

## **Work-Integrated Geomatics Higher Education in Hong Kong**

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**Key words:** Geomatics, work-integrated education.

### **SUMMARY**

Under the policy of work-integrated education (WIE) and university-industry-government (UIG) collaboration in Hong Kong high education, it is required to integrate work-based and school-based learning so that learning at one place reinforces and motivates learning at the other. At the same time, linking students and faculty with the industry while engaging knowledge practitioners of the industry in the teaching and learning activities. This paper explains how the WIE programmes are designed, implemented and evaluated in the Department of Land Surveying and Geo-informatics (LSGI) of The Hong Kong Polytechnic University (PolyU) in collaboration with PolyU Industrial Centre (IC), PolyU Student Affairs Office (SAO), government departments, geomatics firms, co-op associations and voluntary services. These programmes are credit-bearing and non-credit-bearing programmes which include Summer Survey Training Schemes, the Preferred Graduate Development Programme, the overseas placements under the International Association for the Exchange of Students for Technical Experience (IAESTE), and community service training. Benefits of the policy and collaboration are found in the promotion of knowledge capabilities, facilities, research, teaching and learning, and communication.

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## 1. INTRODUCTION

Work-integrated learning is an educational strategy and activities that integrates theoretical learning with its application in the workplace. It is a work-based experiential learning designed to 'give students significant real-world work experience and skills, and reinforce and motivate their academic studies at the same time [1, p.11]', and helps linking students and faculty with the industry while engaging workers of the industry as students' mentors in the teaching and learning activities. Other benefits of WIE programmes in view of academic outcomes, employment outcomes and societal outcomes can be found in [2]. Common forms of WIE programmes in Hong Kong higher education are co-operative ('co-op') schemes, school-based enterprises, community service projects, and pre-placement training programmes, which are being organised through the following process [3]:

- Design of curriculum linking theories with real-world applications in the industry.
- Enrolment of qualified students having minimum number of completed credits and minimum grade point average for the programme.
- Planning of training sessions (during or between semesters) associated with the availability of workplaces, funding, students, staff and mentors.
- Job development and approval by the faculty and employers.
- Hiring procedures follow posting of job requirements, interviews and open competition.
- Pre-employment activities such as workshops for resume writing, interview techniques, career goals, job search skills, attitude-at-work, health and safety, and labour regulations.
- Employment activities under employment contract, job description and expectations of employers and faculty.
- Monitoring and supervision by regular meetings possible amongst employer, faculty, mentors and students on work sites.
- Assessment and evaluation of student performance, giving feedbacks to stakeholders and seeking future improvements.
- Remuneration and financial resources from employers, institutions and the government.
- Maintaining close employer-institution relationship by inviting employers to provide input into the programme operation.

As all undergraduate programmes funded by the University Grants Committee (UGC) of Hong Kong are required to include a mandatory WIE component leading to the development of all-round students with professional competence [4], the following WIE programmes have been organised in LSGI:

- Students are employed during summer semesters under the Preferred Graduate Development Programme (PGDP), the International Association for the Exchange of Students for Technical Experience (ISESTE) overseas placements, Hong Kong

Government Post-secondary Student Summer Internship Programme, employment contracts with local geomatics firms.

- Mandatory credit-bearing Course LSGI339 – Summer Survey Training Scheme is being organized for BSc (Geomatics) Year-2 students working in the Survey and Mapping Office (SMO) of Hong Kong Government Lands Department.
- Students are employed in school-based enterprises under staff's consultancy contracts from the industry. For example, geomatics scientists of the Department are currently involved in China Lunar Exploration Mapping Programme that can offer MPhil/PhD students opportunities to develop high-level knowledge and consultancy skills.
- Student are involved in voluntary service such as setting out race course for the Dragon Boat Festival and surveying and mapping for the construction of schools and bridges in poor rural areas of China (e.g., 'Bridge to China' Charitable Foundation, <http://www.bridge2china.org>). So that students apply their professional knowledge and skills to improve the community and gain a deeper understanding of themselves, their community and society.

The design, implementation and evaluation of these programmes are reported in the following sections.

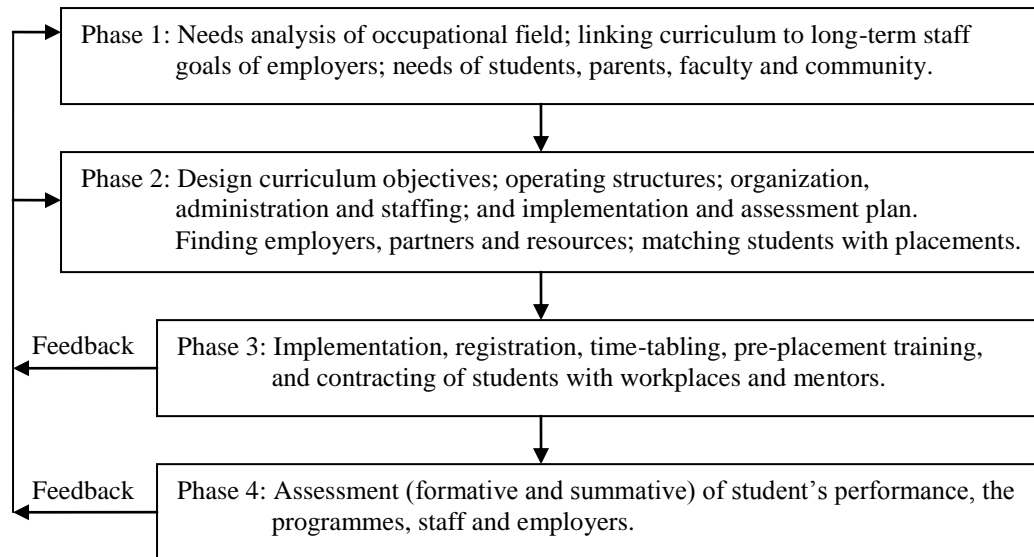
## **2. WORK-INTEGRATED GEOMATICS PROGRAMMES**

LSGI has built a long-term partnership with employers to nurture students in meeting future employment needs and to facilitate a win-win-win situation of benefiting students, employers and PolyU. Under a centralized-decentralized model, e.g. [5], SAO is the central WIE office that sets the programmes' agendas and policy that applies throughout PolyU. It is responsible for the arrangement of life insurance, financial assistance and other assistance to students; and for organizing year-round pre-placement training to students (Table 1) so that students are of the right attitude and calibre to contribute readily to the employers and gain the most from the placement opportunities. Yet the programmes are decentralized in that the Departmental Summer Training and Career Liaison Officer (DSTCLO) and WIE Officer are responsible for the coordination of students, staff, workplace supervisors and employers through the four phases of the process, namely curriculum development, programme design, implementation and evaluation (Figure 1).

How to develop the curricula? As present, WIE programmes are being offered during the summer semester. Thus the curricula of Year 1 and Year 2 studies should bring the knowledge level of students to that of survey technicians and technologists so that students should have the academic knowledge to become productive in the workplace. Examples of developing the curriculum, teaching and learning activities and assessment can be found in [9, 10, 11, 12].

**Table 1:** Pre-placement training programmes at PolyU Student Affairs Office.

Training Theme	Programme Title
Part A: Personal Competence <ul style="list-style-type: none"><li>• Self-understanding and goal setting</li><li>• Interpersonal relationship</li><li>• Communication</li><li>• Time management</li><li>• Decision-making</li><li>• Problem-solving</li><li>• Creativity</li><li>• Leadership</li></ul>	<ul style="list-style-type: none"><li>• Personal Development Programmes - Personal Development and Psychological Testing</li><li>• Leadership and Competence for Success Programmes</li><li>• Complementary Studies Programmes – Communication and Personal Development</li></ul>
Part B: Excellence in the Workplace <ul style="list-style-type: none"><li>• Global outlook</li><li>• Business acumen</li><li>• Protocol and etiquette of the world of work</li><li>• Workplace skills such as team spirit and project presentation</li></ul>	<ul style="list-style-type: none"><li>• Personal Development Programmes - Career Training</li><li>• Leadership and Competence for Success Programmes</li><li>• Complementary Studies Programmes – Business Management and Law, and Political and Public Affairs</li><li>• Career Talks</li><li>• China Plant Visits</li></ul>
Part C: Learning to Learn from Placement <ul style="list-style-type: none"><li>• Work ethics</li><li>• Job hunt</li><li>• Making the most of placement experience</li></ul>	<ul style="list-style-type: none"><li>• Career Talks</li><li>• Programme Appreciation Ceremony</li></ul>



**Figure 1:** Four phases of a WIE programme.

How to design the WIE programmes? The WIE programmes have been structured according to [4], as follows:

- There should be intended learning outcomes including (1) cooperative attitudes and behaviour when working with others, (2) confidence and ability in carrying out assigned duties, (3) critical thinking skill in solving real world problems, and (4) effective communication skills.
- Work experience should be purposely designed to provide intentional learning aimed at the attainment of the intended outcomes, instead of leaving learning to occur incidentally as a side effect of work.
- Appropriate mechanisms of support provided by PolyU and workplace supervisors should be devised to ensure that effective learning does take place.

According to [6, 4], the design should contain an operating plan comprising of:

- Agreement among the student, the employer and the university.
- Pre-placement training programmes for the students.
- Commencing and finishing dates of the WIE programmes.
- An overview of the proposed job description and work experience, along with the above intended learning outcomes.
- Schedule of consultation between the student and workplace supervisor.
- Explanation of how students will be supervised and assessed.

How to implement the programmes? Before reporting duties to the employers, students have to pass the one-week industrial safety training (Course IC251) at IC and undergo the pre-placement programmes at SAO (Table 1). DSTCLO examines students' CV and meets

individually with students to be familiarized with assignments raising their competencies for working locally or overseas. Contracting of students with employers then follows. Students are required to keep a daily or weekly log of their experiences while on WIE assignments. During the process, students' work performance is assessed to see how well students have met specified learning outcomes.

Evaluating learning is always a challenge in any educational process. How to assess student's performance, the programmes, the staff and the employers? By experience, learning outcomes of WIE activities are measurable by the follow items [4]:

- Students are required to document their workplace learning experience using instruments appropriate for demonstrating attainment of WIE learning outcomes.
- Assessment of the attainment of intended learning outcomes and the provision of student feedback should be built in.
- Performance of the overall programme, staff, workplace supervisor, employer and the associated curriculum are currently assessed by the faculty, SAO and the Departmental Academic Advisor and the External Examiner.

Evaluation of the programmes, student's performance, faculty staff, supervisors, employers is made by the collection of WIE Assessment Form (Figure 2) from workplace supervisors, Student Feedback to employers, Student Reflective Journal to faculty, and feedbacks from faculty staff and other stakeholders. Formats of Student Feedback and Student Reflective Journal are adopted from [8, Appendix D] and [6, Ch. 14] respectively. The formative and summative assessment can help stakeholders to discover the extent to which students are achieving the intended learning outcomes or objectives which are specified for both the curricula and the WIE programmes.

### 3. CONCLUSIONS

The WIE programmes meet the needs of geomatics students, industry and PolyU in bringing the students and faculty staff to the workplace and workers of the industry to the lifelong learning or teaching and learning activities. It has been found that the success of these WIE programmes relies on the cooperative partnership among students, educational institutions and employers through the process of curriculum development, design, implementation and assessment (Figure 1). In the design and planning of the WIE programmes, a sustainable geomatics curriculum and total quality management process should be developed. During the implementation phase, before reporting duty to the employers, site safety training, pre-placement training programmes (Table 1), knowledge at technician and technologist levels must be provided to students so that students are of the right knowledge level and attitude to contribute to the employers and gain the most from the placement opportunities. During the workplace training, students are supervised by mentors. Their performance is carefully monitored by both the mentor/supervisor and the WIE coordinator in the form of formative assessment and reports from students' reflective journal. At the end of the session, students' supervisor will provide feedback in the WIE Assessment Form (Figure 2) to the faculty. Together with the feedbacks from all stakeholders, both the geomatics curricula and WIE

programmes can be improved continually. What are the challenges? In short-term, recent impact of financial tsunami on labour markets would decrease employment opportunities for the WIE programmes. However, the construction of mega projects (e.g., Hong Kong-Zhuhai-Macau Bridge, Guangzhou-Shenzhen-Hong Kong Express Rail Link and Kai Tak Cruise Terminal) and the continuous expansion of geomatics profession into broad business areas and industries of applying geographic information systems (GIS) have increased the number of employers for the profession. Facing both negative and positive prospects on geomatics higher education, the problems of finding employment opportunities for the students are not pressing.

### Work Integrated Education (WIE) Assessment Form

Name of student :	Student ID No.:
BSc/HD Programme (Stream):	Year:
Name of company:	
Position assigned to student:	Monthly/Hourly* allowance (if applicable): HK\$
Placement period (full-time/part-time): From _____ (DD/MM/YYYY) To _____ (DD/MM/YYYY)	
Approximate total number of working hours: _____	

Part A: Student's Performance	Excellent	Good	Satisfaction	Poor	Very poor
LEVEL I					
Quality of Work					
Customer Focus					
Teamwork					
Technical & Professional Knowledge					
Self Motivation					
Proactive Communication					
Problem Solving					
Productivity					
LEVEL II					
Planning & Organizing					
Overall Work Performance					

**Part B: Type of Duties**

<input type="checkbox"/> Geodetic Survey	<input type="checkbox"/> Topographic Survey	<input type="checkbox"/> Remote Sensing
<input type="checkbox"/> Engineering Survey	<input type="checkbox"/> Hydrographic Survey	<input type="checkbox"/> Photogrammetry
<input type="checkbox"/> Cadastral Survey	<input type="checkbox"/> GIS and Geo-IT	<input type="checkbox"/> Business Administration
<input type="checkbox"/> Land Information System	<input type="checkbox"/> Cartography	<input type="checkbox"/> Geomatics Research
<input type="checkbox"/> Others (please specify) _____		

**Part C: Work Involvement**

<input type="checkbox"/> Field Work	<input type="checkbox"/> Office Computations	<input type="checkbox"/> Computer Programming & Analysis
<input type="checkbox"/> System Operation	<input type="checkbox"/> Others (please specify) _____	

**Part D:** 1. Would your company consider our students for Work-Integrated Education next year?  Yes  No  
 2. If you wish to make further comments on the student's performance, please attach additional sheets.

**Part E: This Appraisal Form is completed by:**

Name:		Signature & Company Seal:	
Position:		Department:	
Telephone:		E-mail:	
Address of Organization:			

Do not return the completed form to the student. Send the form to: Mr. Steve Lam, Department of Land Surveying & Geoinformatics, Hong Kong Polytechnic University. Fax: (852) 2330 2994. E-mail: [lsiams@polyu.edu.hk](mailto:lsiams@polyu.edu.hk).

**Figure 2: WIE Assessment Form.**



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## **BIOGRAPHICAL NOTES**

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