DEVELOPMENT OF A LEADERSHIP MODEL FOR STUDENTS IN THAI HIGHER EDUCATION INSTITUTIONS OF SCIENCE AND TECHNOLOGY

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Abstract: Leadership development is becoming a critical issue for Thai higher education system since the lack of leadership skills for Thai graduates particularly in the science and technology discipline raises concerns for all sectors involved including stakeholders who expect to recruit the ones with full range of knowledge and capacities. This study aims at developing a leadership model for students in Thai higher education institutions of science and technology to help develop and prepare students to become competent graduates as well as leaders who could gain success in their future. The objectives of this research are: 1) To identify the expected leadership characteristics and practices of undergraduate students of higher education institutions of science and technology in Thailand, 2) To explore the leadership characteristics and practices of undergraduate students of higher education institutions of science and technology in Thailand, 3) To develop a model with the reference to the needed characteristics of undergraduate students of higher education institutions of science and technology in Thailand.

This research was conducted using both qualitative and quantitative methodology. There were four phases for developing the model as follows: 1) documentary research and interviews, 2) survey procedures, 3) draft model development and 4) model validation. The samples for the interviews were selected by purposive sampling techniques while the samples for the survey were selected by the criteria and proportional stratified sampling method. The Student Leadership Practices Inventory questionnaires by Kouzes and Posner were used as an instrument along with the semi-constructed questions for the interviews. The data analysis was done through the synthesis of the documents, the constant comparative method, the descriptive statistics (means and standard deviation) and the connoisseurship model of evaluation.

The major findings were the essential elements which should be composed in the model. From the results, it showed that students needed to develop these components. They were 1) 2 aspects of values, 2) 8 skills and 3) 5 practices needed to be enhanced. The findings also proposed three factors influencing leadership development including opportunity, motivation and engagement. From the characteristics found in the findings, it guided how to construct the model. The final model was created in form of multilayer circle representing all components that must be enhanced to achieve the goal of the model. With the consent of the focus group experts on the model validation, the model for developing leadership for students in Thai higher education institutions of science and technology was complete and supplemented with the constructed course to apply the model as an implementation to help develop students potentially to become competent leaders in the future.

Keywords: Leadership Model, Students in Thai Higher Education Institutions of Science and Technology

Background of the Study

Science and technology have become a crucial foundation for the country's development in economic, social and politic scenes (Charoenpipatpol, 2002). Satoru posits that science and technology are also identified as a major mechanism for sustaining the development of societies (as cited in Charoenpipatpol, 2002). Also, science and technology play a key role to the improvement of the standard of living, leading to the betterment of the quality of life (Lagowski 1994, in Charoenpipatpol 2002). Apart from its influence on the country's development, science and technology have been fully recognized as an indicator of achievement of the nations' economies as Charoenpipatpol asserts that the competition of knowledge based economies is becoming considerably dependent on the advancement of technologies in response to the economic globalization (2002).

Singh states that for Thailand's success in developing science and technology, having sufficiently scientific and technological manpower is regarded as a vital tool for enabling Thailand's economy to compete other nations potentially (as cited in Charoenpipatpol, 2002). In order to produce the quality competent manpower, higher education institutions play a major role in providing education and training, in particular, the ones specializing science and technology may be considered as a leading group as this is their core missions of developing the quality manpower in the field (Charoenpipatpol, 2002).

Regarding with the major reform of education in 2003, Thai higher education system has been restructured and strengthened its capacity of producing graduates. The Office of the Education Council (OEC), Ministry of Education has set goals of higher education reform and one of the them has emphasized the quality

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of graduates as it says "to produce graduates responding to social needs and harmonious with national development trends, particularly in the fields of science and technology, and to enhance the knowledge of the Thai people, who will be endowed with the basic qualifications of global citizenship." (OEC, 2004, p.10) Such the goal has been set due to the changed needs for human resources regarding knowledge, capability and characteristics in order to respond with globalization and the age of technology which has resulted in the knowledge-based society (OEC, 2004). Therefore, the institutions of science and technology are likely to be regarded as a major mechanism of national capacity-building for producing high quality manpower to strengthen the community as well as to enhance the national competitiveness in the international arena.

However, the quality of manpower in science and technology is doubtful as the feedback from stakeholders reveals that the fresh graduates still lack some necessary skills. One of the qualities they are looking for is leadership skills (Charoenwongsak, 2010). The issue of insufficient leadership is also written by Professor Charoenwongsak (2010) who is an academic and educator. He mentions several factors which discourage children from possessing leadership skills and one of them is that Thai education institutions at all levels make less emphasis on developing and encouraging students to possess and practice leadership skills which are necessary qualities to help those students to manage well with the change in society, economy as well as globalization (Charoenwongsak, 2010)

Due to the need of quality graduates in the field of science and technology and the need to enhance leadership for Thai college students, the focus on students of Thai higher education institutions of science and technology in terms of leadership will be the topic of this study in order to serve well with the Thai Government's policy on human development and quality of life. This study, hence, is attempting to develop a model of leadership in students especially of higher education institutes of science and technology as a pathway to fulfill the need of the Office of the Education Council's plan as well as to equip those students with indispensable skills and practices to prepare them for leading successfully in this rapidly changing world.

Research Objectives

1. To identify the expected leadership characteristics and practices of undergraduate students of higher education institutions of science and technology in Thailand.
2. To explore the leadership characteristics and practices of undergraduate students of higher education institutions of science and technology in Thailand.
3. To develop a model with reference to the needed characteristics of undergraduate students of higher education institutions of science and technology in Thailand.

Scope of the Study

The study focused on regular program undergraduate students of Thai higher education institutions of science and technology who were studying in the academic year 2011. Those students were analyzed by examining five leadership practices based on Kouzes and Posner's leadership framework which included five practices : 1) Model the way, 2) Inspire a shared vision, 3) Challenge the process, 4) Enable others to act and 5) Encourage the heart. The research instrument developed by Kouzes and Posner, Student Leadership Practice Inventory (2006) were used in the study.

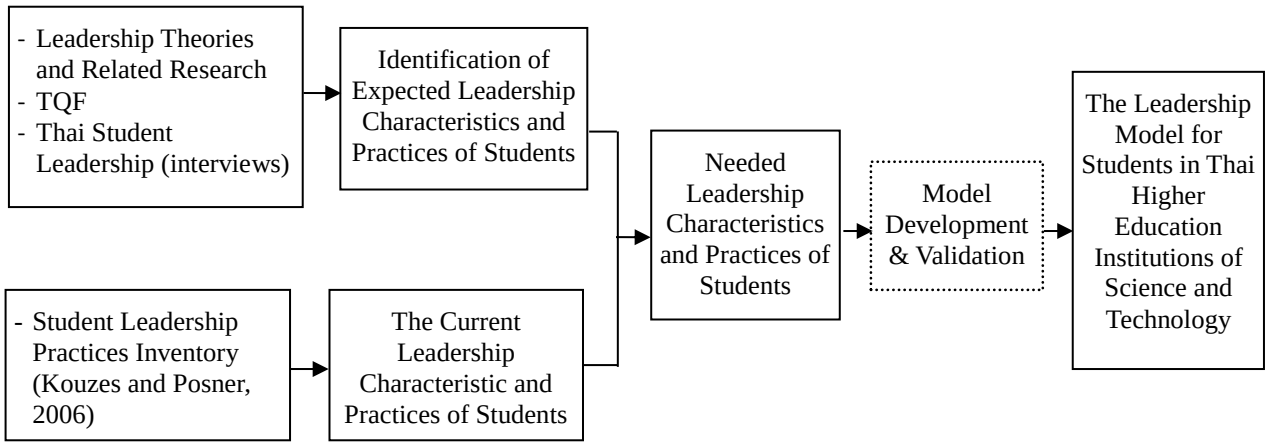

Figure 1: Conceptual Framework – The Leadership Model for Students in Thai Higher Education Institutions of Science and Technology

Conceptual Framework of the Study

Research Methodology

This study was conducted using a mixed method methodology, both qualitative and quantitative and dividing into four phases as follows:

Phase 1: Documentary Research and Interviews.

This phase was to analyze and synthesize the data collected in forms of documents including textbooks, articles in journals, research studies, dissertations and Thai Qualification Framework (TQF). The interviews of educational leaders and student leaders in institutions of science and technology were conducted and analyzed with the constant comparative method. The results from the first phase were the expected leadership characteristics and practices of undergraduate students of higher education institutions of science and technology in Thailand.

Phase 2: Survey Procedures. This phase was to assess the current leadership characteristics and practices of the sampling group of students by using the questionnaire with 30 items. The data werecollected using proportional stratified sampling technique. The samples of this study were 400 undergraduate students from three institutes serving as the well representative population namely, King Mongkut's University of Technology Thonburi (KMUTT), King Mongkut's University of Technology North Bangkok (KMUTNB) and King Mongkut's Institute of Technology Ladkrabang (KMITL). The Yamane Table was used to determine the sample size. The instrument in this study was the Student Leadership Practices Inventory questionnaire created by Kouzes and Posner (2006).The completed questionnaires were analyzed by using Statistical Analysis (Means and Standard Deviation). The results of the second phase were the actual leadership characteristics and practices of undergraduate students of higher education institutions of science and technology in Thailand.

Phase 3: Draft Model Development. This phase utilized the results from Phase 1 and 2 to develop the leadership model. After analyzing the results, the needed leadership characteristics and practices derived were conceptualized and the draft model was constructed.

Phase 4: Model Validation. In this phase, the draft model created in the phase 3 was validated through Connoisseurship Model (Guba, 1981). As a result, the draft model was adjusted and the leadership model with the reference to the needed characteristics of undergraduate students in Thai higher education institutions of science and technology was achieved.

Population

The population of this study consisted of four groups of people: 1) educational leaders in charge of Student Affairs in Thai higher education institutions of science and technology; 2) undergraduate students as leaders or administrators in student unions or Faculty student' s organizations in Thai higher education institutions of science and technology in the academic year 2011; 3) undergraduate students in Thai higher education institutions of science and technology in the academic year 2011; and 4) experts in the Educational Leadership or Educational Administration or Students Affairs.

Samples

For the research objective one, the samples for the interviews were selected by applying the purposive sampling technique. There were 3 educational leaders in charge of Student Affairs and 9 student leaders working in Student Unions or Student Organizations in institutions of science and technology.

For the research objective two, the population was a large number of all students of 17 institutes as it was 210,420 students. The criteria were then set to determine the sample size. The first criteria was the selected institutes must provide a variety of academic programs focusing on the field of science and technology and the proportion of the programs offered in science and technology should be more than 80 % of all the programs. The second criteria for the selected institutes was they have been founded officially as higher educational institutions of science and technology and have produced graduates in this area for more than thirty years so that they have received recognition and reputation as an academic institute specializing in this field. Consequently, there were three higher educational institutions which matched with both criteria. They comprised King Mongkut's Institute of Technology Ladkrabang (KMITL), King Mongkut's University of Technology North Bangkok (KMUTNB) and King Mongkut's University of Technology Thonburi (KMUTT). Therefore, the samples were selected from the three higher education institutions (KMITL, KMUTNB and KMUTT). The sample size was drawn by using the Yamane Table. The sample size then was determined as 400 students.

Table 1: The List of the Selected Institutions, Population and Samples

No.	Institutions	Population (number of students)	Samples	Percentage
1.	KMITL	18,840	175	43.74 %
2.	KMUTNB	12,225	114	28.38 %
3.	KMUTT	12,005	111	27.88 %
	-	48,786	400	100 %

In order to distribute the 400 questionnaires to the samples, the method of a proportional stratified sampling was applied. Firstly, students were divided into groups according to the faculties. Then the students were randomly selected within each faculty at the main campus of each institute (Leedy & Ormrod, 2005). The following tables represented the number of samples when classified by each faculty in each institute.

Table 2: The Samples of King Mongkut's Institute of Technology Ladkrabang

Faculty	Population	Samples
Engineering	6,147	57
Architecture	2,040	19
Industrial Education	1,906	18
Science	4,065	38
Agricultural Technology	2,852	26
Information Technology	369	3
Agricultural Industry	773	7
College of Nanotechnology	47	1
College of Management and Administration	641	6
Total	18,840	175

Table 3: The Samples of King Mongkut's University of Technology North Bangkok

Faculty	Population	Samples
Engineering	3,734	35
Industrial Education	1,302	12
Applied Science	2,818	26
Architecture and Design	526	5
College of Technological Industry	3,845	36
Total	12,225	114

Table 4: The Samples of King Mongkut's University of Technology Thonburi

Faculty	Population	Samples
Engineering	5,340	49
Industrial Education	3,781	35
Science	1,639	15
Architecture	601	6
Information Technology	643	6
Total	12,005	111

Table 2, 3 and 4 represented the number of population and samples from the three institutes. With the highest number of students, the samples taken from King Mongkut's Institute of Technology Ladkrabang were 175 students whereas 114 students were chosen from King Mongkut's University of Technology North Bangkok. The least number of samples was 111 students taken from King Mongkut's University of Technology Thonburi.

For the research objective three, the samples were the experts for proposed model validation. All experts were selected with the purposive sampling technique with the criteria. The first group of experts was educational leaders who were in the executive positions in the Division of Student Affairs of higher education institutions for at least two years. The second group of experts was the ones who either held Doctoral degree with the experience of Educational Leadership (Administration) at least two years or the one who held the executive positions in Thai higher education institutions of science and technology. There were totally nine experts who matched the criteria. The name list and positions of the experts were provided in the Appendix J.

In summary, according to the research objectives of this study, the samples were shown in the following table.

Table 5: All Samples in the Study

Research Objectives:	Samples from 17 Higher Education Institutions of Science and Technology:
Objective 1	3 Educational leaders in charge of Student Affairs and 9 student leaders or student administrators
Objective 2	400 ordinary students
Objective 3	9 Experts in the Educational Leadership or Educational Administration or Students Affairs.

Research Instruments

There were three instruments used in the study: 1) the interview questions for educational leaders, 2) the interview questions for student leaders and 3) the Student Leadership Practices Inventory (SLPI) questionnaire.

1) The interview questions for educational leaders were developed as the semi- structured interview protocol, constructed on the basis of theoretical framework, literature review and the objectives of the study, and consisted of eight questions for exploring the expected leadership characteristics and practices of undergraduate students of higher education institutions in Thailand. Then the interview questions were checked for their content validity and approved by two experts in the field of Educational leadership.

2) The interview questions for student leaders were created as a parallel tool with the interview questions for educational leaders. They were constructed with the same process as well as were checked for their content validity with the two aforementioned experts.

3) The Student Leadership Practice Inventory (SLPI) questionnaire, with the permission from the authors, was employed in this research. The process for the use of SLPI questionnaire and the brief overview of the questionnaire were described as follows.

Data Analysis

There were four main approaches to the data analysis for this research. First, the qualitatively analysis and synthesis was done for the first part of the research objective one in reviewing all documents. Second, the constant comparative method was applied for the interviews analysis. Third, the data analysis in the second research objective was operated through Window Package used by Assumption University to gain descriptive statistics (means and standard deviation). The last approach was Connoisseurship Model for validating the model.

Research Findings

The research findings from phase 1 and 2 showed that there were three main categories found namely, characteristics, components and factors. The first category, the expected leadership characteristics, was shown as follows:

1. Leadership can be learned and developed and it is lifelong learning.
2. Leadership is value based.
3. Leadership is for every student.
4. Leadership is an interactive and collaborative process which is dynamic.
5. Leadership actions and ability with ethical and moral reasoning and courage are the core concept.
6. Leadership concerns change and challenge in a way that makes thing better.
7. Leadership creates the better community by actions neither authority nor position.
8. Leadership involves creating a shared vision towards common goals.
9. Leadership concerns serving, caring and empowering people around.

The second category, the components consisted of 5 practices, 8 skills and 2 values. The 5 practices were 1) Model the way, 2) Inspire a Shared Vision, 3) Challenge the Process, 4) Enable Others to Act and 5) Encourage the Heart. The 8 skills included 1) responsibility, 2) analytical thinking, 3) creative thinking, 4) ethical decision making, 5) problem solving, 6) teamwork building, 7) communication and 8) English language. The values were Leadership for Change and University-based Identity.

The last category comprised 3 factors influencing the development of leadership model. They were motivation, engagement and opportunity.

These findings were then conceptualized and utilized to construct the draft model. After being validated by Connoisseurship Model Evaluation, the draft model was adjusted and became the finalized model shown as follows:

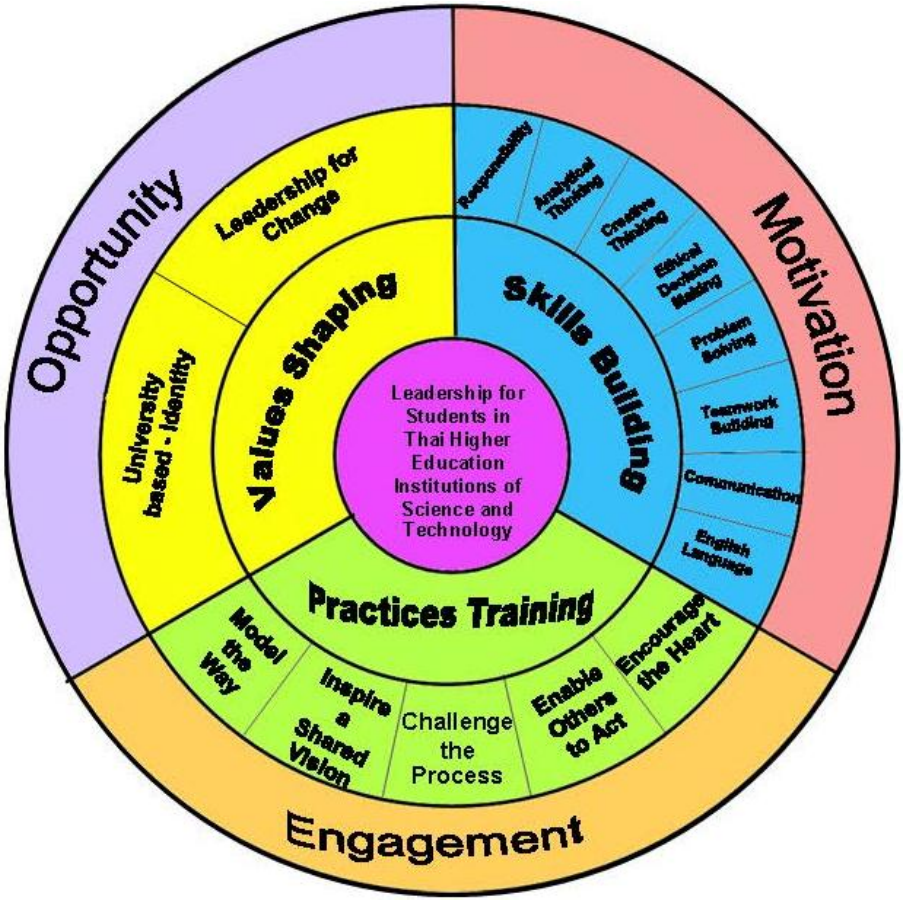

Figure 2: A Leadership Model for Students in Thai Higher Education Institutions of Science and Technology

An Explanation of the Leadership Model for Students in Thai Higher Education Institutions of Science and Technology

Based on the findings and the model validating through Connoisseurship model meeting, the final model was presented in a multi-level pie chart figure. The purpose of the model which is developing leadership for students in Thai Higher Education Institutions of Science and Technology is the first circle shown in the central of the figure. To be able to achieve, there are three main components involved in the development as shown in the second circle from inside. They refer to values shaping,

skills building and practices training. Each component then details what to be developed in the third circle. The last layer or the outer circle represents the factors influencing the leadership development which include opportunity, motivation and engagement. The following is the explanation of each layer of the final model.

- The first layer of the circle presents the outcome of the research which is Leadership for Students in Thai Higher Education Institutions of Science and Technology. The objective of the model is to develop all students to become competent leaders since leadership enables them to gain success both for their personal or work lives.
- The second and third layers of the circles show three components and subcomponents respectively. The three components are values shaping, practices training and skills building. Each one has subcomponents as follows:
  - Values shaping consists of 3 aspects including 1) Leadership for Change; 2) University based – Identity. The findings strongly support that leadership is value based. The first value, Leadership for Change can be defined with the characteristics derived from the findings as Leadership is everyone's business which concerns a collaborative, interactive and life-long learning process to deal with change and challenge by ethical and courage performance to create a better community. The second value refers to University based – Identity as this helps shape students to uniformity.
  - Practices Training comprises 5 practices which are 1) Model the Way; 2) Inspire a Shared Vision; 3) Challenge the Process; 4) Enable Others to Act and 5) Encourage the Heart. The research findings confirmed that leadership can be developed through practices.
  - Skills building include 10 skills of responsibility, analytical thinking, creative thinking, ethical decision making, problem solving, teamwork building, communication and English language.
- The fourth layer of circle refers to the factors contributing to leadership development. The first one, opportunity refers to the active provision and support from the colleges. It can be provided by university agencies both in academic and non-academic areas. The second factor is motivation which refers to how students should be motivated for developing leadership. The last factor which helps contribute to the leadership development is engagement.

Implementation of the Proposed Model

Since the optimal purpose of the model is to develop leadership for all students, the opportunity for all students to get engaged must be provided. Therefore, designing the course for the leadership development can be judged on the degree of involvement they cultivate in students as Astin posits that the outcomes of applying the theory into institutional and pedagogical practices is to accomplish highest level of student involvement and learning (1984). The designed course briefly details as follows:

Aim: To make the model understandable and accessible for all students who will gain all leadership components for their own benefit as well as for serving the community.

Rationale: Students may not realize their potential of being leaders and may lack opportunity to either take leading roles or to realize the importance of leadership. Leadership development is then needed to grow their abilities and build up their potential since it is beneficial for their own development as well as for the community. The Student Leadership Challenge's concept with the five practices for exemplary leaders by Kouzes and Posner has been taken as the core idea for student leadership development in this course. Also, The Relational Leadership Model's definition supports this value by stating that leadership is a relational and ethical process of people together trying to accomplish positive change (Komives et al., 2007). This is also sustained by The Social Change Model which is defined as a process which is purposeful, collaborative and value based and the whole process will lead to positive social change (HERI, 1996).

Another rationale is that leadership is achievable as it "is an observable set of skills and abilities" (Kouzes and Posner, 2008, P. 145). The designed model also focuses on skills and practices development.

Students can learn more effectively through motivation and the motivation can be emerged through effective learning styles. Problem-based Learning (PBL) and Project-based Learning are two learning approaches constructed in the course. The first one, Problem-Based Learning focuses on solving authentic problems like those which happen in daily life. Students are encouraged to solve problems using complex cognitive processes to achieve the results. The Project-Based Learning emphasizes how students work on real, meaningful problem and get tangible results as the end products. Students are required to be active and engage in the learning environment so that they are inspired to gain a deeper knowledge (Santrock, 2009).

In addition to Astin's Theory of Involvement, Kohlberg's Theory of Moral development is used to understand how students investigate moral and ethical dilemmas and value them. Based on its concept, building ethical decision making skills can be planned according to the stages of development (Evans et al., 2010)

Course Requirements: All students must enroll as it is a full credit course and a foundation course and must attend 80 % to pass and receive Leadership training certificate

Objectives of the course:

The course is designed for all students to:

- Develop understanding and awareness of leadership model for students in Thai higher education institutions of science and technology
- Realize and understand the needed values for leadership in the designed model: 'Leadership for Change' and 'University based-Identity'
- Acquire the 8 skills needed for leadership: Responsibility; Analytical Thinking; Creative Thinking; Ethical Decision- making; Problem-Solving; Teamwork Building; Communication; and English skills
- Become knowledgeable and well-trained of the 5 practices of leadership: 1) Model the Way; 2) Inspire a Shared Vision; 3) Challenge the Process; 4) Enable Others to Act; and 5) Encourage the Heart
- Become competent leaders to serve the community

Course contents: Unit 1 - 9

Workshop Series: Every Thursday, the workshops will be provided to complement the course for 45 hours. Examples of workshops are as follows:

- Leadership for Change (Shaping values and sense of effective leaders): Meeting with Change Leaders
- Transforming to be Change Leaders (Building Self-value/self-awareness)
- Strategies for Visions & Goal Setting (Training skills & abilities)
- Developing sense of leadership responsibility (Training skills & abilities)
- Effective Communication for Change Leaders (Training skills & abilities)
- Strategies for Teamwork Building (Training skills & abilities)
- Sharpening Thinking Skills as Leaders (Training skills & abilities)
- Strategies for Problem-Solving as Leaders
- Communicative English Skills Development (Training skills & abilities)
- Grading/Assessment
- Pass/Fail
- Facilitator/Coach/Peer/Self-evaluation through instruments, performance, group-work projects, paper assignments
- Certificate of Completion

Conclusions

The leadership model for students in Thai higher education institutions of science and technology has been developed based on the findings from all phases. The components constructed in the model were primarily supported with the findings from the literature reviews as well as the interview results. The current leadership practices were investigated for the purpose of searching which leadership practices should be needed to enhance. The model then was constructed as a draft model to be validated by the experts through Connoisseurship Model by Guba (1981). Finally, the finalized model was constructed with the adjustment by the experts' analysis and the implementation plan was provided in order to make the model applicable for developing students to be competent leaders in the future.

Recommendations

Recommendations for Future Practices

- The permission and support from the executive team especially the office of student affairs is a must to put the model into real practice.
- To promote and strengthen the model, freshman students must join the orientation program which provides a presentation that emphasizes the university's commitment to develop quality graduates with leadership. The model must be presented with clear explanation and the activities related with leadership should be promoted continuously.
- Universities should seek cooperation from stakeholders, business, industry and professional representatives by inviting them to help the universities establish leadership-training courses, programs, competitions as well as providing funding to support students' activities.
- The model must be promoted extensively on campus by any channels which are easily accessible and understandable for students. They should remember the model without difficulties. This can partially build the organizational culture.
- Facilities and suitable environment must be provided sufficiently as well as support from staff of all offices and faculties. This could create the sustainable growth of student leadership development.

Recommendations for Further Research

- The model developed in this study was constructed for students in science and technology discipline, the further comparative research could be done to find out if it could be effective to use for students in other disciplines or not.
- Based on the findings of this study, the further study which focuses on what can be the most important factors influencing leadership development should be carried out as this could help strengthen the leadership development process.
- With the implementation plan, the action research should be further carried on to find out the effective use of the model.

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