Internship and Industrial Placement

Introduction

Many universities organize internship and placement for their engineering students as part of their undergraduate learning.

Internship and placements are work experience obtained during the undergraduate years. Generally speaking, both internships and placements serve the purpose of providing students work experience. However one may wonder whether internship and placement are the same or different? In fact, a small number of universities distinguish the two terms while other universities may use the two terms interchangeably.

University like the University of Hull (Goodhall, 2013) considers internship and placement to be the same, whereas at the University of South Australia (UniSA) in Adelaide (UniSA, n.d.), internship and placement is categorized by the level of supervision, the duration and the tasks undertaken.

For the purpose of our engineering education website, we will consider internship and placement to be the same.

Although the organizations of internships and placements are often done by the university's career services office, faculty and department, students may also organize the internship or placement themselves. Both internships and placements provide students an opportunity to gain valuable working experience in the field that they have chosen and enhance their prospects for employment before graduation.

References:

- Goodhall, J. (2013). Internships and placements. Retrieved from http://www2.hull.ac.uk/student/careers/paidinternships.aspx
- University of South Australia (Adelaide). (n.d.). Public relations internships, placements and work experience. Retrieved from http://w3.unisa.edu.au/printernship/slides/launch.ppt

Educational Theories behind Internship and Industrial Placement

Internship, as a form of experiential learning emphasizes on the role of experience in the learning process (Kolb & Kolb, 2005). In Fenwick's (2000) review on different perspectives of learning, the constructivist view and the situative view were introduced as two perspectives which address experiential learning.

The constructivist view sees an individual as the main actor in the process of knowledge construction through reflection and Kolb's experiential learning theory (1984) was a model that based on this perspective (see section on Educational Theories behind Experiential Learning [http://hke3r.cetl.hku.hk/ExpLearn.php?page=2]). This model is often mentioned in the experiential learning literature to point out the importance of reflection in learning. In fact, the importance of reflection in learning is also emphasized in Mezirow's (1997) transformative learning theory, which suggested that an individual gain new understanding of his or her purpose and values through critical reflection (Cranton & King, 2003). Internship and industrial placement can be seen as workplace learning experience which provides opportunities for students to feel, observe, reflect and act using prior knowledge and new experience and understanding.

On the other hand, the situative view of learning considers learning as a process rooted in a situation which an individual participates in. Lave & Wenger (1991) earned significant recognition for their proposed model of situated learning, which introduced the concept of 'community of practice' and 'legitimate peripheral participation'. They proposed that learning involves active participation and engagement in a 'community of practice', which include the culture, activities and language of a community. Learning is considered as a form of social practice, which takes place during one's participation as a member of a certain professional community. Internship and industrial placement can be seen as workplace learning experience which provides opportunities for students to learn through participation in a community of practice, facilitating their transition from school to work.

Another concept related to Lave & Wenger's (1991) model is Vygotsky's (1978) concept of zone of proximal development, which proposed that learning occur through social interaction between novice and experts, such that the less skillful and experienced individual will learn under the guidance of and in collaboration with more skillful and experienced individual. This process is known as scaffolding. In this case, internship and industrial placement provide

students with opportunities to learn from their supervisor and fellow colleagues, who have more experience in the community of practice.

Michael Eraut (2004) is another academic well-known for his work on workplace learning. Although his projects does not focus on student learning during placement, his research on the learning of adults working in professions such as engineering, nursing and accounting during their first year of employment and his model of informal learning in the workplace offers valuable insight contributing to our understanding of what is being learnt and how are things learnt at the workplace. He made an attempt to categorize what is learnt at the workplace (as presented in Figure 1 below) and reported four main types of work activity that leads to learning: 1) participation in group activities, 2) working with others, 3) tackling challenging tasks with support, and 4) working with clients (Eraut, 2004).

<table>
<tr>
<td>Task performance

• Speed and fluency
• Complexity of tasks and problems
• Range of skills required
• Communication with a wide range of people
• Collaborative work</td>
<td rowspan="2">Role performance

• Prioritisation
• Range of responsibility
• Supporting other people’s learning
• Leadership
• Accountability
• Supervisory role
• Delegation
• Handling ethical issues
• Coping with unexpected problems
• Crisis management
• Keeping up-to-date</td>
</tr>
<tr>
<td>Awareness and understanding

• Other people: colleague, customers, managers, etc.
• Contexts and situations
• One’s own organization
• Problems and risks
• Priorities and strategic issues
• Value issues</td>
</tr>
<tr>
<td colspan="2">Academic Knowledge and Skills

• Use of evidence and argument</td>
</tr>
</table>

Personal Development • Self-evaluation • Self-management • Handling emotions • Building and sustaining relationships • Disposition to attend to other perspectives • Disposition to consult and work with others • Disposition to learn and improve one's practice • Accessing relevant knowledge and expertise • Ability to learn from experience	• Accessing formal knowledge • Research-based practice • Theoretical thinking • Knowing what you might need to know • Using knowledge resources (human, paper-based, electronic) • Learning how to use relevant theory (in a range of practical situations)
Decision Making and Problem Solving • When to seek expert help • Dealing with complexity • Group decision making • Problem analysis • Generating, formulating and evaluating options • Managing the process within an appropriate timescale • Decision making under pressured conditions	**Teamwork** • Collaborative work • Facilitating social relations • Joint planning and problem solving • Ability to engage in and promote mutual learning **Judgement** • Quality of performance, output and outcomes • Priorities • Value issues • Levels of risk

Figure 1. What is being learnt at the workplace? (Taken from Eraut, 2004)

References:

- Cranton, P., & King, K. P. (2003). Transformative learning as a professional development goal. *New Directions for Adult and Continuing Education, 98*, 31-37.
- Eraut, M. (2004). Informal learning in the workplace. *Studies in Continuing Education, 26*(2), 247-273.
- Fenwick, T. J. (2000). Expanding conceptions of experiential learning: A review of the five contemporary perspectives on cognition. *Adult Education Quarterly, 50*(4), 243-272.
- Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning & Education, 4*(2), 193-212.
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, N.J.: Prentice-Hall.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, England: Cambridge University Press.
- Mezirow, J. (1997). Transformative learning: Theory to practice. *New Directions for Adult and Continuing Education, 74*, 5-12.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological process*. Cambridge, Mass.: Havard University Press.

Learning Outcomes of Internship and Industrial Placement

Engineering students engaged in an internship or a placement will be able to:

1. Gain working experience and transferable skills in a real-world workplace environment.
2. Apply knowledge, techniques, skills, and tools learned from their courses to a variety of tasks related to their major.
3. Develop interpersonal skills and team work skills.
4. Develop problem solving skills to solve engineering problems and take into considerations of the limitations.
5. Make comparison and contrast with what they have learnt in their courses.

References:

- HKU's Faculty of Science. (2012). Guidelines for internship for student. Retrieved from http://www.scifac.hku.hk/files/ug/current/bsc/curriculum/el/guideline/Guidelines_on_Internship_for_Student_2012_Sept.pdf
- The Hong Kong University of Science and Technology (HKUST). (n.d.). Internship opportunities. Retrieved from http://www.cse.ust.hk/ug/internship/

Assessment

Internships and industrial placements are great assessment grounds for supervisors (teachers and industrial tutors) to examine students' transferable skills and knowledge of their course materials. Therefore students completing an internship or industrial placement are often asked to conduct assignments, where students can demonstrate such skills and knowledge. Different companies and universities hosting the internships or industrial placements may have different preferences regarding the format of the assignments. Thus assignments for internships and industrial placements can come in many forms. Some common forms of assignments used to assess students may include portfolio, presentation, reflective journal, logbook, and poster display. Detailed information regarding their application, advantages and disadvantages will be presented in the section of "Assessing Internship and Industrial Placement" (http://hke3r.cetl.hku.hk/assessing-placement.php?page=1).

Credit Bearing

Depending on the companies' preferences in offering the internship or placement, and/or the decision of individual faculty or department in the university, an internship or placement could be credit bearing or non-credit bearing.

For instance the ELEC3840 Internship offered by the Department of Electrical and Electronic Engineering (EEE) at the University of Hong Kong (HKU) is credit bearing (HKU's Dept of EEE, n.d.) and the postgraduate industrial placement offered by the University of Southampton in UK in the Faculty of Engineering and Environment is credit bearing (University of South Hampton, 2013).

At Chinese University of Hong Kong (CUHK) in the Faculty of Engineering (Chinese University of Hong Kong, n.d.), the "Work Study Programme" is non-credit bearing.

References:

- Chinese University of Hong Kong. (n.d.). Sponsoring internship. Retrieved from https://cpdc.osa.cuhk.edu.hk/work-with-us/sponsoring-internship
- HKU's Department of EEE. (n.d.). Computer engineering. Retrieved from http://engg.hku.hk/home/syllabuses/EEE_Syllabuses_2012-13(4).pdf
- University of South Hampton. (2013). CENV129 Industrial based learning. Retrieved from http://www.southampton.ac.uk/engineering/undergraduate/modules/cenv6129_industrial_based_learning.page#overview

Duration

In general, placements and internships are offered to students studying in the third or fourth year to develop part of their learning outcomes for their degree course. The working experience can be offered for any duration from 2 months to 12 months, where some are held during university term time, while some are taken during the summer semester (University of Manchester, n.d.).

For instance the ELEC3840 Internship offered by the Department of Electrical and Electronic Engineering in the University of Hong Kong (HKU) takes up to 6 to 8 weeks in summer and often takes place after the student's third year of study (HKU's Dept of EEE, n.d.; HKU's Faculty of Engineering, n.d.), whereas the Industrial Placement offered by the University of Bristol takes up to 9 to 12 months and is offered to students who have completed their second year of study (University of Bristol's Faculty of Engineering, 2011).

References:

- HKU's Department of EEE. (n.d.). Computer engineering. Retrieved from http://engg.hku.hk/home/syllabuses/EEE_Syllabuses_2012-13(4).pdf
- HKU's Faculty of Engineering. (n.d.). BEng programme structure. Retrieved from http://engg.hku.hk/CommonAdmission/BEng.htm#internship
- University of Bristol's Faculty of Engineering. (2011). Industrial placement. Retrieved from http://www.bris.ac.uk/engineering/interdisciplinary/engineering-design/programme-structure/emat30001.html
- University of Manchester. (n.d.). Career services. Retrieved from http://www.careers.manchester.ac.uk/students/findingwork/workexperience/internships/

Payment

Depending on the companies' preferences in offering the internships or placements, they could be paid or not paid.

For instance the internship provided by the CLP Power Hong Kong Limited is paid, students who have been selected for the job need to provide official document(s) to confirm their "student intern" status under the Minimum Wage Ordinance (MWO). An approximate salary range of the internships (Glassdoor, n.d.) offered at CLP Hong Kong Limited is about $5700 to $6200. Whereas an overseas internship called the "Global Career Launch 2013" (HKU, 2013) offered at the University of Hong Kong (HKU) is unpaid.

References:

- Glassdoor. (n.d.). CLP holdings salaries in Hong Kong. Retrieved from http://www.glassdoor.com/Salary/CLP-Holdings-Salaries-E6723.htm
- HKU. (2013). [Reminder] Global career launch 2013 summer internship opportunities in United States. Retrieved from http://intraweb.hku.hk/local/careers/news/1213/112304.pdf

Companies Organizing Internship or Industrial Placement

At The University of Hong Kong (HKU), local companies that organize internships or placements for engineering students include HSBC (HSBC Insurance (Asia-Pacific) Holdings Limited, n.d), CLP Power Hong Kong Limited (CLP Power Hong Kong Limited, n.d.), Hong Kong Electric, the Civil Engineering and Development Department and Electrical & Mechanical Services Department of the HKSAR government. Besides local companies, an overseas joint internship (Boeing-Cathay Pacific Engineering Internship Programme) (HKU's Faculty of Engineering, 2011), which is organized by Boeing and Cathay Pacific Airways, is offered for engineering students to intern in Seattle.

References:

- CLP Power Hong Kong Limited. (n.d.). Training and internship programme. Retrieved from https://www.clpgroup.com/ourcompany/careers/studentsandgraduates/hongkong/Pages/hk_internship.aspx
- HKU's Faculty of Engineering. (2011). Faculty of engineering newsletter. Retrieved from http://engg.hku.hk/home/newsletters/N201105.PDF
- HSBC Insurance (Asia-Pacific) Holdings Limited. (n.d.). Summer internship programme. Retrieved from http://www.hsbc.com.hk/1/2/inah/careers/programmes/summer

Examples of Engineering Internship and Industrial Placement

Students often have high hopes and dreams on the companies that offer them work experience, without understanding or realizing the company and job nature. Their expectation may often be mismatched and thus, be disappointed. The experience of internships and placements highly depends on the employers. Some employers may provide highly structured guidelines and job nature for each intern, allowing the interns to work in different departments to learn and experience the different job natures of the company. This ensures student expectations are matched. It will also help the company to promote a good image as a prospective employer and attract future employees.

In university, student projects are often well-defined with sufficient budget, practicality and do not involve too many stakeholders. However, this is not the case in industries, and even companies with highly structured guidelines as they may not always be able to provide the best working experience for students, as priority, practicality and budget cut may affect a project.

The CLP Power Hong Kong Limited has provided great details regarding what they expect the engineering student specialized in their relevant fields to do.

Job duty for civil engineering intern

For civil engineering intern, the job duty is to assist in construction management on new and rehabilitation work and carry out small scale study on particular topic related to power generation. They expect the intern to compile PowerPoint, and be able to apply the learning skills or knowledge regarding construction materials, soil mechanic, fluid dynamic and structural analysis.

References:

- CLP Power Group. (n.d.). CLP power internship program (CIP) 2012. Retrieved from https://www.clpgroup.com/ourcompany/careers/studentsandgraduates/hongkong/Documents/CE_ProjectOutline_2012.pdf

Job duty for mechanical engineering intern

For mechanical engineering intern, the job duty is to support the administration of the Gas Projects Knowledge Management Portal, research under the direction of GPKMC Task Force on the latest gas technology, prepare technical write-up and extract relevant gas related materials available in the public domain for internal sharing, and to provide technical supports in LNG Terminal development. They expect the intern to have special skills in sound engineering basics and practices, technical writing skills (knowledge in portal design and taxonomy), and communication skills. They hope the intern will possess learning skills such as project management skills, implementation of knowledge management, and technical knowledge on natural gas application in power industry (LNG terminal/power plant design and construction, O&M, etc.).

References:

- CLP Power Group. (n.d.). CLP power internship program (CIP) 2012. Retrieved from https://www.clpgroup.com/ourcompany/careers/studentsandgraduates/hongkong/Documents/ME_ProjectOutline_2012.pdf

Job duty for electrical engineering intern

For electrical engineering intern, the job duty is to study the existing process and research on international best practices in carbon footprint monitoring for construction work, enrich and refine existing computer tools on carbon footprint calculation and associated cost monitoring for transmission cable installation projects. They expect the intern to have good engineering judgment, an analytical mind and skills in communication when interviewing stakeholders like CLP staff, contractors, and cable suppliers.

References:

- CLP Power Group. (n.d.). CLP power internship program (CIP) 2012. Retrieved from https://www.clpgroup.com/ourcompany/careers/studentsandgraduates/hongkong/Documents/E1_ProjectOutline_2012.pdf

Job duty for electronic engineering intern

For electronic engineering intern, the job duty is to continue the implementation of the Telecommunication Work Management System (TWMS) enhancement and to devise scenarios, test cases and carry out User Acceptance Test for the enhanced TWMS. They expect the intern to have computer skills, critical thinking skills and a logical mind.

References:

- CLP Power Group. (n.d.). CLP power internship program (CIP) 2012. Retrieved from https://www.clpgroup.com/ourcompany/careers/studentsandgraduates/hongkong/Documents/E2_ProjectOutline_2012.pdf

Guidelines in Organizing an Internship or Industrial Placement

Different universities have different requirements for their students to complete the assessment procedure of an internship or a placement. However before completing the assessment, students must apply for the internship or placement.

General Guidelines for Teaching Staff

1. Teaching staff can provide academic advice or guidance for the student who wants to participate in an internship or a placement such as guidance on the procedure for applying an internship or a placement, discussion with students on how the internship or placement fits into the student's academic plan, etc.
2. Teaching staff may take a supportive role to help students, such as writing the necessary reference letters or supporting letters for the student.
3. If the teaching staff happens to be supervising the student intern, here are the followings that the teaching staff can do:
    a. Make regular on-site visit when possible to the student's workplace by seeing and checking up on the student intern's learning progress and experience. If not, maintain contact through email or phone regarding their progress.
    b. Complete one on-site visit together with the student and the employer. The visit could be held in early-to-mid-semester. The teaching staff should discuss and provide feedbacks about the student's work performance up to the time being and make consultations with the student and the on-site supervisor (employer).
    c. The teaching staff will also need to coordinate with the career services office or with their academic department regarding any modifications or interruptions to the internship.
    d. Student evaluation and assessment procedure are determined by the teaching staff such as marking the student intern's work in the internship or placement, setting up the requirements for assessment, evaluating students on-site, etc.
    e. The teaching staff will also be the one giving the final grade for the student interns based on the assessment they have handed in and their overall performance (from the on-site visits made and through the comments received from the on-site supervisor).

References:

- The California University of Pennsylvania – Internship Center. (n.d.). Faculty internship manual 2011 – 2012. Retrieved from http://www.calu.edu/current-students/career-services/internships/files/Faculty%20Internship%20Manual%202011-2012.pdf
- The University of Millersville. (n.d.). Faculty internship quick guide. Retrieved from http://www.millersville.edu/elcm/files/faculty-handbook.pdf
- The Wittenberg University. (n.d.). Faculty internship information. Retrieved from http://www5.wittenberg.edu/administration/careers/internship/faculty.html

General Guidelines for Students

1. The student must first find an internship or placement through their university's career services office or through their department or faculty, depending on who organizes the internship or placement.
2. After finding the internship or placement, students will need to fill in and submit an internship or a placement application form back to their faculty or department, or to their career services officer at the career services office before the closing date of the internship or placement.
3. Along with the application form, they will need to submit the following items: an up-to-date resume, reference letters or supporting letters, academic transcripts of their results, and a cover letter stating the reason why they apply for the internship or placement.
4. Student's need to take the responsibility of managing their time efficiently such as paying attention to when the deadline is for the application of the internship or placement as well as the deadline regarding when to hand in the assessment for evaluation upon the completion of the internship or placement.

The guidelines stated above are general practices of what students and teachers need to do for the application of an internship or a placement and what they need to pay attention to. However, depending on different universities' practices the application of an

internship or a placement may vary, the following is an example of what University of Stevenson in Maryland, USA, English majors need to do.

1. Students will need to submit an agreement form, which lists out the responsibilities of the university, employer, and students and they are to sign to confirm that they understand the stated terms.
2. From the employer, they will need to give an internship description form, stating the job details.
3. In addition, the employer needs to provide an Internship Attendance Sheet (for tallying up the hours, which is signed by the site supervisor).

References:

- Loretto, P. (n.d.). Internship application process. Retrieved from http://internships.about.com/od/coverlettertipssamples/p/AppProcess.htm
- University of Stevenson. (n.d). Internship for English majors. Retrieved from http://www.stevenson.edu/academics/english/internships.asp