A Leadership Development System for Electronic Engineering Students of Myongji University

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Abstract

The importance of leadership in various engineering fields is widely accepted but rarely addressed in engineering education. Although today's engineering programs provide students with opportunities for the improvement of student's communication skills and teamwork skills across disciplines, leadership development has received less attention. In this paper we present a leadership development system developed particularly for the current curriculum and students in the Electronic Engineering Department of Myongji University (EDMU), Korea, which includes the methods of student motivation and the training schedule and materials for leadership development.

Introduction

The importance of leadership in various engineering fields is widely accepted [1-2], but rarely addressed in engineering education. It is well recognized that many engineers who advanced because of their technical ability were then stymied in their ability to progress through the management ranks because they lacked non-technical management skills such as managing people, resolving conflict and communication. In addition, looking at particular skills and attributes, there is strong evidence that the top priorities of skills will be practical application, theoretical understanding, and creativity and innovation [3]. Although today's engineering programs provide students with opportunities for the improvement of student's communication skills and teamwork skills across disciplines, leadership development has received less attention.

EDMU recently developed a leadership development system particularly for the current curriculum and students, which includes the methods of student motivation and the training schedule and materials. The system approach is adopted because it is more effective and resource saving for the department, as well as easier system evaluation and improvement.

The leadership development system starts with the student recruits, finding students with more desire for leadership, and uses formal and informal classes or activities such as *electronic engineering group design* composed of multi-year students and departmental yearly *student orientation* that might be unique for the universities in Korea. For student motivation, various extrinsic and intrinsic motivation methods are included and dispersed throughout 4 year span along with several hand-on group trainings and activities. At the same time, students have to participate in the corresponding leadership development practices or trainings which provide the opportunities of leadership exercises including project management, member management, or creativity and innovation management, taking their business impacts into account. The expected difficulties in the implementation of the system are also pointed out and their possible solutions are discussed

Present state of EDMU

The EDMU aims to produce engineers committed to both scientific principles and flexible application skills by exposing students to long hours of lab training and industry related projects as well as integrated theoretical disciplines in advanced technology. The current curriculum requires more than 140 course hours (c-h) including Liberal Arts (more than 20 c-h), Mathematics, Science, Computer (more than 30 c-h), and Engineering including design (more than 70 c-h). The number of students and full time faculty members are 400 and 11, respectively.

The current curriculum does not require any management related courses and the EDMU does not offer any intense courses or training program for leadership development for students. Each year, the department holds a 2 day orienta-

tion meeting (called LMT, leadership and membership training) for new students and volunteering existing students. Most sessions of the meeting are composed of introduction of the department and curriculum, guide line for college life, speech by a guest speaker, individual/group meeting with faculty members, leadership training, and group activities and welcome party for better acquaintance among students. Although, the leadership related activities and training are one of the major objective of the orientation meeting, the intensity and time are far less than enough to help students understand the importance of leadership during their careers, and the number of about 350 participating students make the leadership training no more than abstractive theoretical lecture-based training, failing to fully motivate students and to provide appropriate hand-on exercises for their leadership development.

Development of the EDMU-SMSDL

Although the Student Motivation System for Leadership Development in Electronic Engineering Department of Myongji University (EDMU-SMSLD) is intended to be applied with minimal impact on the current curriculum and department structure of EDMU, it will be a new addition to the existing system, causing a share of departmental focus, which is totally directed to engineering at present, with behavioral science or management. Because of this share of focus, which is essentially a change, we adopted the Change Process [4] for the development of EDMU-SMSLD.

01. A leader is defined as a person who holds a position that requires decision making or influencing power, including team leaders, managers, technology experts, or conventionally defined leaders
02. The system should be feasible and applicable with a minimal curriculum and structural change of EDMU
03. The system should have a capability of self-improvement using feedback.

The following is the list of the scope and goals for the motivation system development for EDMU.

I. Formation of a guiding coalition

In order to be successful with the development and implementation of the EDMU-SMSLD, it is essential to get total support and participation of all the faculty members in the EDMU. All the faculty members were required to be a member of the guiding coalition, where the needs for EDMU-SMSLD and plan for its development and implementation were reviewed, understood, modified, and improved by the members. In addition, several students were required to participate in the guiding coalition because they would be a good source for student's opinion and feedbacks, and more importantly it was anticipated that their participation and voices would appeal much more to students. Other members we needed to include were from industry who could complement the gaps between academia and industry.

II. Development of a shared vision

The shared vision on the EDMU-SMSLD is a key factor in its successful implementation because the students entering EDMU expect a curriculum focused on electronic engineering, rather than the systemic approach of leadership motivation and training in the department. Because the better motivation arises from short, easy-to-understand, and sympathizing sentences, the shared vision is written as following;

"The 21st engineering wants leaders who are able to lead and manage practical application of technology, theoretical understanding, creativity and innovation, along with non-technical capabilities such as business impacts of technology applications and people management using appropriate communication skills."

III. The EDMU-SMSLS

Figure 1 shows the two major procedures of the EDMU-SMSLD. The system takes new students as input and motivates them and have students put an effort (train) on the development of effective leadership/managerial capability. In doing so, the functions introduced in the above section are appropriately mixed for the successful leadership development. Two different levels of motivation and effort procedures are prepared and each procedure can be repeated during 4 year university period, depending on the progress of individual students.

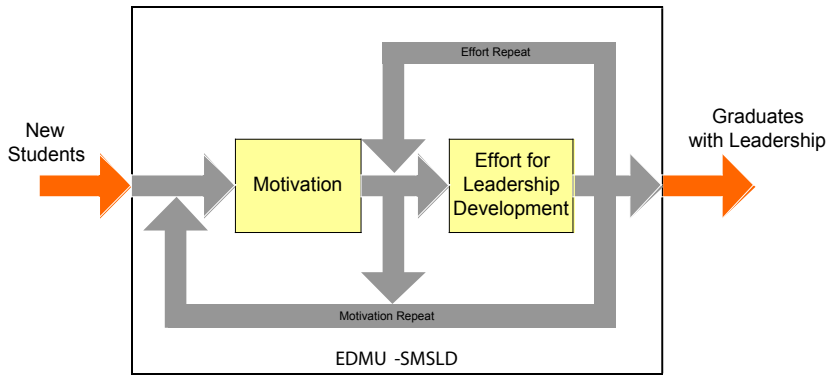

Figure 1: Systemic procedure with repetitive motivation and effort until graduation

The detailed implementation of EDMU-SMSLD is summarized in Table I. The motivation procedure is composed of two levels; Novice (level I) and Advanced (level II). The level I is for freshmen and the major goals for this level is to introduce the knowledge and understanding about leadership and why we need it, trying to strongly motivate students to generate the need for leadership development. In level I, extrinsic motivation will be focused more than intrinsic motivation. The effort for leadership development in level I aims at learning about leadership (rather than practice) through activities. However, role of students in this level is closer to a follower rather than a leader, trying to understand his/her need (or attitude) to be a leader. The motivation procedure will be performed during orientation period, and the Effort procedure will be performed afterward through the school year.

The level II is for students who already took the level I procedure. The level II procedure focuses more on intrinsic motivation. The level II motivation procedure is held during orientation period where existing students have to attend for level II motivation procedure. If a student who wants to attend the level I procedure again, he/she can attend it. The effort for leadership development procedure in level II is focused on the practice of leadership. Students in the level II effort procedure are required to lead a team for a specific goals using capstone design, project courses, or specifically designed conference during summer vacation. Although students are required to follow two year level during four year college period, they can repeat if they want.

Table I: Detailed implementation plan of EDMU-SMSLD.

		Motivation	**Effort for Leadership Development**
Level I	When/How	Orientation (End of Feb or beginning of March)	Summer Vacation (2 days) Capstone Design Class, Project Class
	To Whom	Freshmen or higher	Freshmen or higher
	Contents	Introduction to Motivation Motivation & Education Maslow's Hierarchy Theory Coercion Extrinsic Motivation What is a leadership? Who are leaders? Life as followers, not as a leader	Need theory: Case Study (AT&T 20 year study of managers) Rewards and reinforcement Why we should be a leader? How to become a leader Know yourself Know the world around you Leadership can be obtained through train and education
	Activities	Role Comparison Survival Exercise Video Group discussion	Leadership Job Interview Project classes Summer Vacation Leadership Camp Video

Level II	When/How	Orientation (End of Feb or beginning of March)	Summer Vacation (2 days). Capstone Design Class, Project Class.
	To Whom	Sophomore, Junior, or Senior	Sophomore, Junior, or Senior
	Contents	Intrinsic Motivation Self-determination Theory Herzberg's two-factor theory David McClelland's achievement motivation theory: Need for achievement, Need for power, and Need for affiliation How to become a leader? Leadership can be obtained through train and education	Goal-setting theory Expectancy theory Transformational Leadership Transactional Leadership Examples of leaders Deploying yourself Getting people on your side Managers vs. Leaders
	Activities	Understanding yourself Role Comparison Survival Exercise Video Group discussion	Project Classes Summer Vacation Leadership Camp Capstone Design Survival Exercise Video Group discussion

Discussion

Because the needs for student leadership/managerial capability development are easily understandable and acceptable in light of current social situation of unintentional and unexpected early retirement or lay-off, no serious resistance is expected about the needs of the leadership development, but the way and the driving intensity to implement the EDMU-SMSLD may face different opinions or opposition at different levels depending on one's position and situation.

Professors may show resistance if the EDMU-SMSLD require significant change in the current curriculum or become too much extra burden for them. This kind of resistance can be prevented or minimized by carefully designing the implementation method of the EDMU-SMSLD, reflecting the current curriculum in harmony, while communicating the view of the EDMU-SMSLD and persuading the needs of the student's effective leadership/managerial capability development for the future of students and, at the same time, EDMU.

Students may show resistance if they had expected a focused education only on electronic engineering in the EDMU, if the EDMU-SMSLD is not valuable for their future, or if they think that the participation in the SMSLD burden them too much. However, it will not be a problem if the students are motivated well while the system provide a step by step procedure within courses or as a special conference during orientation or summer vacation leadership development camp.

The goals of the evaluation of EDMU-SMSLD are to improve the system by collecting feedbacks from students, graduates, department faculty, industries that hire EDMU graduates, and/or outside training service providers. The form of feedbacks may include survey, observation, evaluation, or ratios of graduates who become leaders in 3 years, 5 years, and 8 years. The feedback will be analyzed and categorized, and then be used to improve the EDMU-SMSLD each year.

Acknowledgements

Although the Student Motivation System for Leadership Development in Electronic Engineering Department of Myongji University (EDMU-SMSLD) is intended

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