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## **AC 2011-918: THE MASTER OF ENGINEERING MANAGEMENT PROGRAM AT MEMORIAL UNIVERSITY OF NEWFOUNDLAND**

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# **The Master of Engineering Management Program at Memorial University of Newfoundland**

## **Introduction**

Memorial University of Newfoundland (MUN) is the largest degree-granting university in Atlantic Canada. With its main campus located in St. John's, MUN also has subsidiary campuses in Corner Brook, on the west coast of the province, and the town of Harlow in the United Kingdom. Memorial's Faculty of Engineering and Applied Science (FEAS) offers academic and research programs in Civil Engineering, Electrical Engineering, Computer Engineering, Mechanical Engineering, Ocean and Naval Architectural Engineering, and Process Engineering.

The Master of Engineering Management (MEM) program at MUN welcomed its first cohort of students in September 2009, and is one of the first designated MEM graduate programs in Canada. With a mandate to attract both local and international students from all engineering disciplines, and to provide balanced graduate training in Management and Engineering, the program has experienced increasing growth.

For the purpose of knowledge sharing and discourse, this paper will outline the core curriculum, discuss marketing strategies used to attract and retain interested and qualified MEM students, and discuss current approaches of outcome assessment and program. In addition, the paper will present the initial results of a case study of Engineering Management practices in offshore Oil and Gas Engineering firms in St. John's, Newfoundland as an example, to draw the connection between educational relevance and workplace practice of Engineering Management skills and concepts in one particular sector of significant importance to the province. Specifically, the results will explore management challenges in local Oil and Gas Engineering firms, the process for selection of engineering managers, and the development and training of engineers to become managers in this sector.

## **Program Characteristics**

Memorial's MEM program is a course-based graduate program that can be completed on a full or part-time basis and draws on the expertise of both the Faculty of Engineering and Applied Science and the Faculty of Business Administration. The completion of twelve courses results in a Master of Engineering Management, or MEM, degree. The program consists of five courses offered by the Faculty of Engineering and Applied Science, five courses offered by the Faculty of Business Administration, and a two-course project. These courses are shown in Table 1.

To be eligible for the program, applicants must have a Bachelor of Engineering or Bachelor of Science degree in an engineering discipline from a university of recognized standing, with a cumulative B-average. The three Engineering electives required in the program are therefore designed to further the MEM student's technical knowledge in his or her chosen engineering discipline or the technology sector in which she or he works. The Business courses required are designed to equip the engineer to have basic management knowledge at any level within a technology-based organization.

Faculty of Engineering and Applied Science (FEAS)	Faculty of Business Administration (FBA)
Engineering Management Topics	Marketing
Advanced Modeling and Quality Management	Accounting
3 Electives	Organizations: Behaviour and Structure
Project	Managerial Finance
	1 Elective

Table 1: Courses Requirements in the MEM Program

For international students, the program begins with an intensive eight-week session of English language instruction and an introduction to Canadian culture. Notwithstanding, admission requirements for international students include a TOEFL score of at least 550 for the paper-based test, 80 for the Internet-based exam, a minimum overall score of 6.5 on the IELTS test, or other demonstration of English proficiency as prescribed by the university. This typically includes a three-part English writing exam which tests reading comprehension, essay writing, and “skim-and-scan” reading, as well as a face-to-face interview with a university representative.

In the first two cohorts of the program (total of 19 students), 63% of the students are full-time and international, while 37% are part-time students, holding full-time positions in local industries. The program can be completed in 4 semesters on a full-time basis, and students have up to 9 semesters to complete the program on a part-time basis. On average, the students have 2.5 years of work experience, with 60% of the students having held full-time technical positions, or undergraduate internships, prior to starting the MEM program. Currently, students admitted have a variety of engineering backgrounds: Electrical Engineering and Electronics Design, Computer Engineering, Ocean and Naval Architectural Engineering, Mechanical Engineering, Industrial Engineering, Civil Engineering, Environmental Engineering, Biomedical Engineering, and Engineering Management.

### Program Promotion

In the first nine months leading up to the first course offerings of the program in the Fall of 2009, intensive effort was exerted to promote and recruit for the program locally and internationally. Posters were made in English for distribution and sent to Canadian universities with Engineering undergraduate programs. Posters were also made in Chinese for distribution on recruitment trips. An article announcing the new course-based programs in the FEAS was featured under a “Dean’s column” in the Professional Society of Engineers and Geoscientists of Newfoundland and Labrador (PEGNL). Feature articles were published in the university newspaper, *The Gazette*, as well as the provincial newspaper, *The Telegram*, during Engineers Week. A print advertisement, shown in Figure 1, was placed in the January/February issue of *Atlantic Business*, a bi-monthly glossy consumer publication founded in 1989 that covers all areas of business within the four Atlantic Provinces. It is the longest publishing regional business magazine in Atlantic Canada as well as the most award-winning and largest circulation business magazine in the region, publishing a minimum of 35,000 copies per issue. *Atlantic Business* follows a controlled circulation model of distribution that reaches business readers via *The Globe & Mail* and places hard copies of issues in select locations such as airport executive lounges, major hotels and Marine Atlantic ferries.

## Engineering Management

## ENGINEERS *who mean business*

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MECHANICAL • ELECTRICAL • PROCESS • CIVIL • COMPUTER • OCEAN/NAVAL

The Master of Engineering Management (MEM) program at Memorial University of Newfoundland equips forward-thinking engineers in professional, technology-based industries with relevant, cutting-edge knowledge in engineering and management.

- Manage multi-disciplinary teams
- Enhance communication and interpersonal skills
  - Understand financial management
  - Recognize marketing strategy
  - Create innovative solutions
  - Build technical expertise
- Evaluate technological opportunities
  - Learn to lead



**MEMORIAL  
UNIVERSITY**

For further details, please contact:  
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E-mail: [GraduateEngineering@mun.ca](mailto:GraduateEngineering@mun.ca)  
[www.engr.mun.ca/MEM](http://www.engr.mun.ca/MEM)



Applications are being accepted for Fall 2010 admission.

Figure 1: Print Advertisement for the MEM Program

### Program Relevance

In the Fall of 2010, a case study was undertaken by a current MEM student for his two-course project to investigate and assess the importance of this new program to the significant technology-based sectors of the province. The objectives of this case study were to (1) examine the progression from engineer to manager, (2) look at unique challenges faced by Oil and Gas engineering managers in St. John's, and (3) make recommendations of benefit to current and would-be engineering managers in the Oil and Gas industry. Specifically, the research questions explored were:

- What are the management challenges faced for local Oil and Gas engineering firms?
- Do firms see a difference between leadership and management?
- How are engineering managers selected?
- How do engineers respond to being made managers and to being expected to lead?
- What qualities and traits should an engineering manager possess?
- What development and training is needed to manage Engineering?
- Is this training offered? Is it available?

The research process included both qualitative and quantitative aspects; namely, a face-to-face interview with 10 practicing engineering managers at identified Oil and Gas firms in St. John's and an online survey distributed to 26 Oil and Gas firms. The online questionnaire focused on gathering data related to (1) job activities, (2) job problems, (3) personal skills, and (4) planning and problem methods. Secondary data from publicly available sources was also analyzed.

In regards to job activity as compared to degree of importance to job success, Table 2 shows that *interpersonal communication, people management, leadership, motivation, and finance* were ranked as the top five activities that were “important or critical” to job success.

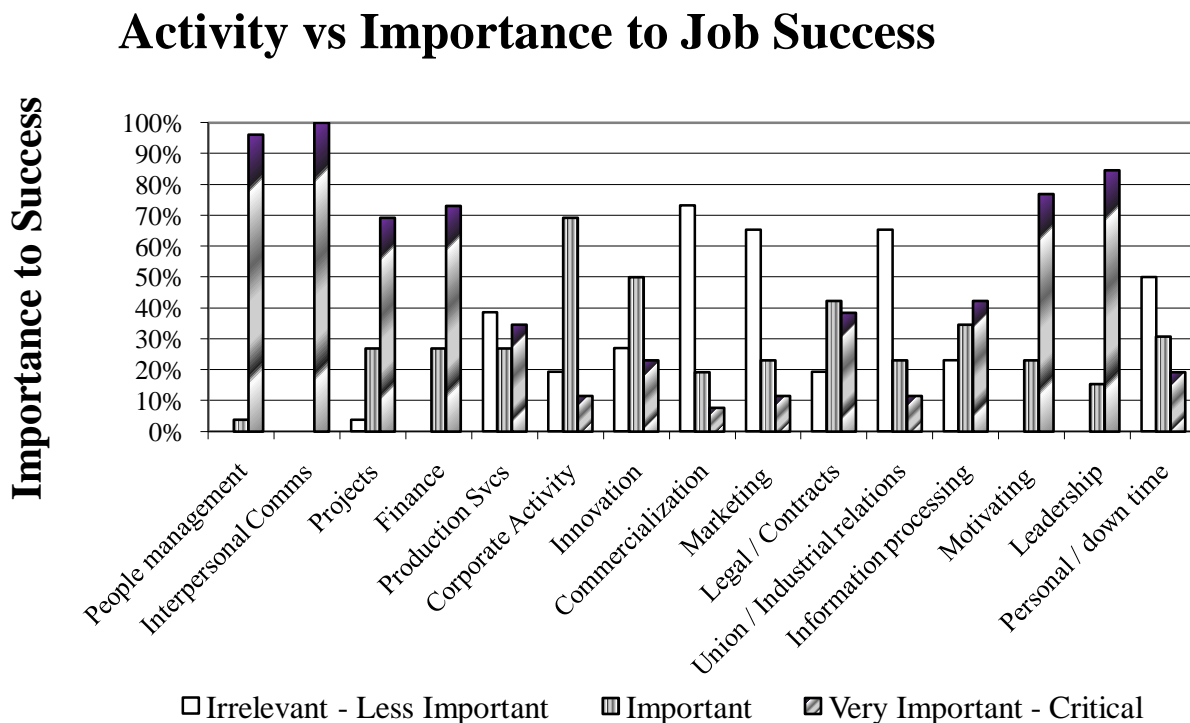


Table 2: Engineering Manager Activity and Importance to Job Success

In regards to job activity as compared to problem frequency and problem difficulty, Tables 3 and 4 show that *people management* is also the most recurring and challenging problem for engineering managers.

In Table 5, when engineering managers were asked to rate the perceived benefit of additional training in a particular skill area that would be offered in a Master of Engineering Management program, *project management* topped the list, followed by *effective speaking, motivating, and leadership*.

## Activity vs Problem Frequency

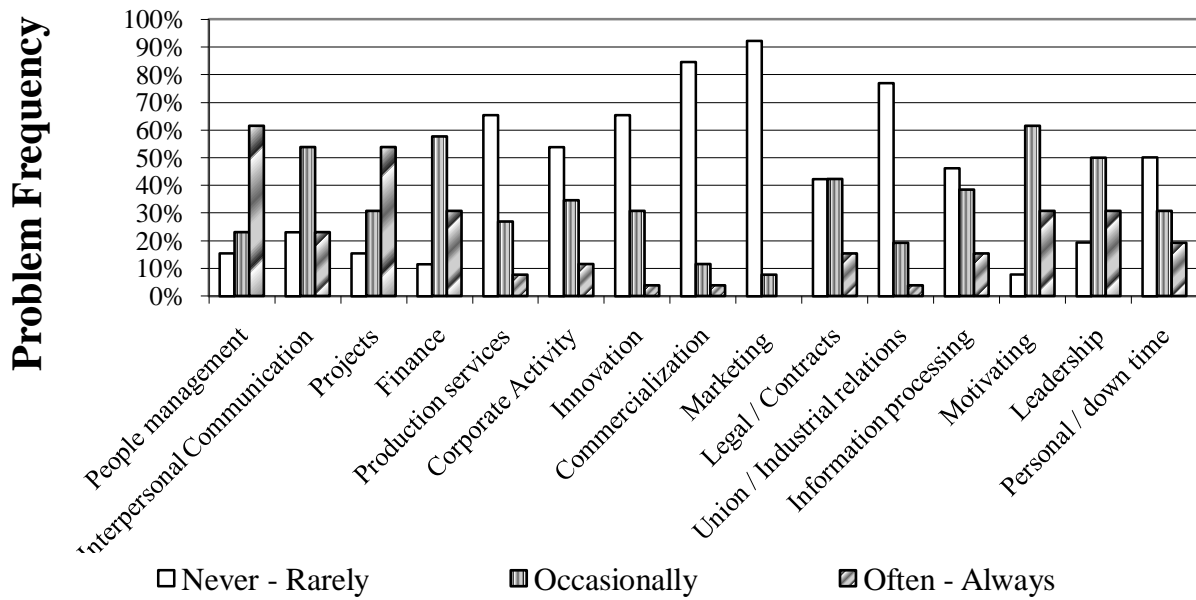


Table 3: Engineering Manager Activity and Problem Frequency

## Activity vs Problem Difficulty

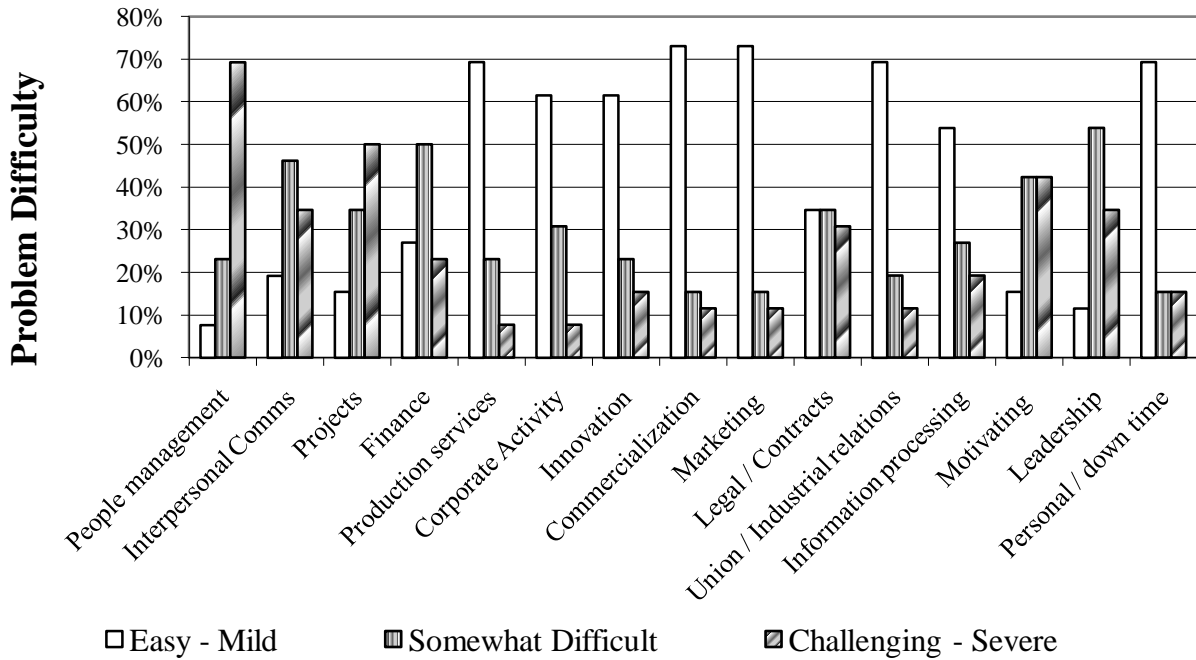


Table 4: Engineering Manager Activity and Problem Difficulty

## Skill Area vs Benefit of Training

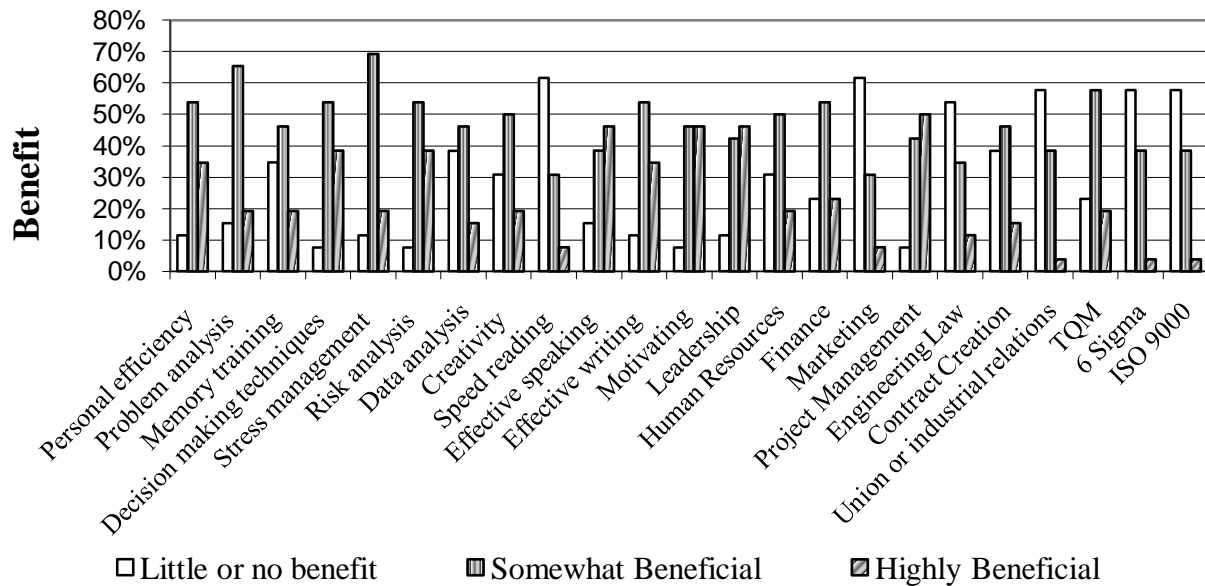


Table 5: Perceived Benefit of Additional Training in an Engineering Management Skill

### Discussion

The initial research presented in this paper supports the balance of Business and Engineering graduate courses as required by MUN's Master of Engineering Management program. Specifically, practicing engineering managers are stating that "professional skills", sometimes inadequately called "soft skills", are what is more required for being *effective* in a technical leadership position. These "soft skills" are often gained from courses in Organizational Behavior, Marketing, and Entrepreneurship/Innovation. It is interesting to note that while *Marketing and Commercialization* are not viewed as important aspects of an engineering manager's responsibilities, based on the research results, both are typical core courses in an MEM program. It is suggested that perhaps they are rated as "irrelevant, easy, less important, and with little or no benefit" because there are typically Marketing and Legal departments, for example, within technology-based organizations to which engineering managers can direct any issues. In addition, marketing may be ill-defined, or imprecisely perceived by engineering managers, as "sales, promotion or advertising" only, where Marketing can include more strategic responsibilities as new product development, understanding customer adoption, and market diversification of technology-based products or services.

A survey of the five American universities that formed the Master of Engineering Management Programs Consortium in 2007, namely Stanford University, Dartmouth College, Cornell University, Northwestern University, and Duke University, all show that even though each program has its unique focus and a defined theme, the programs all incorporate a interdisciplinary approach, taking from a balance of courses in Management and Engineering<sup>1</sup>. Standard core courses in Management include Marketing, Finance, Accounting, Strategy in High-Tech Industries, Entrepreneurship, Leadership and Organizational Behavior.

The initial research results presented also suggest that *project management* is a topic that should be addressed in Memorial's MEM program to be more relevant to engineering managers.

Finally it is interesting to note that "personal/down time" plays a peculiar role. The engineering managers surveyed indicate that while they are not getting enough "downtime", they do not necessarily recognize it as a problem. Further research can relate this finding to work habits and personal characteristics and traits of engineering managers, i.e. hard-working, dedication to detail, and with a strong internal locus of control<sup>2,3</sup>.

## Conclusion

The MEM program at Memorial University of Newfoundland is one of three specifically designated MEM graduate programs in Canada. In its second year of offering, enrollment has increased five-fold, with a good blend of local and international, part-time and full-time, and male and female students from various Engineering backgrounds. The Oil and Gas industry is one significant sector in the province by which Engineering Management skills are relevant and in demand. This paper presented the initial findings from practicing engineering managers who were surveyed and interviewed regarding their current roles and activities, and used to evaluate the purpose and relevance of MUN's MEM program for those in training.

## References

1. "Master of Engineering Management Programs Consortium," [www.mempc.org](http://www.mempc.org), last retrieved January 24, 2011.
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