

raf

MAK 00642.



0000098584

The evaluation of PEO attainment based on alumni and employer survey / Arfah Ahmad ... [et al.].

THE EVALUATION OF PEO ATTAINMENT BASED ON ALUMNI AND EMPLOYER SURVEY

**ARFAH BINTI AHMAD
SUZIANA BINTI AHMAD
MOHD RUZAINI BIN HASHIM
HYREIL ANUAR BIN KASDIRIN**

(1st National Conference on Active Learning (NCAL 2011), 10-11 December 2011, Kampus Bandar UTeM)

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

The Evaluation of PEO Attainment Based on Alumni and Employer Survey

¹Arfah Ahmad, ²Suziana Ahmad, ³Mohd. Ruzaini Hashim, ⁴Hyreil Anuar Kasdirin

^{1,3,4}Faculty of Electrical Engineering, Universiti Teknikal Malaysia Melaka (UTeM),

²Faculty of Engineering Technology, Universiti Teknikal Malaysia Melaka (UTeM),
Hang Tuah Jaya, 76100 Durian Tunggal, Melaka, Malaysia

¹arfah@utem.edu.my, ²suziana@utem.edu.my, ³ruzaini@utem.edu.my, ⁴hyreil@utem.edu.my

Abstract—This study is to investigate the evaluation of Program Educational Objectives (PEO) attainment in Faculty of Electrical Engineering (FKE). The PEO for this faculty consists of five statements that describe expected achievements of graduates in their career and professional life a few years after graduation. Method used to measure the achievement of each PEO is based on alumni survey and employer survey that involve all the alumni in this faculty graduated since 2005 and their employers. The attainment for each PEO is based on the measurement of continuous quality improvement items placed in both questionnaires. Results shows that, out of five PEO listed, only one, that is PEO 3 is not achieve.

Keywords- Program Educational Objectives (PEO), alumni survey, employer survey

I. INTRODUCTION

Universiti Teknikal Malaysia Melaka (UTeM) is a technical university that offers engineering educations such as mechanical, manufacturing, computer, electrical and electronics engineering. UTeM's vision is to be one of the world's leading innovative and creative technical universities. In order to achieve this, UTeM implemented the concept of Outcome Based Education (OBE) to the students. OBE has become the byword in engineering education ever since Malaysia becomes a provisional signatory of the Washington Accord in 2003. This is of course due to the importance placed on graduate attributes and the procedures to evaluate and assure the outcomes of a program under the accreditation requirements of the Accord [3]. Basically OBE is based on the idea of what learners should ultimately be able to do successfully at the end of the educational program, which is what we call outcome.

The goal of OBE implemented at UTeM is the successful of student's performance, while the time required for achieving this goal can be flexible. With this purpose, the graduates from this institution are expected to be knowledgeable, possess necessary skills and attitudes. According to Ir. Ali Askar Shah Mohamad (2009), the concept of OBE is simple and straight forward as it focus of what learners should ultimately be able to successfully at the end of the educational program [2]. Based on this, the curriculum, methods of instruction and assessment of the education program was develop. The implementation of OBE in Malaysia Engineering Programs is based on the requirement of Engineering Accreditation Council (EAC).

Referring to EAC Engineering Programme Accreditation Manual 2007, the team highlights the following; Program Educational Objectives (PEO), Program Outcomes (PO), and a matrix linking courses to PO [3]. The PEO describe the expected achievements of graduates in their career and professional life a few years after graduation. The PEO develop must be consistent with the mission and vision of the university and responsive to the interest of programme stakeholders. Meanwhile the PO is based on the idea of what the students should achieved (skills, knowledge and attitude) immediately after graduation.

The Faculty of Electrical Engineering (FKE) in UTeM provides students in Bachelor Degree of Electrical Engineering and Bachelor Degree of Mechatronics Engineering. The curriculum of the program was develop based on POs and PEOs set by faculty academic committee. In order to attain the achievement of both POs and PEOs, two measurement methods were used, namely indirect and direct methods. Indirect assessment methods are based on survey and questionnaires that consists of an analysis of reported perceptions about student mastery of learning outcomes. The achievement of PO is based on report from exit survey while the achievement of PEO is based on the findings from alumni and employer survey. The assessment of direct method is based on an analysis of student's behaviour or products in which they demonstrate how well they have mastered learning outcomes. For this method, the assessment tools are based on student's achievement in tests, quizzes, examinations, laboratory, assignments and projects.

This paper discuss about the achievement of PEO implemented at FKE, UTeM by focusing on the findings from alumni and employer survey. Both of these set of questionnaire was developed in order to measure the perceptions on UTeM's alumni and employers on the effectiveness programmed offered in FKE, whether the programmed education successfully produce a high competent engineer. Table 1 below shows PEOs set by the faculty academic committee, the assessment tools for each PEO; in which by using alumni survey or employer survey and the indicators of achievement for each PEO. The measurable outcome analysis is based on continuous quality improvement items placed in the questionnaire. The percentage set at the indicators column is based on the

judgement and target of the academic committee in FKE [4].

TABLE 1 Summary of methodology used to assess the PEO achievement.

| Program Educational Objective (PEO) | Tools | Indicators & Target Percentage |
|--|-----------------|--|
| 1: To produce engineers who are able to apply engineering knowledge in their professional careers. | Employer survey | 60% of the graduate are employed according to their qualification |
| | Alumni survey | 60% of the graduate work in electrical engineering field |
| 2: To produce engineers who are creative and innovative in adapting themselves into the global working environment. | Employer survey | 30% graduates work in multinational industries |
| | | 30% of the graduate works with international standard compliant companies |
| | Alumni survey | 30% of the company require creative and innovative criteria 5% of alumni are involved in new product / innovation |
| 3: To produce engineers who practice high standards of ethical conduct and societal responsibilities. | Employer survey | less than 1% of graduates are charged in disciplinary |
| | Alumni survey | 50% of the graduates are registered with professional bodies |
| | | 5% of the graduates join voluntary bodies 80% of the graduates have societal responsible |
| 4: To produce engineers who are capable of developing their professional career through both practical experience and lifelong learning. | Employer survey | 80% of the graduate shows interest |
| | Alumni survey | 20% of alumni have intention to further studies |
| | | 50% of the graduate gone through training |
| 5: To produce engineers who have strong technical competency in the field of Electrical and Mechatronics Engineering. | Employer survey | 60% of the employer satisfied with the graduates competency |
| | Alumni survey | 10% of alumni get working competency certificate |
| | | 10% of alumni get promotion or awards |

II. METHODOLOGY

The assessment for the achievement of each PEO in this study is based on the result from alumni survey and employer survey. Two set of questionnaire was develop in order to gain data for this study. The alumni questionnaire was distributed to the students that have graduated from FKE, UTeM since 2005. Whereas the employer survey was

distributed to all employers around Malaysia that hire graduates of FKE, UTeM as their employees.

A. Alumni Survey

A set of alumni questionnaire was develop which consists of three parts, namely Part A, Part B and Part C. Part A of the questionnaire for respondents background is structured into two sections; alumni educational background and working place. Alumni educational background contains the gender, programme, year of graduation and currents status, whether working, unemployed or pursuing further studies. The second section required the respondents to fill in their company address, designation, job scope and reason if the respondent status is still unemployed. Part B of the questionnaire consists of 5 items related to PEOs of the faculty. For each of these items, four level of satisfaction scales used are not prepared, slightly prepared, prepared and well prepared. The analysis for each item is carried out numerically by marking each of the responses 0, 1, 2 and 3 respectively. As the last part of the questionnaire (Part C), the continuous quality improvement questions was develop regarding on each PEO's items in Part B. The purpose of this section is to identify the career achievement of FKE's alumni and to see the correlation with PEO set by the faculty. For each of the questions in Part C, the responses is based on the agreement to the question, which is the response should be 'yes' or 'no'.

B. Employer Survey

A set of employer questionnaire was develop which consists of three parts, namely Part A, Part B and Part C. Part A of the questionnaire is for company background that consists of the company address, name and designation of the officer in charge in the survey, fax number and email address. All of this information needed to make sure that the person in charge in this survey is really from the industry. Part B in the employer survey required the employer to rate the PEO listed based on the four level of satisfaction scales. Each of the scale represent by 0 for not prepared, 1 for slightly prepared, 2 for prepared and 3 for well prepared. Part C in the employer questionnaire contain 8 items of continuous quality improvement that related to each PEO in Part B in which each item response's whether 'yes' or 'no' based on the agreement to the statement.

III. RESULT

The alumni and employer questionnaire was distributed to the respondents through email and phone calls. The survey was carried out starting from January 2010 until May 2011. A set of questionnaire were given to alumni in this faculty graduated since 2005. Total of 115 alumni and 33 employers were responded to the survey. Responses to these questionnaires were recorded and further analysis was made for the assessment of PEO in FKE, UTeM.

A. Result from alumni survey

About 60.87% of the respondents are male and female respondents represent 39.13% of overall respondents. Majority of the alumni is currently working (93.04%), 4.35% of them are pursuing their studies and only 2.61% are still unemployed since graduated. From 115 alumni, 91 graduates work in technical sector while 5 of the graduates are in non-technical sector. For technical sector, 84 of the graduates employ a position as an engineer, 5 as technicians and one as technical consultant. Most of the graduates in this survey possess designation of process engineer, electrical engineer, project engineer and system engineer. Meanwhile, 5 respondents work as technicians, in which they do not give a position regarding on their qualification. According to the survey, some of them willingly be a technician as an early step in working environment to gain experience before they are proposed to be an engineer.

A total number of 11 alumni involve in education sector as a lecturer, tutor, vocational training instructor and teacher. However, the survey also found out that 3.48% of FKE's alumni employ a job that does not related to engineering field (non-technical sector), where each one of them become a policeman, replacement teacher, car sales advisor and kindergarten teacher. A total of 3 respondents (2.61%) involve in this survey are still unemployed since graduated. The reasons given for this situation are fail in communication skills, looking for a job that fulfil their specifications and does not have interest in the job offered. Based on the finding of respondents background, it can be said that the engineering programme offered in FKE, UTeM has successfully produce an engineer as majority (73.04%) of the graduates employ a position that related to their field of study.

The level of PEO achievement among graduates in this institution will reflect to the quality of the programme conducted by FKE, UTeM. Table 2 below present the percentage of PEO achievement respectively. Based on the table, the highest percentage of the respondents rated themselves as rank 2 (prepared) for PEO 1, PEO 2, PEO 3, PEO 4 and PEO 5. More than 50% of the graduates believe that they are prepared in applied engineering knowledge in their professional careers, prepared in being a creative and innovative engineer in adapting themselves into global working environment and prepared to develop their professional career through both practical experience and lifelong learning.

TABLE 2 Percentage of PEO attainment of alumni survey based on ranking

| Rank | Not prepared | Slightly prepared | Prepared | Well prepared |
|-------|--------------|-------------------|----------|---------------|
| PEO 1 | 0% | 14.78% | 57.39% | 27.83% |
| PEO 2 | 0% | 14.78% | 55.65% | 29.57% |
| PEO 3 | 0.87% | 10.43% | 47.83% | 40.87% |
| PEO 4 | 0.87% | 6.96% | 52.17% | 40.00% |
| PEO 5 | 0.87% | 15.65% | 49.56% | 33.91% |

Interestingly, about 40% of the alumni rank themselves as well prepared to become an engineer who practices high standards of ethical conduct and capable of developing themselves once they have graduated from engineering education in UTeM. Out of these matters, only one respondents rank himself as not prepared to fulfil the criteria of an engineer set in PEO 3, PEO 4 and PEO 5.

Instead of the responds from alumni on PEO ranking, the PEO achievement can be measured based on supporting items of each PEO that describe briefly all the quality needed to be an engineer. Table 3 below list down all continuous quality improvement items, the percentage attain and the mapping of PEO for each item.

TABLE 3 Continuous quality improvement criteria and mapping of PEO of alumni survey

| PEO | Continuous quality improvement criteria | Percentage |
|-----|---|------------|
| 1 | Nature of work require the knowledge obtained in undergraduate studies. | 68.17 |
| 2 | Involve with product design. | 45.22 |
| 3 | Register with engineering professional bodies. | 38.26 |
| | Involve in any voluntary bodies. | 20.87 |
| | Willing to help those who are needed. | 92.17 |
| 4 | Interest in further studies. | 38.26 |
| | Skill enhancement training. | 82.61 |
| 5 | Recognition. | 26.96 |
| | Received certificate of competencies. | 24.35 |

68.17% of the respondents agree that their nature of work require the knowledge obtain in undergraduates studies. This item is parallel with the criteria needed to produce an engineer that fulfill PEO 1. 45.22% of the graduates claim that their nature of works required them to involve in the design of new product as the criteria needed for PEO 2. The result of the alumni survey also reveal that out of 115 respondents, only 38.26% of them are registered with engineering professional bodies, whereas 20.87% of them involve in voluntary bodies and non-profit organization. As part of the ethical conduct and social responsibilities, 92.17% of the graduates are willing to sacrifice their time, money and effort to help those that are in need. All of these measurement criteria are to fulfill PEO 3.

Meanwhile about 38.26% of the graduates involve in this survey have interest in further their studies to a higher level qualification such as master degree, doctoral engineering and philosophy doctor. A big percentage of the alumni, that is 92.17%, have gone through training and courses to enhance their working skills and knowledge. Based on the survey, the respondent's claims that most of the training are compulsory for their working environment, only a small amount of them attending courses by their own interest. However, the survey found out that only 26.69% of the graduates have received promotion and award in their performance and only 24.35% of them have certificate of competencies that related to their field of work. A justification for this situation is due to the graduates that

mostly are still fresh in their working field, hence they need time to develop their carrier competencies.

B. Result from employer survey

A total number of 33 employers all around Malaysia involve in the employer survey that has been running out from January 2010 until May 2011. Based on company background, almost 76% of the employer involve in this survey comes from technical company. Majority of the employers that involve in this survey works as project engineer, senior quality assurance, manager and senior engineer. Only 2 out of 33 employers are from non-technical company, which are from legal firm and consultation company. Meanwhile, about 15% of the respondents in the employer survey are from education sector with the designation as manager of higher education, head of department in a polytechnic, assistant director and school principle. Instead of that, the survey also gained response from an assistant manager of research institute.

The employer survey is in the form of self evaluation where the employer are required to rate each PEO according to the graduates competency. All of the items in the survey form are designed to assess the career and professional accomplishment as set by the program objectives. Table 4 below present the percentage of PEO achievement based on the rank of not prepared, slightly prepared, prepared and well prepared. Based on the survey result, more than 50% of the employers rank the graduates in the level of 2, meaning that the graduates are prepared for PEO 1, PEO 2, PEO 3 and PEO 5.

Result from employer survey proven that graduates produce by FKE, UTeM are prepared to be an engineer that can applied engineering knowledge in their career, prepared in becoming an innovative and creative engineer, prepared to practice high standards of ethical conduct and prepared to have strong technical competency in the field of electrical and mechatronics engineering. As for the achievement of PEO 4, almost 40% of the employers rated the graduates as well prepared in developing their professional career through both practical experience and lifelong learning. However, about 3% of the employers believe that the engineer produce by this institution does not prepare to develop their professional career.

TABLE 4 Percentage of PEO attainment of employer survey based on ranking

| Rank | Not prepared | Slightly prepared | Prepared | Well prepared |
|-------|--------------|-------------------|----------|---------------|
| PEO 1 | 0% | 15.15% | 51.52% | 33.33% |
| PEO 2 | 0% | 15.15% | 57.58% | 27.27% |
| PEO 3 | 0% | 6.06% | 57.58% | 36.36% |
| PEO 4 | 3.03% | 9.09% | 48.48% | 39.40% |
| PEO 5 | 0 % | 24.24% | 54.55% | 21.21% |

The PEO achievement can also be measured based on continuous quality improvement items that support each PEO listed in this institution. Table 5 presents the percentage of PEO achievement based on items in Part C of the

questionnaire. In order to measure the achievement of PEO 1, the continuous quality improvement criteria are about the employment of the graduates based on their qualification. Findings from the employer survey show that 78.79% of the employers hire UTeM's graduates according to their qualification.

TABLE 5 Continuous quality improvement criteria and mapping of PEO of employer survey

| PEO | Continuous quality improvement criteria | Percentage |
|-----|--|------------|
| 1 | Employ workers based on engineering qualification. | 78.79 |
| 2 | Multinational company. | 57.58 |
| | Comply international standards. | 81.82 |
| | Creative and innovative working environment. | 90.91 |
| 3 | Disciplinary problems. | 0.0 |
| 4 | Skill development training. | 97.00 |
| 5 | Technical competencies. | 84.85 |
| | Employer satisfaction on graduates performance. | 93.94 |

PEO 2 is about to produce engineers who are creative and innovative in adapting themselves into the global working environment and the measurement criteria for this PEO are the company in this survey is a multinational company that comply international standards. Results shows that 57.58% companies are type of multinational company in which 81.82% of the companies comply international standards in their management process. In addition, 90.91% of these companies apply the concept of creative and innovative working environment.

Result of the employer survey also reveal that the employers claim that no graduates are involve in any disciplinary problems in working place and this fulfil the criteria of PEO 3. For PEO 4, about 97% of the companies emphasize the skill development training for the workers. Meanwhile more than 80% of the employers involve in this survey satisfied with graduate's technical competencies and performance, and this measurement been applied for PEO 5.

IV. PEO ATTAINMENT

Result from the survey shows that PEO 1, PEO 2, PEO 4 and PEO 5 are achieved as all the measurement criteria exceed the percentage of the target set. However PEO 3 is not achieved as one of the criteria of continuous quality improvement is not met the target. The percentage of the target is 50% of the graduates are registered with professional bodies, but the results shows that only 38.26% of the alumni are registered as a member of professional bodies. Hence the correction method for PEO 3 should be made. As for this, suggestion that can be made in order to enhance PEO 3 is that the faculty should continually organize talk and seminars for the students regarding on the importance of joining the professional bodies such as IEM and BEM. Apart of that, the faculty should also continually

organize campaigns and platforms to facilitate the student's registration with the professional bodies before the students graduate. Through this method, it is believed that the awareness of the students about the importance of professional in their career path may be increased.

V. DISCUSSION

From the analysis carried out in this study, it appears that FKE, UTeM offers an electrical and mechatronics degree programme that can produce high competent graduates as out of five PEOs, only one PEO does not achieve. However, this result is based on the findings from employer and alumni survey which account for only 115 alumni and 33 employers. In the light of this matter, the sample size of the alumni and employer survey is not representative enough the number of graduates produced by the last five years. As for suggestion, the statistical formula for ideal sample size should be used in order to achieve a number of valid sample size.

On the other hand, the method of data collection should be improved as this study only involves survey by phone call and via online. By using both of these techniques, errors that may take place as respondents do not understand the questions, do not clearly hear the questions and could not focus on the questions read as nuisance factors may occur. Hence, other techniques should also be considered; for example by using postage method or face to face interview. Apart from that, the committee that involve in phone calls survey should be trained precisely as human errors may occur that reflect data collection method. In addition, the method of sample selection should also be taken into consideration since the students in this faculty involve four different courses. The researcher should use a correct technique of randomization, with stratified sampling or cluster sampling.

In the aspect of the questionnaire used in this study, effort could, perhaps, be taken by the survey committee to improve the structure of the questions. For the continuous quality improvement items that measure the attainment of each PEO, all the questions constructed are really straight forward. The choice for respondent's answer only comply 'yes' or 'no'. Hence, the validity of the questions by using Alpha Cronbach's technique could not be done. Respondents may need other choice of response, for example – not sure. As for suggestion, it would be better if the choice of the answer involve the using of Likert scale based on level of satisfaction. Thus, the perceptions of the respondents can be measured accurately. The number of measurement questions for each PEO should also be the same. For example, the committee may set each PEO is represented by three continuous quality improvement items. Taking into consideration all of these improvements, the achievement of

PEO can be measured accurately and the validity of the respondents response can be made.

The percentage target for achievement of each PEO is based only on the judgement of the academic committee in this faculty. The justification for each percentage set is based on student's achievement in the previous cohort. For the next survey design, it is recommended that the committee do some revision and benchmarking with other universities before setting up the target percentage for PEO achievement. Different cohort of sample size will require different number for the attainment of each PEO. Moreover, the content of the PEO should also be revised continuously.

VI. CONCLUSION

As for conclusion, this study has attempted to reveal that out of five PEO set by the faculty, four of them are achieved. Hence, the engineering programmes offered by this faculty fulfil the criteria needed to be an engineer. However, some improvement on the survey design should be made for the next study in order to enhance the result of PEO achievement, so that a high quality programme can be developed and thus a high competent engineer can be produced by this institution.

ACKNOWLEDGMENT

The authors gratefully acknowledge the committee of survey and OBE team of FKE 2011. The authors also gratefully thank all the alumni and employers that involve in the surveys. The survey committee believe that findings from this study will greatly benefit engineering programme in FKE especially and the future engineering studies in UTeM generally.

REFERENCES

- [1] Academic Handbook Faculty of Electrical Engineering (FKE), Diploma & Degree Program, Semester 2011/2012.
- [2] Alfian E., and Othman M.N. 'Undergraduate student's performance: the case of University of Malaya,' *Quality Assurance in Education*, 2005, Vol. 13, pp 329- 343.
- [3] Ali Askar Sher Mohamad, "Implementation of OBE in engineering education," International Conference on Engineering Education, 2009, pp. 164-166.
- [4] Bowerman B.L., O'Connell R.T., and Koehler A.B. "Forecasting, time series, and regression," Thomson Brooks/Cole, USA, 2005.
- [5] Bryman A. and Cramer D., "Quantitative Data Analysis with SPSS 12 and 13, a guide for social scientists," Routledge Taylor & Francis Group, London, 2005.
- [6] Engineering Programme Accreditation Manual 2007: Board of Engineers Malaysia (BEM).
- [7] Report on Alumni and Employer Survey of FKE, 2010 and 2011.