

MEETING THE STAKEHOLDERS EXPECTATIONS IN ENGINEERING PROGRAMS: A CASE STUDY OF RIVATEX EAST AFRICA LIMITED

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ABSTRACT

Students' learning outcomes show that graduates from university courses are lacking in important skills, such as communication, decision-making, problem solving, leadership, emotional intelligence, and social ethics as well as the ability to work with people from different backgrounds. Engineering graduates today need to work within multicultural and multinational workplace environments with adequate professional attributes or competencies. The missing links between engineering graduate attributes and employers' expectations are elaborated in the paper. This paper discusses the position of Moi University graduates vis-à-vis the expected at the industry. The paper outlines what the consumers i.e. employers of graduates of engineering often complain of being given half baked products. It sought to establish the lacking skills in this graduates taking a case study of Rivatex factory and graduates of Moi University. What are the competences the industry require and to what extend the graduates possess them. It gives analysis of attributes as seen by the employer and draws conclusion and suggestions on requirements to be considered while training an engineer. The paper is significant as it seeks to establish the skills lacking in engineering graduates from the employer's point of view. The findings of the study will contribute to a deeper understanding of the issue and possible avenues for their address.

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KEYWORDS: Competencies, engineering graduates, graduate attributes, skills

1. INTRODUCTION

Institutions of higher studies primarily aim to develop generalized measures of knowledge and skill outcomes for the student body. This being the premise, the expectation is that graduates of universities are ready at graduation for industry. Interviews on graduates from Moi University shows that graduates are not necessarily getting the skills that are required by industry from university courses.

There is lack of important skills such as communication, decision-making, problem solving, leadership, emotional intelligence and social ethics. The studies by other researchers show that in a globalised work environment, graduates seem deficient in their ability to work with people from different backgrounds (Wellington et al, 2002). What seems to be evident is that there is a mismatch between graduate students' skills during their studies and those needed in the workplace. This paper discusses the alignment of graduate attributes to that needed in the engineering industry.

1.1. Graduate Attributes

Graduate attributes are defined as: 'The qualities, skills and understandings a university community agrees its students would desirably develop during their time at the institution and, consequently, shape the contribution they are able to make to their profession and as a citizen' (Bowden, *et al* 2002)

It is observed that institutions of higher learning are trying to produce graduates with the skills that are highly regarded by employers and are seen to add to the country's prosperity and social capital. Moi University has developed frameworks and/or guidelines for the Schools and Departments to clearly define monitor and articulate graduate attributes in their curricula. Moi University is addressing the importance of employable skills through cyclic revision of various course curricula. Professional bodies such as Institute of Engineers of Kenya (IEK) and Engineers Regulatory Board are increasingly placing high degree of emphasis on graduate traits as outcome measures (Orawo, 2004)

In the report initiated by Kenya Association of Manufacturers (KAM) in 2006 to review how institutions of higher learning teach and assess employability skills, it presented recommendations based on an integrated approach that emphasizes improved processes for identifying, developing, assessing and imparting employability skills to graduates.

1.2. Engineering Graduate Attributes: Global Perspectives

It is generally accepted that engineering graduates need to be prepared for the increasing use of advanced and appropriate technology in their future workplaces. However research by Radcliffe, Wellington and Patil (Wellington et al, 2002), (Radcliffe, D.F. 2005) & (Patil, 2005) showed that there is a mismatch between graduate students' skills during their studies and those needed in the workplace.

Data collected in a report of the University Of Manchester Institute Of Science and Technology (UMIST) showed that careers of most engineers include managerial tasks although many remain in predominantly technological jobs. UMIST report stated that most engineers' careers demand a variety of managerial skills and expertise, particularly in leadership and the management projects (Dudman & Wearne 2003). Indeed, the workplace performances of engineering graduates have been a constant subject of criticism. For example, a recent report on state of higher education in Africa, a World Bank/UNESCO report, (Rosovsky *et al*, 2002.) warns universities about falling behind in the ability to meet industrial needs. The report states that university engineering graduates were not skilled in essential engineering skills, such as, for example, simulation techniques (Maiden & Kerr, 2006)

The global mobility of engineering profession, multicultural workplace environment, growth in student enrolments and engineering graduates are significant key issues which have created the increasing need for designing engineering course curricula for engineering programmes. In order to enhance the mobility and certification of engineers, it is important to assess engineering design skills and associated elements of the professional engineer who is capable of working in the global context (Vohra & Kasuba, 2004). As a result, there is a strong need to include so called Global Competencies along with the **Hard Skills** or discipline specific skills depicting the "knowledge of basic laws, concepts, theories and principles of engineering". **Soft Skills** or Competencies on the other hand are the communication, leadership and management skills best described as being inter-personal and intra-personal skills in engineering programmes, because engineering graduates need to work within multicultural and multinational workplace environments (Patil & Codner, 2007), (Shakespeare *et al*, 2004). The elements of essential global competencies as defined by Patil and Codner (Patil & Codner, 2007) are as listed below:

- Understanding of the globalisation of engineering education
- Knowledge of the international labour market and workplace imperatives
- Understanding of the international business, economy and world market
- Ability to acquire and apply knowledge of engineering fundamentals
- Having the competency in theoretical and research engineering
- Having competency in application and practical oriented engineering
- Ability to communicate effectively, not only with engineers but also with the community at large
- Having in-depth technical competence in a specific engineering discipline
- Ability to undertake problem identification, formulation and solution
- Ability to utilize a systems approach to design and evaluate operational performance
- Ability to function effectively as an individual and in a group with the capacity to be a leader or manager as well as an effective team member
- Having the understanding of the social, cultural, global and environmental responsibilities and ethics of a professional engineer and the need for sustainable development
- Ability to design and conduct experiments, as well as to analyze and interpret data
- Having the knowledge of contemporary issues
- Having the basic entrepreneurial skills
- Awareness of global political and societal issues
- Understanding of cross and multicultural issues
- Recognizing the need to undertake lifelong learning, and possessing/acquiring the capacity to do so

It is therefore clear that engineering graduates must have the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.

2. CASE STUDY

As a case study, the employers' survey (Rivatex East Africa Limited) results on engineering graduates of Moi University are presented. This study outlines the findings of the recent survey conducted on the perception of graduate attributes of Moi University engineering graduates.

3. METHODOLOGY

A list of 10 graduate attributes was used in the survey derived from Rivatex East Africa Limited graduate attributes and feedback from production departments. Managers and supervisors were asked to

rate each attribute in terms of importance and their satisfaction with the extent to which each was demonstrated by Moi University graduates already employed. The survey was administered over a two month period. Fifteen employees participated in the survey.

Table 1: Analysis of Engineering Graduates Attributes as seen by Employer

S/No.	Attributes	Average percentage score
1	Oral communication skills	35
2	Interpersonal skills with colleagues and clients	43
3	Written communication skills	45
4	Capacity to analyze and solve problems	46
5	Ability to develop new or innovative ideas, directions, opportunities or improvements	55
6	Time management skills	55
7	Capacity for co-operation and teamwork	56
8	Ability to apply knowledge in the workplace	58
9	Ability to cope with work pressure and stress	60
10	Capacity to learn new skills	62

4. DISCUSSION AND CONCLUDING REMARKS

4.1. RESULTS

The results of this survey match the findings of previous research in that there seems to be skills that are lacking with university graduates [(Patil, 2005), (Jones, 2008)]. The results also show that the shortfalls are primarily in communication, problem solving, leadership and social ethics skills.

Many of the skills listed in Table 1 are essential skills that an engineering graduate should be proficient in after his/her courses at a university while others are the soft skills that make a graduate ready and efficient as an employee.

The results suggest that such soft skills, social ethics and team skills are not embedded in the course curricula

in Moi University. Also research work by Shuman et al (Shuman *et al* 2005) showed that there are few examples of the development of assessing professional skills, such as students' ability to evaluate and resolve ethical dilemmas, assessment of team skill development and project effectiveness, etc.

The global employment has placed a new attribute found to be essential for engineering graduates, this being the ability to work in a multicultural work environment. Rojetier (Rojter, 2005) reports that cultural awareness and diversity are required attributes for effective engineering practice.

4.2. CONCLUSION

The results of the employer survey suggest:

- a) There is a need to have a clearer understanding of essential generic and professional attributes of graduates to ensure quality in imparting engineering knowledge, and,
- b) That school of engineering ,Moi University would have to work hand in hand with industry so that graduates are better equipped for the industry requirement,
- c) Hard and Soft skills must be included in Moi University engineering programmes.

From the Rivatex East Africa Limited Management the ability to communicate effectively, not only with engineers but also with the community at large and ability to undertake problem identification, formulation and solution are given a top priority in the process of recruiting new engineers.

4.3 RECOMMENDATIONS

The following are recommendations from the authors:

The institutions of higher learning training engineers should factor in the soft skills in all the courses. The examination of end of semester or term paper distribution of marks should have a certain percentage for soft skills.

Regular skills and competencies needs surveys be done in institutions to establish what skills are lacking from the graduates and find ways of improving them in subsequent groups.

Institutions of higher learning forge a closer relationship with industries on the training needs of the graduates with the aim of continuous improvement.

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