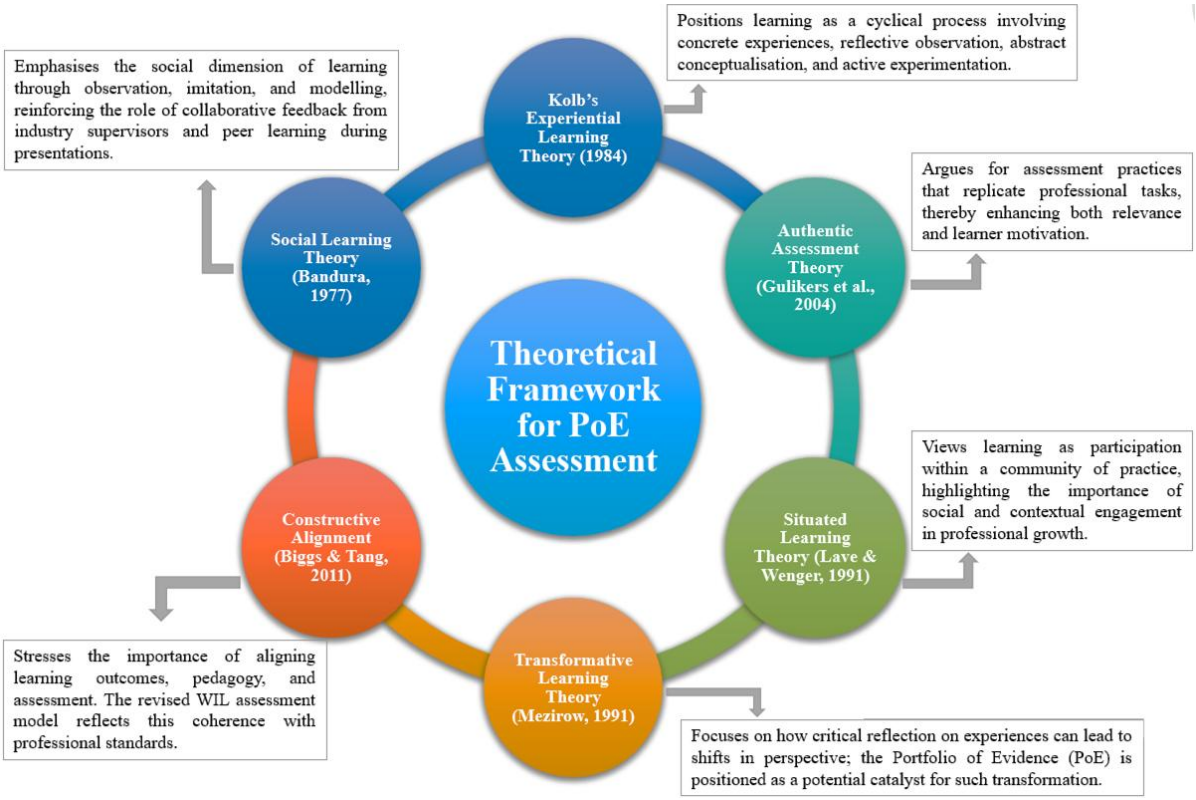

Figure 1 WIL Assessment Theoretical Framework

Kolb's Experiential Learning Theory (KLT) (1984) provides a foundational lens, emphasising learning as a cyclical process involving concrete experience, reflective observation, abstract conceptualisation, and active experimentation (Kolb & Kolb, 2005; Kolb, 1984). Within the context of WIL, KLT highlights the iterative cycle whereby students engage in professional tasks, reflect critically on their experiences, learn from those experiences, and apply these insights to new, authentic situations.

Using professional practice as its central focus, Gulikers et al. (2004) propose a five-dimensional assessment framework. They argue that assessment must demonstrate validity both in its construct by accurately measuring what it intends to and in its consequences, such as eliciting relevant competencies and promoting learning. For students aiming for professional qualifications, this means integrating knowledge, skills, and attitudes in ways that mirror

authentic professional practice. As a result, assessment tasks should not only evaluate individual competencies but also reflect how these competencies interact and manifest in real-world settings. Moreover, authentic assessment should approximate the complexity of professional scenarios, requiring students to exercise judgment, assume ownership of tasks, and devise contextually appropriate solutions (Gulikers et al., 2006). The five dimensions of the assessments include authenticity, where tasks resemble learning activities but are presented in new situations connected to prior knowledge; a realistic physical context aligned with professional practice; a social context similar to the workplace that involves collaborative social interaction with positive interdependence and individual accountability; authentic assessment results that demonstrate competencies through performance, including presentations and multiple indicators of learning; and the use of authentic criteria that focus on relevant competencies for future professional life (Gulikers et al., 2004).

This philosophy resonates strongly with the Situated Learning Theory (SLT) expounded by Lave & Wenger (1991), which frames learning as participation in a community of practice. SLT emphasises the relationship between learning and the social context in which it occurs. Within such contexts, professional competence emerges not only through individual performance but also through interaction, collaboration, and gradual acculturation into professional norms (Lave & Wenger, 1991; Lave, 1991). In other words, WIL supports learning as well as the construction of a professional identity. However, SLT is criticised for its limited emphasis on knowledge acquisition and its failure to account for individual differences among students (Besar, 2018).

To account for individual experiences during WIL assessment, we also considered Mezirow's Transformative Learning Theory (TLT), which explains how reflection on authentic experiences can shift perspectives enabling learners to question assumptions, reconstruct meaning, and develop professional identities (Mezirow, 1991). TLT involves two key components: critical reflection, where learners examine their assumptions or presuppositions, and critical discourse, where they evaluate and validate their judgments or the quality of possible solutions based on their belief systems (Kitchenham, 2008; Christie et al., 2015). Transformation occurs when students not only elaborate on existing frames of reference but also develop new ones, thereby transforming their habits of mind and points of view. The Portfolio of Evidence (PoE) model serves as a practical tool for embedding such reflection, prompting students to critically document and interrogate their learning trajectories.

The integration of all these approaches should be underpinned by Constructive Alignment (Biggs, 1996; Biggs & Tang, 2011) to ensure coherence between intended learning outcomes, teaching activities, and assessment tasks. The students' WIL experiences may be mis-educative if they are not aligned with learning outcomes (Scholtz, 2020). Constructive Alignment warrants that learning outcomes, teaching methods, and assessments are coherently linked so that students are taught and evaluated in ways that directly support the intended outcomes. It also emphasises the constructive role that feedback has on student learning (Gallagher, 2017;

Hristov et al., 2023). In contrast, learners should be encouraged to engage actively in the feedback process, positioning themselves as participants in dialogue rather than passive recipients (Evans, 2013). Moreover, assessment outcomes can inform the students, lecturers and supervisors of knowledge gaps (Scholtz, 2020).

Lastly, Social Learning Theory (SoLT) highlights the role of observation, modelling, and interaction, where activities such as collaborative feedback sessions, peer evaluations, and presentations embed learning within a social context that mirrors professional collaboration (Bandura, 1977). Building on this, scholars emphasise the value of post-WIL peer reflection activities, enabling students to learn from the diverse social contexts of their peers (Trede & Jackson, 2021). Taken together, this ensemble of learning theories defines best practice in experiential learning by emphasising authentic, contextually embedded tasks, structured reflection, constructive alignment, and social engagement, ensuring that WIL develops reflective, adaptable, and socially attuned professionals.

3. METHODOLOGY

This study employed a qualitative, reflective case study methodology within the Scholarship of Teaching and Learning (SoTL) framework (Canning & Masika, 2022; Godbold et al., 2024). SoTL promotes improving educational experiences by systematically exploring questions related to student learning. The research examined the transformation of Work-Integrated Learning (WIL) assessment practices in the third-year Geomatics Diploma program at the Department of Civil Engineering and Geomatics, Cape Peninsula University of Technology (CPUT). The case study approach provided insights into a defined educational context, specifically focusing on the design, implementation, and outcomes of the restructured Work Preparedness Program (WPP) and WIL.

The study's approach is informed by design-based educational research, which involves the systematic design, implementation, and reflection on curriculum and assessment innovations within authentic educational settings (Anderson & Shattuck, 2012). This methodology was considered suitable for examining pedagogical interventions aimed at enhancing employability, professional competence, and student engagement in applied disciplinary contexts, such as Geomatics. The primary intervention analyzed in this study was the redesign of work-integrated learning (WIL) assessment, shifting from traditional logbooks to a structured Work-based Portfolio of Evidence (WPP), complemented by project-based portfolios (PoE) and oral presentations.

Data sources included course documentation, assessment artifacts such as PoEs and presentation rubrics, observations of student engagement, and reflective practitioner insights collected during the implementation of the revised assessment framework. These sources provided a comprehensive understanding of how students interacted with the redesigned WIL

components and how the assessment practices fostered the development of technical skills, professional competencies, and reflective ability. The redesigned WIL assessment framework was also evaluated for its capacity to support equity, inclusivity, and diverse student pathways, aligning WIL assessment with the broader social justice mandate of South African higher education.

The analytical approach was guided by established educational theories, including Experiential Learning Theory, Authentic Assessment, Constructive Alignment, Transformative Learning, and Social Learning Theory. These frameworks shaped both the design of assessment interventions and the interpretation of outcomes, ensuring consistency and coherence among learning objectives, teaching methods, and assessment practices.

Ethical considerations were maintained by using anonymised student data and performing a reflective analysis aimed at overall program enhancement rather than individual evaluations. Additionally, since only academic staff observed both the traditional and new methods, they were the sole observers qualified to assess and comment on the differences; consequently, students and employers were not interviewed.

This methodological approach aimed to generate contextually grounded insights into effective WIL assessment practices and to contribute to broader discussions on preparing workplace-ready graduates in professionally accredited programmes that meet the requirements of the Council on Higher Education (CHE) and the South African Geomatics Council (SAGC).

4. WIL PROGRAM AND ASSESSMENT EVOLUTION

4.1 The Context of the Study

The Cape Peninsula University of Technology (CPUT) is the only university of technology dedicated to Geomatics in the Western Cape Province of South Africa (Figure 1). The catchment of students in the Faculty of Engineering and the Built Environment (FEBE) includes individuals from neighbouring provinces, such as the Northern Cape and Eastern Cape.

The research was conducted within FEBE at CPUT in Cape Town, South Africa. The faculty comprises eight academic departments, including the Department of Civil Engineering and Geomatics (DCEG). The Diploma in Geomatics at CPUT is unique nationally, as the Department of Civil Engineering and Geomatics (DCEG) is the only department within a South African University of Technology (UoT) that offers diploma streams in both Land Surveying and Geographical Information Science (GISc). The other UoTs such as Tshwane University of Technology (TUT) and Mangosuthu University of Technology (MUT) offer either a Diploma in Geomatics or Surveying. Geomatics as a discipline is distinctive because it is accredited by the South African Geomatics Council (SAGC), rather than the Engineering Council of South Africa (ECSA).

Students pursuing the Diploma in Geomatics are required to complete a six-month Work-Integrated Learning (WIL) module during their third year. This module is designed to integrate academic knowledge with professional practice and to align graduate competencies with the requirements of SAGC. The WIL module was reduced from 12 months to 6 months when the National Diploma was phased out in 2019 and replaced by the Diploma in Geomatics.

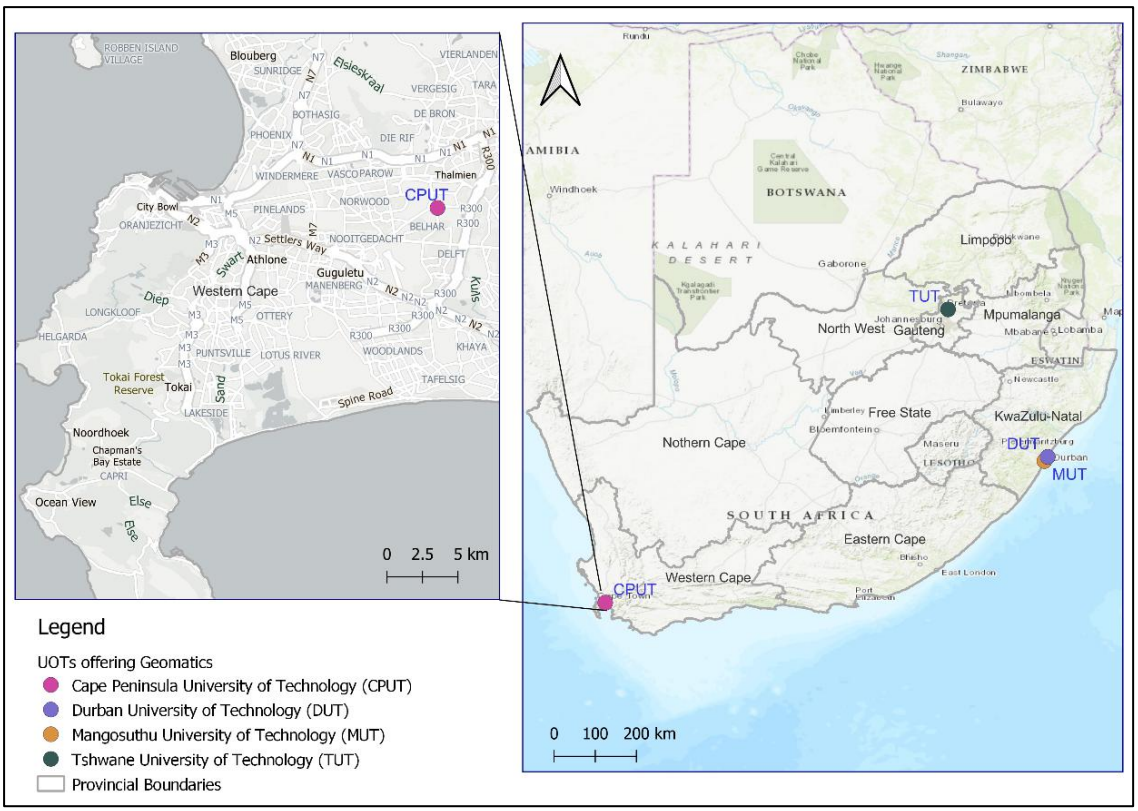

Figure 2 Relative location of Universities of Technology offering Geomatics qualifications

4.2 Experiential Learning Syllabus and Structure

The SAGC has outlined the key competencies students must attain during the WIL program. In the GISc stream, students are expected to demonstrate proficiency in various areas, including information technology applications, spatial data acquisition and capture, data management and manipulation, cartographic design, map production, and advanced spatial modelling and analysis. Conversely, the Surveying stream aims to develop professional competence in fieldwork and computational surveying practices, including triangulation, levelling, traversing, topographic surveys, engineering and construction surveys, and computer-based data processing. By embedding these discipline-specific outcomes within a structured workplace environment, the WIL module ensures graduates are equipped with both the technical skills and professional attributes necessary for registration and effective practice in the geomatics field.

During WIL, students undertake assignments, tasks, and real-world projects that have practical relevance. All activities are supervised and verified by registered professional employers with SAGC. Students are required to enrol in Survey Practice 2 and Geospatial Practice 2 at the start of the academic year in January. The experiential learning requirements for both the Surveying and GISc streams are summarized in Table 1, which also shows how these requirements have evolved from 2022 to the present.

Table 1 Minimum compulsory training requirements

Stream	Category / Field of Work	Minimum Working Days	Category / Field of Work	Minimum Working Days
	Pre -2022 (12 months)		**Current (6 months)**	
Surveying	Triangulation	20	Triangulation	20
	Levelling	15	Levelling	15
	Traversing	15	Traversing	15
	Topographical Surveying	10	Topographical Surveying	10
	Computer Data Processing	10	Computer Data Processing	10
	Engineering/Construction Surveys	10	Engineering/Construction Surveys	10
	Other		Other	
GISc	IT Skills	10	IT Skills	10
	Data Collection & Capture	15	Data Collection & Capture	15
	Data Manipulation	15	Data Manipulation	15
	Map Production	20	Map Production	20
	Spatial Modelling	20	Spatial Modelling	20
	Additional Training: Engineering/Construction, Hydrographic surveys	>160 *		

The additional training relates to the surveying stream as follows. Students must complete at least 160 working days in the following types of surveys, of which not less than 10 days or more than 120 days will be acceptable in any four of the following options:

a. Cadastral Surveys with a professional land surveyor, government department, or an organisation doing such work.
b. Control Surveys
c. Topographical Surveys with an aerial survey firm, professional land surveyor, surveyor, government department, or a firm doing similar work.
d. Engineering/Construction Surveys
e. Hydrographic Surveys with a government department, the Hydrographic Survey of the

Navy or any other operation or firm undertaking such work.

In the new pedagogy, DCEG has focused only on the compulsory 80 days, as shown in Table 1.

4.3 Pre-2022 Assessment Approach

4.3.1 The Course Structure

Before 2022, WIL at CPUT was organized over 12 months, with the Geomatics qualification divided into two separate Diplomas: the National Diploma in Surveying and the National Diploma in GISc. Students selected one specialization and completed a full year of workplace training as part of their academic program. To earn a National Diploma, students had to complete 12 months of relevant experiential learning after two years of theoretical studies. This meant students needed to be registered at the university for 12 months before their experiential learning could be officially recognized.

Student capabilities prior to receiving the Diploma were assessed through a multifaceted process, as illustrated in Figure 3. The evaluation included logbook assessments, workplace visits, and employer evaluations. This structured approach ensured compliance with SAGC regulations, requiring students to meet specific criteria in categories such as triangulation, levelling, and traversing. The assessment strategy also verified technical competency, with supervisors signing off logbooks and rating students as A, B, or C—indicating Superior, Competent, or Needs Improvement, respectively. It is important to note that there was no formal rubric for these grades, and supervisors, who were industry practitioners, were not trained in constructive alignment. Additionally, there was no structured workplace readiness program or industry engagement to ensure the academic relevance of the diploma..

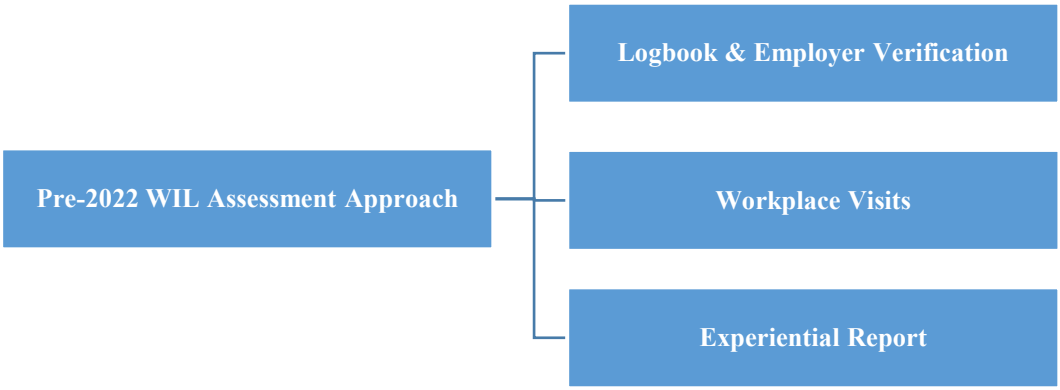

Figure 3 CPUT pre-2022 WIL Assessment criteria for National Diploma in Surveying and the National Diploma in GISc

4.3.2 The Logbook Structure

Students were required to regularly record their learning experiences in a logbook, formatted as a technical report that included the nature of the work, duration, and directly performed duties. Log sheets were incorporated into the final logbook for submission and assessment. At least once a month, the logbook entries had to be signed by a registered practitioner responsible for the student's supervision or mentorship, certifying that the recorded work was truthful.

4.3.3 Workplace Visits

Students needed to demonstrate to the University, in partnership with their employer and advisory committee, that they had acquired the necessary experience during their WIL period. The qualification was granted only after successfully completing experiential learning, which included two workplace visits, one each semester, by the WIL coordinator to monitor students' progress and ensure learning objectives were met. The authenticity of the training was confirmed through industry visits conducted by the WIL coordinator.

4.4 Current Assessment Model (Post 2022)

4.4.1 The New Course Structure

The Diploma in Geomatics includes five semesters of theoretical courses, completed over two and a half years, followed by a six-month Work-Integrated Learning (WIL) component. The program offers two specialisations: Surveying and GISc. Students must select one specialisation and complete a six-month workplace training to earn the diploma. Prior to WIL, students participate in a twelve-week Work Preparedness Programme (WPP), which develops both technical and soft skills. The assessment process is summarised in Figure 4.

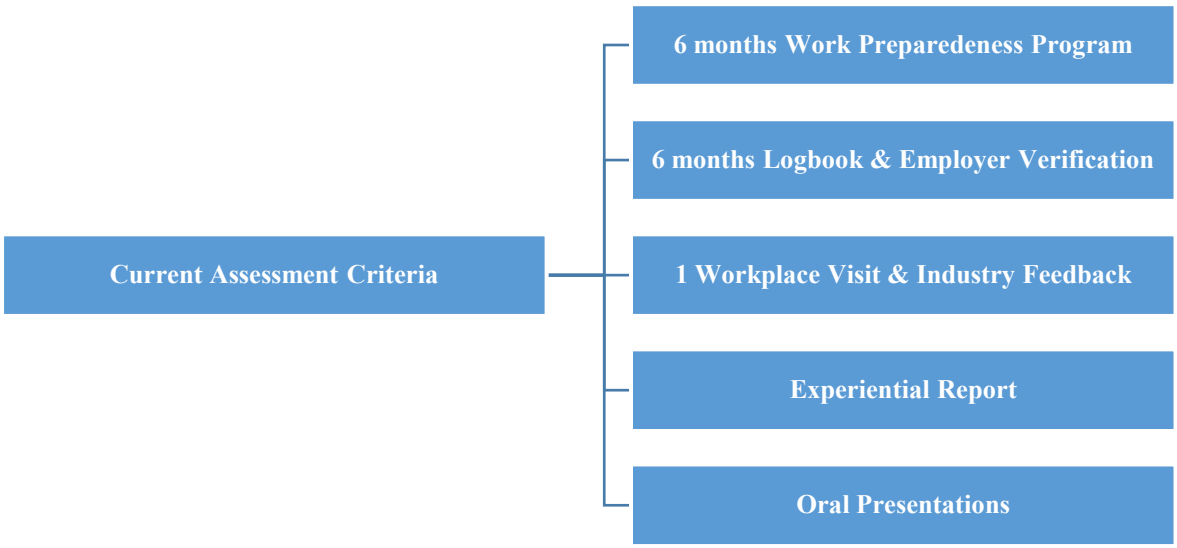

Figure 4 CPUT current WIL Assessment criteria for Diploma in Geomatics (Surveying and GIS streams)

4.4.2 The WPP Structure

DCEG introduced the Work Preparedness Program (WPP) to equip students with a comprehensive set of employability skills before entering the industry. The program integrates both technical and personal development through a wide range of competencies that prepare students for the realities of contemporary workplaces. Professional application skills are strengthened through CV writing, cover letters, and interview practice, while workplace readiness is cultivated via modules on professionalism, health and safety, and conflict resolution. In addition, the WPP introduces students to critical thinking and ethics, focusing on logical reasoning, values, and emotional intelligence, and develops communication skills through public speaking, online meeting facilitation, and presentation delivery.

To ensure discipline-specific readiness, the WPP introduces Geomatics practice, complemented by continuous learning and digital literacy strategies such as weekly online quizzes, Blackboard integration, and scaffolded assignments (such as draft and final CV or cover letter submissions). The structured use of Blackboard for quizzes, resources, and videos models blended learning pedagogy. At the same time, courses on emotional intelligence, conflict resolution, and management styles emphasise the value of soft skills in a professional environment. Collectively, the redesigned WPP emphasises competency-based learning, digital integration, and holistic skill development, ensuring that students enter their WIL placements not only technically competent but also adaptable, reflective, and workplace-ready.

4.4.3 The New Logbook Structure

Students are currently required to compile a Portfolio of Evidence (PoE) that documents their learning through workplace projects. The portfolio includes a detailed project description, tasks undertaken, methods applied, and outcomes achieved, supported by relevant artefacts such as data outputs, reports, and reflective commentary. To strengthen authenticity, students must present their PoE to the industry supervisors, creating opportunities for feedback and improvements. This approach moves beyond simply recording tasks to emphasise reflective practice, critical analysis, and the demonstration of professional competencies within a real-world context.

4.4.4 Workplace Visit & Industry Feedback

Under the current model, formal workplace visits have been supplemented by structured opportunities for industry engagement and feedback. This provides a platform for industry representatives to validate the readiness of a student, offer professional insights, and provide constructive feedback on both technical outputs and professional conduct. The inclusion of industry supervisors in the evaluation process ensures alignment with workplace standards while fostering stronger partnerships between the university and employers. This collaborative approach not only enhances the credibility of the assessment but also exposes students to real-time professional critique, better preparing them for future industry expectations while also allowing the industry to contribute to curriculum development.

4.4.5 Experiential Report

The students are now required to write a report with the approval of their supervisors, providing an overview of the experience they have gained over 6 months. The report includes tasks, data collected and key findings. By embedding industry voices into the reporting and assessment process, this approach not only enhances the relevance of workplace experience but also promotes mutual accountability among students, employers, and the university. It strengthens partnerships with industry, ensures that students gain constructive feedback from multiple perspectives, and supports their development into competent, work-ready graduates.

4.4.6 Oral Presentations

In the new assessment model, students are required to deliver an oral presentation of their Portfolio of Evidence (PoE) to their peers, the academic staff and industry supervisors on the university campus. This presentation provides students with the opportunity to showcase their workplace projects, articulate the methods and skills applied, and reflect on the outcomes achieved. Beyond demonstrating technical competence, the oral component develops essential professional communication skills, including clarity of expression, confidence in public speaking, and the ability to respond to questions from a professional audience.

The involvement of industry representatives ensures that students are exposed to authentic professional critique, bridging the gap between academic assessment and workplace expectations. This collaborative setting not only validates the credibility of student work but also enhances student preparedness for professional environments where oral reporting, project briefings, and client interactions are routine.

4.4.7 Portfolio of Evidence (PoE)

Table 2 presents the structured Portfolio of Evidence (PoE) assessment framework implemented within the Geomatics Diploma programme at CPUT. The table illustrates how the PoE is designed to accommodate both Land Surveying and Geographical Information Science (GISc) streams, ensuring coherence and professional relevance across specialisations.

Each PoE component is mapped to representative disciplinary tasks, clearly defined evidence requirements, and explicit assessment criteria. This structure supports authentic, work-based assessment by capturing not only technical competence and task completion, but also analytical reasoning, professional judgement, ethical awareness, and reflective learning. In doing so, the PoE framework aligns with professional accreditation expectations while advancing transformative and socially responsive learning outcomes within Work-Integrated Learning (WIL).

Table 2 Example of Portfolio of Evidence (PoE) components for Work-Integrated Learning (WIL) in Geomatics at CPUT.

PoE Component	Surveying Example	GISc Example	Evidence Required	Assessment Criteria
Organizational structure	CEO, Chief Surveyor, supervisor, interns	CEO, GIS specialist, supervisor, interns	Students locate themselves on the company organogram	Clarity on the hierarchy & dissemination of tasks
Project Overview	Topographical survey of a housing development site	Spatial database creation for municipal asset management	Brief, objectives, scope, role, client	Clarity, relevance, professional structure
Field/Data Acquisition	Levelling, traversing, GNSS measurements	Field data capture using GPS, mobile apps, orthophoto interpretation	Field sheets, GPS logs, screenshots	Accuracy, method selection, completeness
Data Processing	Least-squares adjustments, contour generation	Attribute cleaning, projection alignment, geodatabase design	Software outputs, maps, tables	Technical correctness, reproducibility
Analysis & Interpretation	Volume computations, slope analysis	Spatial modelling, buffering, overlay analysis	Figures, workflows, analytical summaries	Critical reasoning, alignment with requirements
Final Output	Engineering layout plans, survey report	Thematic map series, dashboards	Maps, reports, shapefiles	Professional standards, cartographic quality
Reflective Commentary	Lessons from field errors, teamwork challenges	Ethical considerations in data use	Reflective essay excerpts	Depth of reflection, alignment to theory
Supervisor Validation	Signed confirmation of work	Signed confirmation of work	Mentor signature & comments	Authenticity, workplace credibility

5. OUTCOMES AND EARLY REFLECTIONS

5.1.1 Alignment with theoretical frameworks

Before WIL, all students participate in a twelve-week Work Preparedness Programme (WPP), which develops both technical and soft skills. This scaffolding reflects Constructive Alignment (Biggs & Tang, 2011), ensuring that the program's intended learning outcomes are directly supported by preparatory teaching activities and later assessed in the WIL context. The assessment process is summarised in Figure 4.

The redesigned WPP equips students with employability skills that extend beyond technical competence to encompass personal and professional development. Professional application skills (e.g., CV writing, cover letters, interview practice) and workplace readiness (professionalism, health and safety, conflict resolution) reflect Authentic Assessment Theory (Gulikers et al., 2004), as they mirror tasks students will encounter in real employment settings. Modules on critical thinking, ethics, and emotional intelligence resonate with Transformative

Learning Theory (Mezirow, 1991), encouraging reflection on assumptions and values. Communication training through public speaking, online meeting facilitation, and presentation delivery aligns with Social Learning Theory (Bandura, 1977), as these skills are strengthened through interaction, observation, and peer engagement.

Discipline-specific preparation through an introduction to Geomatics practice, combined with digital tools such as Blackboard integration, online quizzes, and scaffolded assignments, reflects Kolb's Experiential Learning Cycle (1984): students engage in concrete practice, reflect on their learning, conceptualise improvements, and apply refinements. Collectively, the WPP embodies an integrated approach that ensures students are adaptable, reflective, and workplace-ready before embarking on their WIL placements.

Students are now required to compile a Portfolio of Evidence (PoE), documenting their workplace learning through project descriptions, tasks, methods, outcomes, and a reflective essay. This model emphasises authenticity by anchoring assessment in real-world practice (Gulikers et al., 2004), while also advancing Transformative Learning through structured reflection and critical analysis (Mezirow, 1991). By presenting their PoE to industry supervisors, students participate in a community of practice (Lave & Wenger, 1991), progressively enculturating into professional norms through dialogue and feedback.

Formal workplace visits have been expanded into structured opportunities for industry engagement and feedback. This approach reflects Situated Learning Theory, as students' competence is validated in authentic professional environments through observation and interaction with experts. The direct involvement of industry supervisors also illustrates Social Learning Theory, as students learn not only from their own experience but also from modelling professional behaviours and incorporating feedback into their practice.

The requirement for an experiential report, approved by industry supervisors, strengthens the reflective and conceptualisation phases of Kolb's learning cycle. By documenting tasks, data, and findings, students move beyond describing activities to making sense of them, integrating theoretical knowledge with workplace practice. The embedding of industry voices ensures the constructive alignment of learning outcomes, assessment tasks, and professional expectations, reinforcing accountability across students, employers, and the university.

The oral presentation of the PoE to peers, academics, and industry supervisors represents an authentic assessment task that mirrors professional practices such as client briefings and technical reporting. It develops communication skills while providing opportunities for peer learning and modelling in line with Social Learning Theory. Moreover, the reflective and interactive nature of oral presentations advances Transformative Learning, as students critically engage with feedback, refine their assumptions, and build professional confidence. Notably, supervisors also benefit by learning from the diverse experiences that students have had with other supervisors and in different workplace contexts, enabling a reciprocal exchange of professional practice insights. This collaborative setting not only validates the credibility of

student work but also enhances student preparedness for professional environments where oral reporting, project briefings, and client interactions are routine.

5.1.2 Staff observations

Students demonstrated notable improvements in confidence during interviews and presentations. Unlike their earlier theoretical coursework, they were able to present projects to supervisors and colleagues with greater assurance, often articulating at least one workplace project confidently. Employers similarly reported enhanced professional communication skills among graduates, addressing a long-standing concern at CPUT regarding weaknesses in discussion, email etiquette, and technical writing. The reflective nature of WIL created opportunities for frequent engagement with employers and ongoing interaction with CPUT staff, contributing directly to this progress.

In addition, engagement with Geomatics professional ethics and values broadened students' understanding of professional responsibility. Soft but critical personal skills, such as ethical awareness and value-driven decision-making, have become embedded in students' professional outlooks. This reflects the impact of Social Learning Theory, as students increasingly develop their professional values through observation, modelling, and interaction within authentic workplace and academic contexts.

Nevertheless, continuous refinement is required to deepen students' critical engagement with workplace complexities. Heavy staff workloads at CPUT limit workplace visits to once per term, constraining the level of academic-industry interaction. Similarly, while the Work Preparedness Programme (WPP) integrates both technical and personal development within a single 12-week semester, its delivery exclusively by academic staff risks superficial coverage. The absence of practitioner involvement in this preparatory stage not only restricts exposure to critical professional insights but also diminishes opportunities for social learning, where students could benefit from observing and modelling professional behaviours directly from industry practitioners. Addressing these gaps by increasing workplace visits, incorporating practitioner-led sessions into the WPP, and creating more structured opportunities for reflection would strengthen the integration of theory and practice, ensuring that students' preparation fully aligns with the collaborative and practice-based realities of the Geomatics profession.

6. CONCLUSION

This study sought to critically evaluate and redesign WIL assessment practices within Geomatics to align professional accreditation requirements with transformative, socially responsive, and authentic learning outcomes. The objectives were to evaluate existing WIL assessment practices in Geomatics, examine the influence of professional accreditation, integrate key learning theories, strengthen the role of feedback and reflection, and propose a

transformative, socially responsive assessment model aligned with professional standards in South Africa.

This study has demonstrated the importance of rethinking Work-Integrated Learning (WIL) assessment in Geomatics in ways that extend beyond compliance with professional training requirements towards deeper, more meaningful learning. While professional bodies such as the South African Geomatics Council (SAGC) provide clear guidance on workplace training, the absence of prescribed assessment models creates both a challenge and an opportunity for higher education institutions. This study shows that institutions play a critical role in shaping how WIL is assessed, particularly in ensuring that assessment practices capture not only task completion but also reflective learning, professional development, and social responsibility.

The redesigned WIL assessment framework demonstrates strong alignment with Authentic Assessment, Situated Learning, Transformative Learning, Constructive Alignment, and Social Learning Theory. Through the integration of multiple educational theories, the redesigned WIL assessment framework demonstrates how theory-informed practice can strengthen coherence between learning outcomes, teaching strategies, and assessment methods. The alignment with principles of authentic, situated, transformative, and socially mediated learning highlights the value of grounding professional education in pedagogical approaches that reflect the realities of contemporary workplaces.

The findings further indicate that structured feedback, reflective activities, and opportunities for self-assessment contribute significantly to students' ability to connect theory with practice. These elements supported deeper conceptual understanding, enhanced engagement with professional values, and fostered the development of a confident and ethically aware professional identity.

Finally, the study proposes an alternative WIL assessment model that balances professional accreditation requirements with the broader transformative mandate of higher education in South Africa. The model demonstrates potential for adaptation across similar professionally accredited programmes, offering a scalable approach to strengthening employability while advancing socially responsive and justice-oriented educational outcomes.

The study suggests that the proposed WIL assessment model can be replicated across similar professionally accredited programs in South Africa. It provides a scalable approach that aligns professional standards with transformative, socially responsive, and authentic learning outcomes, thereby making a meaningful contribution to higher education's social justice and employability objectives.

However, the programme's limitations highlight the need for continued refinement. Greater industry involvement in co-teaching would enhance authenticity and relevance, while longitudinal tracking of graduates could provide evidence of sustained professional growth.

Addressing these gaps would further consolidate the WPP as a model that balances academic rigour with workplace realities.

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