

## **Employability Proficiency in Workplace: A Study on Skills Affecting Prospective Engineering Graduates**

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**Abstract:** The objective of this study is to reveal the degree to which prerequisite of foundation knowledge and skill obtainable through institution of higher education might influence prospective graduates' employability proficiency in terms of interpersonal and enterprise skills. An exploratory factor analysis was used to verify factor structures that shape the foundation of this generic transfer. The results indicated that respondents were in conformity on how higher education program, internship, extracurricular activities and campus life could possibly influence employability proficiency at their respective workplaces. The present study could also lead any scholar to examine systematic changes in factors affecting employability proficiency in workplace in Malaysia as lecturers incorporate the remuneration of additional interactive teaching with the conventional literary practices entrenched in the engineering syllabus.

**Key words:** Graduate engineers, employability proficiency, work place, syllabus, knowledge

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### **INTRODUCTION**

The strains on conveying quality employability skills to potential engineering graduates have been comprehensively arguable both in the United Kingdom and Malaysia. Employers look forward to and require good quality engineering graduates from higher education institutions. These institutions are striving to fulfil the high expectation of employers within their given constraints. Many scholarly works have been conducted on suitable approaches in transferring skills needed by employers in the workplace (Harvey, 2001; Quek, 2005; Dench, 1997; Andersen, 2004) to the undergraduates. Nevertheless, studies related to individual's ability are non exhaustive. Other scholars' findings illustrate on how to equilibrium the academic syllabus and employability skills (Quek, 2005; Holden and Hart, 2004; Morris, 2003). However, university stake holders from industry and academics have different stipulation, definitions and perceptions of employability skills (Dench, 1997). With the striking contrast of opinions from both parties, the transitions of employability skills can be difficult.

It is thus, recommended that both employers and higher education institution have a significant position in developing the skills needed in the workplace. This study attempts to illustrate that the foundation knowledge and skills provided by the higher education institution with a

suitable teaching package during internship will be helpful to new graduate employees in the workplace. The researchers' attention is to scrutinize the degree of engineering syllabus, internship, campus life and extracurricular activities offered to engineering students' influence their employability ability at future workplaces. Several research questions were developed as follows: do these schemes assist to encourage interpersonal skills towards employability? Do these schemes assist to endorse entrepreneurial skills towards employability?

**Literature review:** According to Skills Dialogues, engineers are required to equip themselves with several skills which correlate to the needs of technology and business (Andersen, 2004). The employers have also stressed the importance of transferable and employability skills in all areas of work. The key position of managers and supervisors has become progressively more vital and requires a combination of good quality of industrial and communication skills. The engineering syllabus has been criticized for not being capable to develop adequate employability skills amongst graduates. In addressing the importance of interpersonal and enterprise skills' growth, there are industry cases that exhibit the need to enhance the related skills. There is a soaring breakdown rate of New Product Development (NPD) reported by Balachandra and Friar (1997) who state that almost 90%

Table 1: Comparison of employability competency skill at workplace 2006-2014

Researchers	Variables
Ministry of higher education	Communication skill critical mind and problem solving skill; team work skill; entrepreneurship skill; professional ethic and moral; leadership skill
Mahamod <i>et al.</i> (2012)	Versatility; creativity; technology changes and lifelong learning and technology savvy
Muslim <i>et al.</i> (2012)	Positive attitude; professionalism; communication; leadership; teamwork; solving problems; life-long learning and social responsibilities skills
Saad and Majid (2014)	Problem sloving tool handling competency presentation skills and team working skills

of products introduced in 1991 did not reach their commercial targets (Souder and Sherman, 1994; Schilling and Hill, 1998; Cooper, 2005; Yahaya and Bakar, 2007) due to human factors.

Malaysian Economy Report 2013 demonstrates a raise of 0.1% in the unemployment rate in 2013 as compared to 2012. The report indicated the jobless persons, including university graduates in Malaysia rose from 386,000 in 2012; 426,000 in 2013. Thus, this study focal point is on the possible engineering graduates holding first degree qualification as they are competent to take up in supervisory, managerial and generally higher positions in workplace. In Malaysia, it is often conceptualized that an engineering graduate can effortlessly being employed because of their professional status as compared to graduates from the arts. In short, they should not have any problems to be employed compared to the non-engineering graduates.

A synchronization in engineering has been monitored as significant and persistent attribute within a numeral of interpretations and approaches to engineering management; for example, models of the engineering design process (Ray, 1985; Cross, 1994), concurrent engineering (Handfield, 1994; Duffy *et al.*, 1993; Prasad, 1996; Perrin, 1997; Coates *et al.*, 1999, 2004) and project management (Oberlender, 1993; Bailetti *et al.*, 1994; Cleetus *et al.*, 1996). Indeed, coordination has been recognized as being important in several other approaches such as work flow management (Alonso *et al.*, 1996), design integration and computer supported cooperative work (Malone and Crowston, 1994; Schal and Schael, 1996). Communication is crucial in any coordinated work. Therefore, interpersonal skill is vital to sustain coordination and work flow amongst engineers (Coates *et al.*, 2004).

In the contemporary manufacturing industry, it is obvious that serving manufacturing requirements will also serve market desires due to the necessary reaction to clients. One risk of the conventional engineering approach which is centered on product design for function only is that the enterprise organization imparts courage designers to treat themselves in engineering design and less in communication and assessing the overall needs to be served.

Employability competency is required in the workplace. Table 1 demonstrate employability competency required by employers in the workplace. Studies conducted from 2006-2014 have shown that communication skill is crucial. Employers need employees with the ability to communicate either non verbal or verbal communication. This refers to communicating ideas and solution towards certain issues. The researchers suggest the non-verbal communication need to be instilled by certain level of employees, e.g. Supervisory or managerial level due to the position as organizational leadership and task given to them in reporting the organizational performance.

From the study done, the employer requirements are parallel with the competency skills set by the Ministry of Higher Education. Nazri highlights that social responsibility skill has not been included by other employability competency study. It is suggested that the society needs good employees that are aware of needs for other people in the community in order to be good citizens.

The intention of this study was to investigate whether the lack of interpersonal and enterprise skills competencies are the root of redundancy amongst engineering graduates in Malaysia. This study was to determine whether engineering undergraduates have received a highly quality internship (appropriate to their learning, knowledge and employability skills) and in turn complied with the requirements of the workplace. The degree of the engineering syllabus, internship and campus life and extracurricular activities offered to engineering students was also analysed.

## MATERIALS AND METHODS

This study utilized Generic Transfer Questionnaire (GTQ) adopted from the framework of Course Experience Questionnaire (CEQ) Australia. The validation of interpersonal and enterprise skills attribute used in the GTQ survey was established by Harvey's employability framework. The Generic Transfer Questionnaire (GTQ) reflects whether the engineering degree syllabus, internship, extracurricular activity and campus life have augmented the engineering students' interpersonal skills

and enterprise skills. Exploratory factor analysis was used to test the validity and reliability of the anticipated methodology and measurement instrument.

This study engaged stratified random sampling from four Malaysian universities; two public and two private universities. According to Sekaran (2003), stratified random sampling represents a technique for obtaining a sample with a greater degree of representativeness. The standardized categories of this sample are such that they constituted final year engineering undergraduates (civil engineering, electrical engineering and mechanical engineering) who have been acknowledged from the higher education institutions.

## RESULTS AND DISCUSSION

During the data collection, a total of 360 questionnaires were disseminated to respondents but only two hundred and 69 questionnaires constituted of seventy four percent were returned. According to Mangione reply score within 70-80% range are viewed as very good. From the demographic data, out of 200 and 69 respondents, one hundred and 54 or 57% were male. Hence, there was only a small gap in the number of male and female engineering undergraduates. Participants provided their score on a 6 point Likert scale ranging from 1 which listed 'strongly disagree' to scale 6 'strongly agree' with the mean score of between 4.5 and 5. The standard deviation scores of programme/syllabus, internship and campus life and extra curricular assessment were from 0.87-1.0. According to Tabachnick and Fidell (2001), soaring scores leaning towards 1.0 are indicators of a good result.

Numerous exploratory factor analysis (hereafter called EFA) exercises were conducted to verify factor construction, as well as testing the reliability and validity of the measurement model. In the first run of factor analysis, the Rotated Component Matrix illustrated there were items being loaded or overlapped in meaning between factor 3-5. The words 'effect, written and oral' used in the question overlapped in meaning. The communality in connotation of some of these factors suggests that a number of factors can be joined or deleted to improve result. Therefore, the substance which were overlapping or cross-loading were deleted and the analyses were repeated. This technique determines whether the data deviates significantly from a random matrix. Thus, the correlation matrix is adequate and has important correlation amongst at least some of the variables.

Table 2: 2nd EFA -total variance explained

Factor	Eigen value	Variance (%)	Cumulative (%)
1	12.419	41.396	41.396
2	5.345	17.818	59.214
3	2.502	8.340	67.554
4	1.018	3.394	70.948

Total variance was clarified using the principle of retaining only factors with eigenvalues of 1. As a result, only 4 factors were retained for rotation. These 4 factors accounted for 41.396, 17.818, 8.340 and 3.394% of the Total Variance, respectively and for a total of 70.948%. Table 2 shows the abbreviated results of the factor analysis of determinant attributes.

Lewis suggests, "reasonable comprehensiveness" is sustained when extracted factors explain at least 60% of variance. The total variance explained by all four factors is somewhat higher that is at around 71%.. For a sample size of two hundred and sixty nine and in referral with the recommendations by Tabachnik and Fidell (2001), correlations of <0.45 were deemed unexceptional.

In this study, the Rotated Component Matrix has identified eleven items were loaded on factor 1 which was labelled campus/extracurricular. Factor 2 consisted of eleven items that obviously reflected assessment of internship and was labelled internship. Factor 3 listed 6 items that reflected syllabus assessment and was labelled engineering syllabus. Factor 4 contained 2 items that reflected the enterprise skills and was labelled enterprise. This four-factor model represented the mixture of the five original factors and appeared to reflect sufficiently the fundamental factor structure of the 41-item generic transfer list.

A sample of two hundred and sixty nine respondents' feedback was processed in this analysis with no missing values. The Cronbach's alpha score was 0.955 which indicated high overall internal consistency. As recommended by Cronbach (1970), the alpha value of 0.60 was considered reliable among the items representing syllabus assessment factor, internship and campus life and extracurricular activity factor respectively. The corrected item-total correction showed the correlation (consistency) between each item and the summation of the enduring items.

The findings show that higher education institution has significant responsibility in moulding competent engineers. The undergraduates agree that the engineering syllabus they undergo has increased their knowledge and they have acquired a good engineering background. This finding is in rhyme with a previous research. The higher education institution extracurricular activity has developed the engineering undergraduate employability skills. Therefore, the engineering undergraduates provide a positive feedback to their engineering syllabus,

internship and campus life and extracurricular outcomes. In addition, the appropriate teaching approaches could also improve students' learning outcomes. Many researchers (Chu and Choi, 2000; Martin and Halstead, 2004) have established that a strategic teaching approach could enhance students learning outcomes in terms of knowledge and employability skills. This study has contributed to the need for higher education institution educators to look into the matter seriously. Educators should always reflect and appraise their teaching approach to the best of their ability to boost graduates' output (Davies *et al.*, 2006) to the demand of work market. Hence, learning for self and future career growth does not end after graduation day but it is a lifelong learning route (Halstead *et al.*, 2004) both for the students and to the Higher Education Institutions' (HEI) educators.

This study has highlighted that engineering job should also be based on capability. Engineers must have the technical knowledge along with interpersonal and enterprise skills required for the accomplishment of engineering projects (Slyke *et al.*, 1998; Duke and Williams, 1999; Bailey and Stefaniak, 1999; EI Saadany *et al.*, 2008). The literature has demonstrated that to bring a product to market involves concurrent engineering and the synchronization of team members is most important. Interpersonal communication skills are essential to convey information and observe the present situation of the project through regular meetings and others. Interpersonal skills can also assist to decrease possible miscommunication within the supply chain sectors as well as in product development network. Thus, awareness on the significant of interpersonal and enterprise skills can help avoid any project failure. As supported by the literature for workplace requirements, today's engineers must therefore, equip themselves with relevant interpersonal skills and enterprise skills.

From the findings, the engineering students also request more hands-on sessions in the curricular or internship sessions as the current hands-on sessions are insufficient for employability (Andersen, 2001). The students want the higher education institution to re-examine the engineering syllabus and try to integrate the theory and hands-on sessions. In addition to that, although there is full agreement about the employability investigation contributed by employers, contradiction was inevitable. Most of the engineering students agree that the training duration (3 months or 12 weeks) is not adequate enough in giving them ample time to correlate the theoretical aspects of what they learn in higher education to the workplace and to reflect on the new knowledge and practical exposure they receive during the industrial training. As such, they would prefer the industrial training period to be extended from either

3-6 or 3-12 months. The engineering students also want the employers to allow them to participate in daily work activities such as meetings, presentations, problem solving and real industry projects. Having such involvement would indicate that their (students) ideas are being acknowledged.

The engineering respondents also appreciate campus life, in particular, the extracurricular activity. This is because they can develop their generic skills such as communication skills, leadership qualities, managing people and interpersonal skills. The students suggest having grooming classes to polish their personal development according to market demands. The students also recommend changing the extracurricular activity into a module and making it compulsory for every student.

This finding is in rhyme with Norida and Mohd Tajuddin and Ruhizan's findings which indicate that extracurricular activity contribute to generic skills development amongst undergraduates. Similarly, Shazaitul also agrees that internship contribute to employability skills development amongst graduates. These confirm that extracurricular activity and internship training play a significant responsibility in moulding employability competency skills.

## CONCLUSION

This study demonstrates that the foundation knowledge and skills provided by the university with an appropriate training package during internship will be constructive to new graduate employees in the workplace. Moreover, higher education institution has given the best package in terms of knowledge, attitude and assessment for workplace needs. In addition, the GTQ measurement tool can significantly serve as pre and post evaluation for interpersonal and enterprise skills amongst higher education institutions and educators. The present study can be a guideline for researchers in observing changes in interpersonal skills and enterprise skills in Malaysian higher education institutions. Future research should look into furthering multivariate statistics which are obviously absent in this study into areas on interpersonal and enterprise skills and further exploration on the impact of social responsibility skills towards sustainable employability skill.

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