

WORK-INTEGRATED LEARNING: THE CASE OF SECOND-YEAR IT STUDENTS

Lynette Drevin
North-West University
lynette.drevin@nwu.ac.za

ABSTRACT– This paper reports on a section of a bigger project in which research is conducted to investigate work-integrated-learning (WIL) activities of second-year Information Technology (IT) students. There is a need for aligning academic content and industry experiences during the education of IT students. For a number of years these IT students from a South African university did practical work in a corporate environment during their winter holidays. The aim of this research is to reflect on the students' experiences and the challenges they faced when engaging in WIL activities. The methodology used was an empirical study where an online questionnaire was used to gather data from the students concerning their WIL activities. Several statistical analyses were performed in order to get insight into their work experience. Results indicate the students' biggest challenge was to find an agreeable company. The students' most satisfying aspect was the practical side of the work and their least satisfying aspect was time related issues. Other results are reported in the paper. This information can be used as input for the lecturer(s) to support their planning of WIL for subsequent student groups to enhance their WIL experience. It is crucial for academia to reflect on classroom and surrounding activities concerning teaching and learning in order to present the best possible value to students and future employers.

Keywords: Work-integrated learning; Student; Employability, Experiences; Challenges; Skills.

1. INTRODUCTION

Work-integrated-learning (WIL) has been part of higher education for quite a few years and is a common activity in certain disciplines, such as education and medical fields. There is a range of reasons for including WIL in the academic curricula. WIL can have mutual benefits for students, businesses and universities in that the work readiness for students improves, and gaps between theory and practice may diminish. It is also important to develop the professionalism and professional identity of a student and by employing WIL, this outcome can be achieved. WIL also found ground in IT departments as seen in a study by Koppi, Edwards, Sheard, Naghdy, & Brookes (2010) in which a case for IT students is described and the feedback from students is given and the student experiences of WIL with their industry partners are discussed. Such surveys provide valuable information that can be used by other parties when WIL activities are planned in related fields.

The academic departments offering Information Technology (IT), Computer Science (CS) or Information Systems (IS) at universities are more conscious of addressing the need for not only technical skills, but also practical and soft skills of students. These skills are often called generic skills. Freudenberg, Brimble, & Cameron (2011) state that there are still challenges in respect of how educational institutions can provide effective opportunities for generic skills development. These skills include aspects, such as employability, skills transferability and professional skills. There are several benefits to students and companies in the development of these skills. There is an increased prospect for the student to get better employment and the industry may employ better work-ready graduates. The students that have generic skills may also have the benefit of easier transferability in the case of work changes. WIL may be a way to develop these generic skills.

WIL also aids in fulfilling the mission of educational institutions, which is amongst others to provide education that will respond to present and future needs by producing better work-ready students

(Smith, 2012). According to Freudenberg et al. (2011), there is a gap between what industry requires of graduates and their attributes regarding work readiness and generic skills. WIL is a technique to address this emerging gap.

In this paper, experiences with preliminary results of a WIL project that was designed for second-year IT students where practical work was done during their winter holidays are presented. The aim of the research regarding this WIL project is to get insight into the students' WIL activities. The research questions are: a) What are the challenges the students experience during WIL? b) What knowledge and skills are learned by the students? And c) What lessons can be learned from these experiences for subsequent WIL sessions? The layout of the paper is as follows: in section 2, more background on WIL activities is presented. In section 3 the methods are discussed. In section 4, results and the discussion thereof are presented. In section 5, the paper is concluded and future work possibilities are given.

2. BACKGROUND AND LITERATURE

In this section, a few definitions of WIL, challenges of universities, the partners in these activities, as well as possible models that WIL can take on in a practical setting are set out. A comprehensive discussion of WIL is beyond the scope of this paper. WIL can be viewed as a partnership between universities and the workplace (Choy & Delahaye, 2011). There may, however, be challenges in aligning academic content to the industry activities and expectations. It may be complex to map academic teaching and learning activities with workplace knowledge and required skills. Each partner has domain knowledge and expertise and these ought to be aligned to give input to the academic programs' planning. According to Freudenberg et al. (2011), WIL is described as educational initiatives that combine and integrate learning in a workplace setting. In this way, universities can offer improved educational effort to their clients – the students.

Universities experience challenges as they have to adhere to governmental procedures, accreditation board regulations and institutional guidelines and frameworks when designing academic programs. As a result, it may happen that the needs of the workplace are not adequately met. Calway (2006) states that the basics of WIL are to integrate work and learning and that a relationship exists between not only the industry, students and educational institutions, but also, in a wider sense, between government and the community.

Freudenberg et al. (2011) worked towards a description of a philosophic underpinning of the WIL activities, indicating that WIL can be experienced through a variety of theories, depending on how literature is used and analyzed. Learning theories include experiential services, vocational frameworks, situational theories and so forth. There is also a variety of models to integrate knowledge and skills in the workplace. Examples of these models are: project-based experience, vocational education, work experience, joint industry and university programs and work-integrated learning, etc. All these models pose their own challenges when planning these activities.

The project discussed in this paper was based on the model of WIL activities and work experience whereby integration of learning took place in a workplace setting. In the next section, more insight into the planning of the work-integrated assignment and the research project flowing from this is given.

3. METHODS

In this section, an overview of the planning of the WIL activities, as well as the design of the associated research project concerning these activities are presented.

3.1. Design of the WIL activities

The second-year IT students have a multi-disciplinary program, including not only IT subjects, but also management, accounting, and statistical and mathematical courses. The students are required to undergo a period of practical work during their winter holidays and they have to complete both an IT and a Business Management assignment for the start of the second semester. These assignments

include IT aspects in the company, as well as business and entrepreneurial aspects of the industry for which they worked. This paper only focuses on the IT-related aspects.

The students received instructions about networking and how to approach possible employers. The students received their assignment before the holidays. The assignment asked for information on the business in general as well as specific IT-related topics about which they had to inquire and observe while working. These topics include software development methodologies, hardware and software used, security aspects and project management approaches. The companies' managers (employers) also received a letter from the university stating the aim of the work week and setting out the assignment and possibilities for the practical time. Appreciation was also expressed to the companies for the value exchange that would take place during the students' practical time.

After the holidays, the students had to submit the assignment, which was marked and it counted towards the final participation marks of the IT course involved (System Analysis and Design II). Thereafter, all the students were asked to complete an online questionnaire reflecting on their work experience. In the next section, the design of the measuring instrument and research methods used are discussed.

3.2. Methodological approach

The aim of this project was to reflect on classroom activities and for this specific paper to get insight into the IT students' WIL activities during the practical time at companies, identifying the challenges and learning opportunities.

The data collection for this research project on WIL activities was done by means of an online survey using a questionnaire developed in Google Forms. The survey consisted of four sections. The first section contained demographical information, such as type of industry, previous work experience, age and gender. The next section consisted of questions relating to their work experience such as their main activities, how challenging it was, how likely they would be to work for this specific company and the most and least satisfying aspect of their practical work. The aspects to be assessed were the students' personal development and skills competencies (eleven factors), including issues, such as self-awareness, teamwork, communication, planning and organizing, integrity, etc. (Jackson, 2015). The fourth section was on commercial awareness, specifically for the Business Management assignment. This is, however, beyond the scope of this paper. Some questions were asked on a Likert scale, while others were open-ended. Coding was done on open-ended questions to organize the answers in categories that could be counted and statistically analyzed (Bogdan & Biklen, 1997).

The participants were enrolled in a second-year Business Management course, which included IT students, as well as Consumer Studies, Entrepreneurship and Tourism students. Only IT students' responses are reflected upon in this paper. The questionnaire was completed by 156 students of which 57 were IT students. The participation was voluntary and informed consent was stated. Ethical clearance for this project was obtained from the university's relevant ethical committee.

Data analysis was done with the software package SPSS version 24 and Statistical Consultation Services assisted with the analyses and interpretation. In the results section, a subset of the findings of this survey is presented.

4. RESULTS AND DISCUSSION

Several statistical analyses were performed on the data set. Descriptive statistics, such as frequencies and means were done in order to see trends. Factor analysis and Spearman's correlation, T-tests and ANOVA tests were also performed. Effect sizes were also calculated, which is an indication of practical significant differences between groups is. Post hoc tests were also completed using Tukey's tests.

Factor analysis was done on the personal skills competencies of students. Three factors were extracted from the skills that were originally assessed with eleven factors in the questionnaire. The total variance explained is 62% with the three factors.

The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.758. The Cronbach Alpha coefficients of the three factors were 0.78, 0.79 and 0.67, which is high (Kerlinger, 1986). Evidence of reliability and validity was shown with these tests. The length limitation of this paper restricted the scope of statistics given and discussed here to only descriptive statistics.

4.1 Descriptive results

Table 1 indicates the demographic data of the students. 81% of the students were male and 19 % female. This correlates with the current demand for female IT workers (TEC Partners, 2017). It is seen that 67% of students worked in the IT industry, while the rest worked in industries as indicated in Table 1. The industries that were used were extracted from the United Nations Statistics Division where industries are classified in main categories (United Nations, 2017). Just more than half of the students had previous work experience of 2 weeks or more. Their ages are displayed in Table 1, showing 54% were 20 years of age. 74% spent one week at the company, while 26% of students worked for more than a week.

Table 1. Demographic data of the second-year IT students

Industries	%	Previous work experience	%
10.Information and communication	67.00	1 week or less	49.0
11.Financial and insurance activities	3.00	2 weeks or more	51.0
13.Professional, scientific and technical activities	2.00		
14.Administrative and support service activities	2.00	Age	%
16.Education	4.00	19<	7.0
17.activities Human health and social work	2.00	20	54.0
2. Mining and quarrying	4.00	21 >	39.0
22.Other	7.00		
4. Electricity, gas, steam and air conditioning supply	2.00	How long have you worked?	%
6. Construction	2.00	1 week	74.0
7. Wholesale and retail trade; repair of motor vehicles and motorcycles	5.00	More than a week	26.0
Main Activities	%	Gender	%
Admin/general/observe	43	Female	19.0
Software development	37	Male	81.0
Technical support/data capturing	20		

43% of students did administrative or general work or engaged in observing the business activities. 57% of students developed software or did technical support or data capturing. In a more idealistic setting, one would like to see the IT students engaging in more IT-related work.

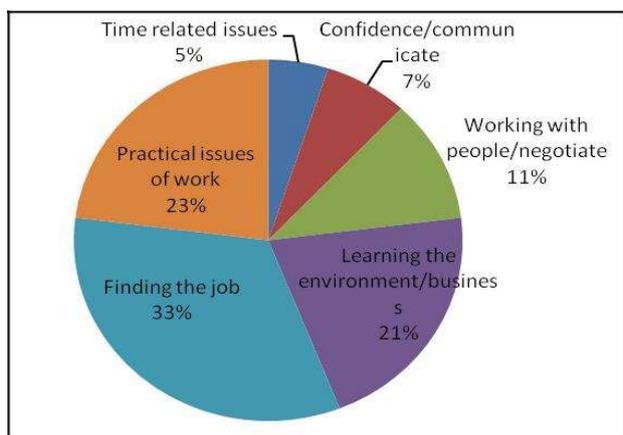


Figure 1: Greatest challenges that IT students experienced during WIL

33% of students indicated that it was a huge challenge to find a job in order to do their practical time. Second on the list were practical issues regarding the work they had to perform (23%). It was also challenging for the students to get to know the business and to become accustomed to their new environment (21%). Other challenges were to get used to working with people and how to negotiate with clients, how to gain more confidence and how to communicate and learn to get up early and work long hours. Table 3 indicates aspects of learning of the students and own improvements necessary for their future careers.

Table 3. Important skills learned and aspects to change

Most important skills learned during WIL	%	Important aspect need to change to be successful in your career	%
Teamwork&Communication	28.0		
Values,patience,people skills,conflict, confidence, endurance	19.0	Self confidence/motivation/hard work	29.0
Practical skills	18.0	Communication/ team work	28.0
Time management	15.0	Planning/time/problem solving	25.0
Hard work/problem solving/creative/stress	12.0	Stress/ patience/people skills	18.0
Confidence/Endurance	8.0		

It can be seen in Table 3 that students indicated teamwork and communication skills as the most important skill that they have learned about, followed by value-related skills and endurance. The highest ranked aspect that they indicated they needed to change to be successful in their future is to work on their self-confidence and own motivation to work hard. Communication and teamwork can also improve for the future as well as planning, problem solving and people skills improvement.

5. CONCLUSIONS

The contribution of this paper is the identified challenges, most satisfying aspects and the least satisfying aspects which the second year IT students experienced during their work-integrated learning experience. This answers research question one. Figure 1 indicated the aspect of finding an agreeable company to work for as the most challenging. The most satisfying aspect was the application of practical skills. The least satisfying aspect was time-related issues, which indicates that the transition from university to industry can be challenging in a number of ways. The next research question aimed to identify what knowledge and skills were learned by the students during their WIL experience. Table

3 indicated the most important aspects that were learned during the students' WIL activities. Teamwork and communication aspects stood out as the important skills followed by values and people skills. During this WIL period, the students also learned which aspects were important that they personally needed to change for better employability in their careers. The highest aspects were recognized as self-confidence, own motivation and hard work.

These experiences of students can be used by the lecturers in the IT courses to change course content, to improve planning for WIL sessions and to empower students to bridge the gaps that they have discovered during the WIL activities. This addressed the third research question. Such issues include for example communication, teamwork, time management and problem solving that can get more attention during class time.

Future work that may be done regarding this WIL project is to get feedback from the employers to obtain their perceptions on the students' work-integrated learning experiences. Specific mapping of course content with WIL activities and industry expectations may also be valuable to pursue.

REFERENCES

- Bogdan, R., & Biklen, S. K. (1997). *Qualitative research for education*. Boston: Allyn & Bacon.
- Calway, B. A. (2006). What has work-integrated learning learned?—A WIL philosophy. *Asia-Pacific Journal of Cooperative Education*, 10(3), 151-162.
- Choy, S., & Delahaye, B. (2011). Partnerships between universities and workplaces: some challenges for work-integrated learning. *Studies in Continuing Education*, 33(2), 157-172. doi: 10.1080/0158037X.2010.546079
- Freudenberg, B., Brimble, M., & Cameron, C. (2011). WIL and generic skill development: The development of business students' generic skills through work-integrated learning. *Asia-Pacific Journal of Cooperative Education*, 12(2), 79-93.
- Jackson, D. (2015). Employability skill development in work-integrated learning: Barriers and best practice. *Studies in Higher Education*, 40(2), 350-367. doi: 10.1080/03075079.2013.842221
- Kerlinger, F. N. (1986). *Foundations of Behavioral Research*. Third edition. Japan: CBS Publishing.
- Koppi, T., Edwards, S. L., Sheard, J., Naghdy, F., & Brookes, W. (2010). *The case for ICT work-integrated learning from graduates in the workplace*. (In Proceedings of the Twelfth Australasian Conference on Computing Education - Volume 103, Brisbane, Australia).
- Smith, C. (2012). Evaluating the quality of work-integrated learning curricula: a comprehensive framework. *Higher Education Research & Development*, 31(2), 247-262. doi: 10.1080/07294360.2011.558072
- TEC Partners. (2017). It's 2017, yet there's still a shortage of women in tech. Retrieved from <http://www.tecpartners.co.uk/2017-yet-theres-still-shortage-women-tech/>
- United Nations. (2017). International Standard Industrial Classification of All Economic Activities, Rev.4. Retrieved from <https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=27&Lg=1&Top=1>