

Educating Oil Drilling Engineering Professionals of Tomorrow

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Abstract - *The key challenge to maintaining a robust petroleum industry is ensuring an adequate supply of well trained professional, now and in future. Drilling engineering education today is more than the study and application of science. Employers of engineering graduates confirm that they are looking for well - rounded individuals with skills and attitudes which enable them to fit quickly and smoothly into work force. This paper explores some of the implication for our universities who, in the past, have primarily concentrated on imparting knowledge. The paper also proposes a course model and its resource implication.*

Index Terms - *Petroleum- Drilling Engineering- Education-Skills-Knowledge – Attitudes*

INTRODUCTION

The competence of engineers are changing and increasing rapidly. There is general concern, both nationally and internationally about current approaches to the territory education of engineers and how will they are equipped for working in industry.

The development of a graduate in oil drilling engineering is consider to encompass not only technical knowledge but also the capability to continue to learn, to resolve problems, to communicate effectively and to have an understanding of commercial world in which a drilling engineer operates [1-5]. A part from the specific knowledge requirements for graduate entering the industry, there are generic capacities which should form part of the development of a graduate drilling engineer, irrespective of which part of the industry the graduate moves into.

WHAT IS REQUIRED

Discussion on tertiary education of engineers and the role of universities are not new. There is now a considerable body of research address out coming required from engineering education. These provide a greater focus on describing the preferred knowledge, skills and attitudes sought in new graduates rather than prescriptive courses of study.

Based upon the author's observation, in selecting graduates camploers do not specifically test applicants for technical knowledge but instead concentrate on skills and attitudes. The implicit assumption is that the degree program provides the graduate with appropriate knowledge. This places a high onus on the academic staff to ensure this is achieved.

Knowledge

Broadly, the knowledge base should encompass mathematics, science, engineering sciences, geology, rotary drilling equipment, reservoir rocks mechanics drilling fluids, environmental sciences applied to drilling, basic understanding of drilling and processing methods and application, business concepts and feasibility studies and project evaluation, management systems including safety and industrial relations, legislation and the professional practice of drilling engineering.

Skills

In the survey of industry expectations, there was a notable emphasis on business concepts and legislation requirements which

- Work lifestyle (what to do, how to do it)
- communication(written, oral, presentation),

- computer application (word processing, spread sheets)
- team working, thinking (clear, independent, creative),
- problem solving(define problem, analyse, resolve, deal with uncertainty),
- interpersonal (understands and can adapt to differences),
- time management, and ability to acquire knowledge.

These aspects present particular challenges to engineering educators in providing the climate for development.

Attitudes

Attitudes are described as personal attributes influenced by upbringing, worldly experience and other aspects of professional formation. These are judged by behavior, which is not always the true measure of a person's attitudes but is what the world sees. The preferred attitudes have been described as eagerness to continue to learn, wanting to improve process and self, integrity, wanting to take responsibility, and accepting and not afraid of change.

Academics involved in the education of undergraduate engineers can have an influence on personal development through example, and by the way the individual student is dealt with as a young professional. Such attributes are even more difficult to inculcate and assess than skills and represent a further challenge to the academic.

A significant issue in the education of drilling engineering graduates is, therefore, to establish an appropriate balance of knowledge, skills and attitudes and how these can be best developed by the student undergraduate course (Figure1)

A COURSE MODEL

Intellectual development is considered to be well handled in a professional engineering degree program: development of skills and attitudes are more difficult to address both in course design and in assessment. Some academic issues arising from these two points are:

- the balance to be attained between conveying knowledge in specific fields to the student as against the development of the individual student to self learn and collect and apply knowledge over a range of fields,
- the need to provide adequate time for absorption and reflection on what is learnt and its relevance to professional practice,
- the opportunity for students to pursue areas of study outside drilling and other engineering fields to broaden as professionals and to develop a greater enthusiasm for learning (this may require greater flexibility in class scheduling).

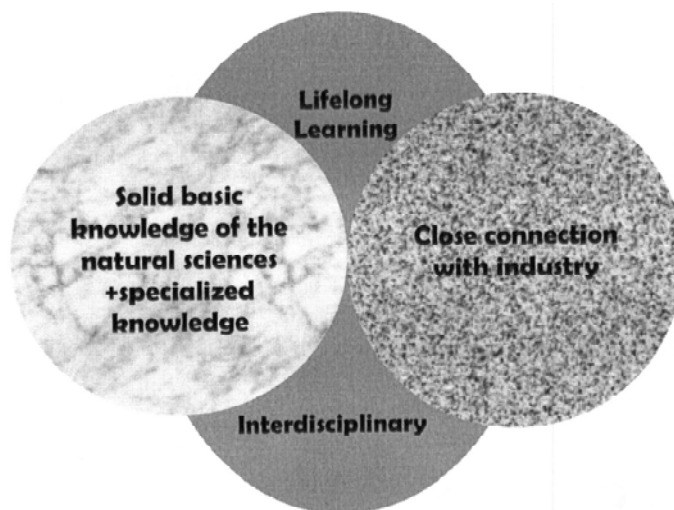


FIGURE 1 :
core of the engineering profession

The following is proposed by the author as part of a course which aims to produce the well rounded, job-ready graduate:..

- early introduction to tools and skills in accessing information,
- greater emphasis on engineering problem definition and then problem solving using examples from contemporary drilling practice -this should be applied over all mathematics, science and engineering subjects,
- attention to written and oral communication as an integral part of appropriate subjects rather than just a separate subject,
- application of word processing, spreadsheets and computer software as an integral part of subjects from early on in the course,
- development of more structured vacation work programs towards exposing the graduates to their future roles in the workplace,
- a greater content of site visits as an integral and assessed part of the course and not just occasional events-this should include opportunities in country and overseas,
- a close collaboration between industry and Academia more involvement in team exercises on drilling project engineering and even moving more towards multi-disciplinary teams mirroring how the engineer will have to work in industry,
- exposure to business decision-making exercises involving judgments on the impact of uncertainties in community, environmental, financial and technical issues,
- incorporation of a greater use of peer assessment,
- units on personal style and behavior early in the course to assist in developing personal awareness and social skills,
- consideration of the professional practice of drilling engineering.

In all these developments, an engineering course should incorporate training in engineering ethics. Professional morality and responsibility should be introduced to engineering students. Engineering graduates should be familiar with increasing code of ethics so that they can uphold and advance the integrity, honor, and dignity of the profession by doing the following:

- using their know ledge and skill for the enhancement of human welfare
- Being honest, loyal and impartial in serving with fidelity the public, their employers, and clients.
- Striving to increase the competence and prestige of the profession.
- Supporting the professional and technical societies of their disciplines.

RESOURCE IMPLICATIONS

The major implication of adopting this model is, in the view of the author, the increased demands on academic staff time in order to provide more individual attention to each student. This individual approach requires a move away from relying only on written final examinations to a more continuous form of assessment, taking into account not only technical understanding but also personal development. This requires more time to assess, provide feedback and hold discussions with individual students.

Assessment practices will have to take into account the greater emphasis on skills and attitudes as an educational outcome. This requires a more judge- mental and qualitative assessment, It also suggests a greater involvement of industry personnel, particularly through more feedback to the students during vacation work programs.

Greater attention would need to be given to the individual learning style of students, with help for them in determining their own needs and then allowing for these factors in the course structure. The mode of delivery needs to be consistent with the material. In other words, there is no common mode of delivery to suit all material as well as allowing for the individuals learning style.

This requires a higher level of appropriate staffing and perhaps a greater involvement of industry professionals on secondment to work with particular areas in student development. Academic staff will also need to adjust and organize the integration of a greater involvement by industry personnel and to monitor constantly the effectiveness of this as regards the required outcomes.

CONCLUSIONS

Whilst requiring some specific knowledge and skills, the education of drilling engineers for the industry should be considered in the broader framework of the overall Petroleum industry. Wide ranging reviews of requirements in industry lead to a greater emphasis on the specification of outcomes for the broader development of the graduate drilling engineer's attributes of knowledge, skills and attitudes.

The mode of teaching and assessment will need to adapt to these needs. This has implications for the provision of adequate staffing levels and capabilities for the future.

More industry support will be required to assist course work and provide opportunities for a more structured vacation

work experience as part of the drilling graduate's educational and professional development at university. Also communication between Industry and Academia must be a priority in order to achieve sufficient and up to date courses. Industry feed back is important and certainly drilling engineering education for the tomorrow will be closely related to the future reserved to the industry.

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