ENGINEERING STUDENT'S PERCEPTION AND ATTITUDES TOWARDS NATIONAL DEVELOPMENT

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INTRODUCTION

The quality of people's life is massively dependent upon the engineering skills of those who design and develop our goods and infrastructure. (Grainger and Kestell, 2012) Engineers are recognized as a valuable asset for the economies in which they work, in particular because of their contributions to innovation and productivity. (Matthew, 2012) Every year, a large number of students throughout Sri Lanka come to earn their qualifications in engineering disciplines. To cater for these students private engineering colleges and universities of technology are mushrooming all over especially in the main cities in Sri Lanka. These engineers become future leaders and professionals who contribute to social wellbeing and national development and therefore, the quality of an engineer's education and their attitudes towards national development have immense significance. According to Goh et al., 2008, future engineers should have the ability to work in a multi-disciplinary multi-cultural way with deep technical knowledge to address global challenges. But the general aim of engineering studies is to become a engineer; it is not a requirement of students to have knowledge in multidisciplinary domains such as environmental education and studies in sustainable society and development. However, these are recommendations for professional engineers especially according to the Washington Accord.Scott and Yates,(2002) said that, while technical expertise is a necessary capability for successful practice it is certainly not sufficient. In the end students should have multidisciplinary domain knowledge and approaches accommodating success stories in engineering activities. Also it is a prerequisite for a student to acquire interdisciplinary studies to achieve success in the engineering profession. Therefore, this study was carried out to evaluate newly enrolled engineering students' perspectives on becoming professionals, to assess personal commitment of engineering students to contribute to national development and enhance well-being of society through exploitation of knowledge and to promote sustainability of natural resources.

METHEDOLOGY

This study was focused on newly enrolled students group in an engineering study program that generates future engineers in different engineering disciplines. The sample was selected purposely and the group size was 110 comprising students who are employees, university students and school leavers. The questionnaire survey was conducted to evaluate student's perspectives on becoming professionals and their personal commitment to enhance social well-being, ensuring health and safety of the community. Formal and informal discussions with students were conducted to assess students' attitudes towards national development and becoming future leaders and matrix ranking was adopted to give priority to student's attitudes and commitment. Data were analyzed using a phenomenological approach and a literature survey about past studies was conducted.

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RESULTS AND DISCUSSION

General Information of Study Group

The survey was completed by 110 newly enrolled engineering students comprising employees 20%, 32.7% of university students and 47.3% of school leavers. Of the sample, 47.3% was from the Western Province, 20.0% from Central Province, 10.9% from the Eastern province, 5.5% from the Northern Province and 16.4% from the Southern Province. Figure 1 depicts the total sample of female and male enrolment in engineering courses of Civil, Mechanical, Electrical and Electronic disciplines. A total of 61.8% of the sample was male and 38.2% was female.

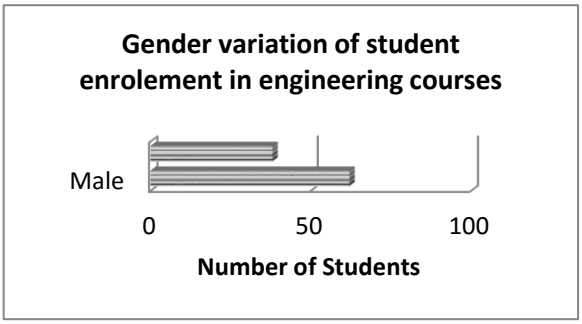

Figure 1: Male & female students enrolement

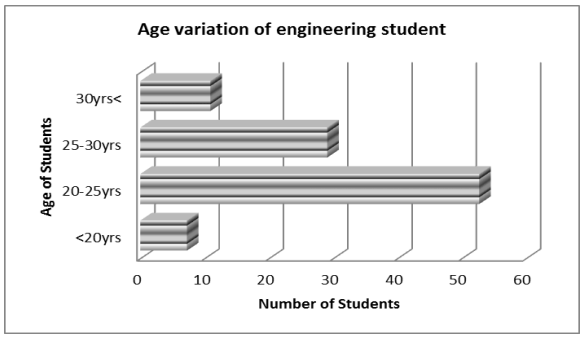

Figure 2: Age variation of student's enrolment

Figure 2 depicts the age variation of student's enrolement in engineering courses. The mean age was 22.3 years and 7.3% of student were in the age range of less than twenty, 52.7% of students were in the twenty to twenty five range, 29.1% of students were in the twenty five to thirty age range and 10.9% were in the more than thirty age range . It was found that a lot of students are in the younger age group. Theresults show that students who have not entered in the conventional universities, want to develop their careers in the engineering field as well those who didn't get entry requirements for engineering studies enroll in private colleges of engineering to aquire engineering qualifications. Students in age groups of more than thirty and some students in the 25 to 30 years age group were employees and aquiring engineering qualification as it is a prerequisite for their career development. There was a wide range of economic backgrounds, with parent's household income ranging from less than Rs. 75,000.00 to more than Rs. 75,000.00 monthly. 20.0% of students were self funded as they are employed or running their own businesses.

Meaning of engineering studies

Table 1 presented student's perception on becoming an engineer and their future aspirations. Here student's ideas on "why would you like to become an engineer?" were collected during the formal and informal discussions and prioritized in seven categories as presented in table 1.The first column shows student's perspectives and other three show whether "agree", "disagree" and 'neutral" which meant not responded.

According to the results shown in table 1; 89.1% of students really needed to exploit their skills and capabilities to be successful in the engineering profession. 92.7% of students expected good respect and a hierarchical status in society. 49.1% of students really needed to enjoy and satisfy their career aspirations. 80.9% of students' expectation was to have a big salary and financial security. It is an objective of the study to investigate student's attitudinal changes after studying the engineering in context course module that has included course content like characteristics of professional engineers, engineering code of ethics and so on.

Table 1: Engineering student's perspectives to be a professional engineer

	Student's perspectives	Agree %	Disagree %	Neutral %
1	To enhance intellectual development through planning, finding and organizing and technological and scientific discovery	60.9	21.8	17.3
2	To find a career that provides enjoyment and satisfaction	49.1	19.1	31.8
3	To make a big salary & financial security	80.9	10.9	8.2
4	To exploit my knowledge & skills to contribute to the engineering field	89.1	7.3	3.6
5	Variety of career opportunities like business, design, medicine, politics, law and government	59.1	35.5	5.5
6	Profession that has good respect & high privileges at society	92.7	5.5	1.8
7	To enhance welfare, health and safety of community and contribute to national development	69.1	26.4	4.5

69.1% of students stated that they want to serve society and help the nation's development. That really shows the practice of engineering does not exist outside the domain of societal interests. (Nichols and Weldon, 2013) The critical roles of engineering is to address the pressing challenges facing our societies and to tackle issues of energy, transportation and climate change; providing more equitable access to information for our populations, clean drinking water; mandate disaster mitigation, environmental protection and natural resource management, among numerous others.(United Nations Educational, Scientific, and Cultural Organization, 2010) So this study brought some insights of newly enrolled students' aspirations to become professional engineers and future leaders to contribute to national development and enhance well-being of the community that emphasized safeguarding life, health, property, economic interests, and the public welfare or the environment. (Professional Engineering Act, 2010)

What will it take for the engineers of the futures to meet society's challenges?

According to the National Academy of Engineering, with technological innovation, the world will be intensely interconnected; those involved with technology will need to be multidisciplinary; and social, cultural, political, and economic forces will impact technological innovation. That meant the engineer who is produced in the future should have multidisciplinary skills and capabilities to address the twenty first century's engineering challenges.

Table 2: Engineering student's attitudes towards national development

	Student's Perspectives	Agree %	Disagree %	Neutral %
1	Create new system of roads, building & bridges	23.6	61.8	14.5
2	Give new innovations & creations to society	78.2	14.5	7.3
3	Give my maximum commitment to development project	60.0	20.9	19.1
4	Develop Sri Lanka & other under developed countries	34.5	50.9	14.5
5	Conserve natural environment & enhance environmental and social health	38.2	13.6	48.2
6	Designing solutions to existing problems so as to help people	50.9	20.0	29.1
7	Uplift living standards of community people	53.6	20.9	25.5

Table 2 presents several findings of student's attitudes towards national development. 78.2% of students had immense preference to develop new technologies and benefit the society. 60.0% of students were very much concerned about the present development projects and their impact on socio-economic development and the environment. 50.9% of students well understood existing

problems that future engineers needed to address and to design solutions for existing problems. 53.6% of students were waiting to utilize their proficiency in engineering disciplines to ensure welfare, health and safety through uplifting living standards of community. Additionally, only 38.2% of students responded to protect the country environment and society. The amendment of multidisciplinary studies in engineering study programs can develop and train students to apply technical knowledge to reinforce sustainable social, environmental and economic development in the future. It will change future engineers' attitude towards sustainable development that is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs (Bruntland report –"Our Common Future", 1987)

CONCLUSIONS/RECOMMENDATIONS

This study was based on preliminary data and to have well understood student attitudes change, it is a requirement to further study the same student group after four years. The newly enrolled students especially employees in engineering field have immense knowledge and understand about the importance of engineer' contribution to national development as well as protection of natural environment. School leavers are looking forward to fulfilling their engineering studies and their thoughts are not well defined for social well-being and sustainable future. It is a prerequisite of engineering students to change their attitudes to ensure elevation of standards of livings and conservation of the natural environment.

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