ผลการจัดการสมรรถนะการเรียนรู้ของผู้เรียนด้านวิทยาศาสตร์และเทคโนโลยี ระดับปริญญาตรี

Results of Learning Performance Management of Science and Technology Undergraduates

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การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อศึกษาการจัดการสมรรถนะการเรียนรู้ของผู้เรียนด้านวิทยาศาสตร์และเทคโนโลยี ระดับปริญญาตรี ตามกรอบมาตรฐานการเรียนรู้ที่พึงประสงค์ในศตวรรษที่ 21 จำนวน 5 ด้าน คือ 1) ด้านคุณธรรม จริยธรรม 2) ด้านความรู้ 3) ด้านทักษะทางปัญญา 4) ด้านทักษะความสัมพันธ์ระหว่างบุคคลและความรับผิดชอบ และ 5) ด้านทักษะการวิเคราะห์เชิงตัวเลข การสื่อสาร และการใช้เทคโนโลยีสารสนเทศ กลุ่มตัวอย่าง ได้แก่ ผู้เรียนระดับปริญญาตรี ชั้นปีที่ 4 ของวิทยาลัยเทคโนโลยีอุตสาหกรรม มหาวิทยาลัยเทคโนโลยีพระจอมเกล้าพระนครเหนือ ปีการศึกษา 2559 จำนวน 358 คน ใช้วิธีสุ่มแบบแบ่งชั้นภูมิ (Stratified Random Sampling) เครื่องมือที่ใช้ในการวิจัยเป็นแบบสอบถามสมรรถนะการเรียนรู้ จำนวน 1 ฉบับ วิเคราะห์ข้อมูลโดยการหาค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน การทดสอบค่าทีแบบอิสระ (t-test Independent) และการวิเคราะห์ความแปรปรวนทางเดียว (One-Way ANOVA)

ผลการวิจัยสรุปได้ดังนี้ 1) การจัดการสมรรถนะการเรียนรู้ของผู้เรียนภาพรวม อยู่ในระดับมาก โดยผลการจัดการสมรรถนะการเรียนรู้ของผู้เรียน รายด้าน อยู่ในระดับมากทั้ง 5 ด้าน 2) การเปรียบเทียบการจัดการสมรรถนะการเรียนรู้ของผู้เรียนระหว่างเพศชายและเพศหญิง พบว่า ไม่แตกต่างกัน อย่างมีนัยสำคัญทางสถิติที่ระดับ .05

คำสำคัญ: *ผลการจัดการสมรรถนะการเรียนรู้ ผู้เรียนด้านวิทยาศาสตร์และเทคโนโลยี ระดับปริญญาตรี*

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Abstract

The purpose of this research is to study the management of learning competencies of undergraduate students in science and technology in accordance with the learning standards framework of the 21st century. Five aspects were explored: 1) morality and ethics 2) knowledge 3) intellectual skills 4) Interpersonal skills and responsibility and 5) numerical analysis skills, communication and use of information technology. Using Stratified Random Sampling method, the sample group consisted of 358 fourth year undergraduate students (academic year 2016) of College of Industrial Technology, King Mongkut's University of Technology North Bangkok. The tool used in the research was a learning performance questionnaire which were then analyzed by finding an average, a standard deviation, a t-test independent test and a one-way analysis of variance (One-Way ANOVA).

The results of the research can be summarized as follows: 1) the overall value and five aspects of management of learners' learning competencies were at a high level 2) there was no gender difference (statistical significance at the level of .05.) of the learning performance management of the learners.

Keywords: *Learning performance management, Science and technology learners, Undergraduates*

Introduction

Nowadays, it can be seen that Educational institutions will experience problems with learners' behavior both in terms of lack of discipline and treat yourself to your own self more than accuracy, which may affect the peace and good morals of the society. Higher education institutions which are important organizations in producing graduates into society plays an important role in developing desirable characteristics of students who have to graduate to be consistent with the needs and values of society. The 2017 National Education Plan defines the vision that all Thai people receive quality education and lifelong learning with live happily. The goal of the implementation of the 20-year strategy (2018-2037) "Thailand 4.0" is to drive the technology and industry groups to have potential and opportunity, create stability wealth and sustainability for the country in a concrete manner (Suwit Mesinaree. 2016). Education is an important tool in preparing people for knowledge, thought, attitude, values, morality, ethics and Individual behavior in order to be a good citizen, quality and efficiency. The concept of learning management in the 21st century is an era in which people face rapid, violent, unforeseen and unexpected changes. The characteristics or competencies of learners are important features that make students able to work successfully. Principles are

based on the concept of McClelland (1973: 1-14). The components of competency are 5 parts: knowledge, skills, self-concept, traits and motivation/attitude. Sukanya Rasmithamchot (2004: 48) concluded that competency is composed of knowledge, skills and attitudes/motivation or knowledge, skills and attitude/motivation, causing performance. The Office of the Higher Education Commission (2011) have a role in preparing manpower to have the necessary characteristics in the 21st century. The framework for learning standards of undergraduate students is expected to be at least 5: ethical and moral, knowledge, cognitive skills, interpersonal and responsibilities skills, communication and Information Technology. All aspects are features that graduates are satisfied, and measures of the characteristics and readiness of learners to enter the labor market after graduating from the university. Therefore, in order to give learners the performance for the 21st century and the desired results, competencies of learners are characteristics of learners who should have and use them appropriately. Science and technology learners are manpower that is an important factor in driving the country's development into the economy and knowledge-based society which will make the country capable of adapting to change and to develop the workforce in the labor market to have high potential corresponding to the future career as well as supporting innovative industries to support the migrant market (Office of Science Policy Committee National Technology and Innovation. 2019).

Mission of College of Industrial Technology, King Mongkut's University of Technology North Bangkok aims to produce graduates with desirable characteristics with excellence in science and Technology. Wijan Panich (2012: 138) stated that the production of graduates Learning management need in the 21st century Informative Learning to Transformative Learning. Learning courses must be transformed into a competency based in accordance with Sitthiwong (2000). It concluded that work performance of experienced workers must develop learners to cover knowledge, skills, attitudes and values. That will help the students to be able to work responding to the needs of the industrial sector in the 21st century. Therefore, the researcher is interested in studying the results of managing learners' learning competencies of undergraduate in science and technology to provide information for the development of learners and graduates to be use for the benefit of the organization, society and nation.

Research Objectives

1. To study the management of learning performance undergraduate in science and technology

2. To compare the learning management performance of undergraduate in science and technology by gender

Scope of Research

1. The population used in the study is undergraduate students, College of Industrial Technology, King Mongkut's University of Technology North Bangkok, academic year 2016, 3,436 people

2. Variables used in the study

2.1 Independent variables include personal information

2.2 Dependent variables are 5 aspects of learning performance such as 1) morality and ethics, 2) knowledge, 3) intellectual skills, 4) interpersonal and responsibility skills, and 5) numerical analysis skills, communication and use of information technology

Implement of research

1. Sample Group

The sample group used the Stratified Random Sampling method to perform the Multi-Stage Radom Sampling. Determining the size, and sample size, used sample calculation formula (Krejcie and Morgan, 1970: 608-609 cited in Thanin Sincharu. 2008: 45). The sample group of 358 people has the following steps.

Step I: determine the size of the sample group obtained from the calculation formula.

Step II: classify the sample into 8 groups according to the subject area of study.

Step III: sampling from the study area by using a stratified random sampling method in proportion to the landscape

2. Tools Used for Data Collection

It is a learning performance management questionnaire with 5 point-rating-scale. From the concept of learning results of the National Higher Education Qualifications Framework, 5 bachelor's degrees are moral, ethical, intellectual skills, interpersonal relationships and responsibilities and skills in numerical analysis, communication and information technology. It is checked by the quality of the questionnaires by experts assessed to find the confidence of the questionnaire of 5 people and bring the tools to find the accuracy values with the non-sample population of 30 people. Subsequently, Cronbach's alpha coefficient is .83. There are 50 questions, 10 questions per subscale.

3. Data Analysis Process

3.1 Analyze the learning management performance of undergraduate in science and technology by calculating the average value standard deviation

3.2 Compare the results of learning performance management of undergraduate in science and technology according to gender variable by independent t-test

3.3 Compare the results of learning performance management of undergraduate in science and technology according to gender by one-way analysis of variance (One-Way ANOVA) and post-hoc comparison by the Scheffé method

For criteria used to interpret the mean, the researcher determined the range of average values according to Likert scale method (1967) as follows: 4.51-5.00 meaning the highest learning performance level, 3.51-4.50 meaning high level of learning performance, 2.51-3.50 meaning a moderate level of learning performance, 1.51-2.50 meaning a low level of learning performance and 1.00-1.50 meaning the lowest learning performance.

Results

1. Analysis of Basic Statistics of Basic Data

Basic data analysis of learners from the sample group that collected 358 people found that most were male, 65.10%. Study area proving information in descending order is mechanical Engineering technology, Electronics Engineering Technology, Civil Engineering Technology, Power Engineering Technology, Welding Engineering Technology, Electrical Engineering Technology, Industrial Engineering Technology, and production and Information Technology Management. In addition, the year in which the contributors are studying, in descending order is Year 3, Year 2, Year 4, and Year 1, as written in Table 1.

Table 1: Average, Standard Deviation, Level of Management, Learning Performance of Undergraduate in Science and Technology Bachelor's Degree (n = 358)

Variable	Number	%
Gender		
Male	233	65.10
Female	125	34.90
Total	**358**	**100**
Major		
Mechanical Engineering Technology	56	15.60
Electronic Engineering Technology	51	14.20
Civil Engineering Technology	51	14.20
Power Engineering Technology	50	14.00
Welding Engineering Technology	48	13.40
Electrical Engineering Technology	45	12.60
Industrial Engineering Technology	35	9.80
Production and Information Technology Management	22	6.10
Total	**358**	**100**
Year		
3	107	29.90
2	95	26.50
4	90	25.10
1	66	18.40
Total	**358**	**100**

2. Learning Performance Management of Undergraduate in overall aspect was at a high level ($\overline{x}$ = 4.06). When considering each aspect, it found that the management of learning performance in all 5 aspects was at a high level, as follows: competencies in numerical analysis skills, communication and use of information technology ($\overline{x}$ = 4.14), moral and ethics performance ($\overline{x}$ = 4.08), knowledge competency = 4.07), Intellectual skills competencies ($\overline{x}$ = 4.06), and relationship skills competencies between individuals and responsibilities ($\overline{x}$ = 3.94) as shown in Table 2

Table 2: Average Standard Deviation, Level of Management, Learning Performance of Undergraduate in Science and Technology Bachelor's Degree (n = 358)

Result of Learning Performance Management	$\overline{x}$	S.D.	Level
1. Morality and ethics	4.08	0.48	High
2. Knowledge	4.07	0.34	High
3. Intellectual skills	4.06	0.41	High
4. Interpersonal and responsibility skills	3.94	0.46	High
5. Numerical analysis, communication and information technology skills	4.14	0.33	High
Total	**4.06**	**0.20**	**High**

3. The Comparison of Learning Performance Management of the Learners showed that the learning performance management of the learners was not different with statistical significance at the level of 0.05 as follows.

3.1 The test of average differences found that the learning competencies of male and female learners were no significant difference at the level of .05.

Table 3: Results of Comparison of the Learning Performance Management of Undergraduate in Science and Technology Classified by Gender (n = 358)

Gender	n	$\overline{x}$	S.D.	t	sig
Male	233	4.06	0.191	-0.325	0.746
Female	125	4.07	0.204		

*p < .05

3.2 The comparison of learning performance of Undergraduate in overall aspect is at a high level. The average difference test showed that learners had no different learning competencies with statistical significance at the level of .05. Students learning to learn numerical analysis skills, Communication and use of technology is higher than other aspects. The results of the comparison of learning performance of double students found that the overall aspect was different with statistical significance at the level of .05. When considered individually, it was found that there was a difference between interpersonal skills and responsibility for morality, ethics and knowledge. Therefore, test should be in pairs. Also, it found that there are no different pairs as shown in Table 4.

Table 4: Statistics Comparison of the Differences in Learning Performance Management of Undergraduate in Science and Technology Bachelor's Degree by Gender (n = 358)

Learning performance	Source of variance	df	SS	MS	F	P
Interpersonal skills and responsibilities	Between groups	7	5.478	0.783	3.890*	0.000
	Within groups	350	70.410	0.201		
	total	**357**	**75.888**			
Moral and ethics	Between groups	7	1.949	0.278	1.219	0.291
	Within groups	350	79.917	0.228		
	total	**357**	**81.866**			
Knowledge	Between groups	7	3.694	0.528	4.773*	0.000
	Within groups	350	38.694	0.111		
	total	**357**	**42.388**			
numerical analysis skills, Communication and use of information technology	Between groups	7	0.588	0.084	.743	0.635
	Within groups	350	39.553	0.113		
	total	**357**	**40.141**			
Intellectual skills	Between groups	7	0.639	0.091	.560	0.788
	Within groups	350	57.037	0.163		
	total	**357**	**57.676**			
Overview	Between groups	7	0.846	0.121	3.288*	0.002
	Within groups	350	12.870	0.037		
	total	**357**	**13.717**			

* $p < .05$

Conclusions and Discussion

1. Learners have overall learning performance management in the high level ($\overline{x}$ = 4.06). Also, individual learning performance management in all 5 aspects is at the high level as follows: numerical analysis skills, communication and use of information technology ($\overline{x}$ = 4.14), moral ethics performance ($\overline{x}$ = 4.08), knowledge competency ($\overline{x}$ = 4.07), intellectual skills competencies ($\overline{x}$ = 4.06), and relationship skills competencies between individuals and responsibilities ($\overline{x}$ = 3.94). It shows that science and technology learner has the characteristics of desirable graduates according to the National Higher Education Qualifications Framework. Students with competencies in numerical analysis skills, communication and use of information technology are in the highest level. Waraporn Aewsakul (2012) emphasizes that the teaching process of the TQF era should be include data analysis to solve problems and provide real benefits in teaching and learning career. This helps them acknowledge their limitation and accept the unknown. It is the creation of wisdom that promotes initiative and self-learning throughout life,

which is corresponding to Chickering & Reisser (1993) concluding that school age is the period when students will find themselves based on the factual basis that has been agreed upon in the relationship between values, behavior, and behavior to other people, such as occupation. While students are on campus, they will develop 3 skills: intelligence ability, physical ability and social capabilities by learning from their own abilities, accepting criticism from others, and integrating it into their own skills.

2. For testing the difference of average values of Science and technology learner by comparing the results of learning performance management, female learners have higher learning performance than males, which is in accordance with Rangsan Somya (2018: 309-315), conducting self-study behavior. Between male and female students, it found that female students had higher self-learning behaviors than male students. The comparison of the learning management competencies of the learners showed that there were 3 different aspects: interpersonal and responsibility skills, competence in morality, ethics and knowledge. Therefore, testing on a pair basis found that there were no differences in the management of learning competencies of each pair. In conclusion, the overall aspect of the comparison of learning competency management of science and technology learners is different with statistical significance at the level of .05, indicating that science and technology learners is a feature of the graduates of the 21st century which correspond to Chetniphat Boonyasawat (2011) stated that the efficiency and standard of education reflect the quality of graduates who have earned that qualification, which can be considered from the Learning Outcome (LO) which covers at least 5 aspects, namely morality, ethics, Intellectual skills, interpersonal relationships and responsibilities skills, and numerical analysis skills, communication and use of information technology. In addition, the quality of the learners is in accordance with the educational standards of King Mongkut's University of Technology North Bangkok Results for learners Is a person with lifelong learning skills, various knowledge. They can apply various knowledge and skills to create a career and quality of life with good morality and ethics as well as being a skilled 21st century (Educational Quality Assurance Center, King Mongkut's University of Technology North Bangkok. 2019).

Suggestions

1. Recommendations for the use of research results

Research results of College of Industrial Technology, King Mongkut's University of Technology North Bangkok are compared with each course for improving the quality of education to be progressive and more support the labor market.

2. Recommendations for further research

Desirable characteristics of graduate studies should be provided according to the needs of the employer and labor market.

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