Model of Environmental Education Strategy Integrated with Traditional Knowledge for Primary School Administrator
รูปแบบกลยุทธ์สิ่งแวดล้อมศึกษาบูรณาการด้วยภูมิปัญญาท้องถิ่นสำหรับผู้บริหารโรงเรียนประถมศึกษา

Pradit Budtarach[1], Nongnapas Thiengkamol[2] and Tanarat Koowaranyoo Thiengkamol[3]
ประดิษฐ์ บุตราช[1] นงนภัส เที่ยงกมล[2] และธนรรรตต์ คู่วรัญญ เที่ยงกมล[3]
Student, Department of Environmental Education
Faculty of Environmental and Resource Studies of Mahasarakham University
[2,3]Lecturers, Department of Environmental Education
Faculty of Environmental and Resource Studies of Mahasarakham University
praditmakok@hotmail.com, mahidol@gmail.com, and send2ohm@gmail.com

บทคัดย่อ

วัตถุประสงค์การวิจัยเป็นการพัฒนารูปแบบความสัมพันธ์เชิงโครงสร้างภูมิปัญญาท้องถิ่นเพื่อการอนุรักษ์สิ่งแวดล้อม คุณลักษณะผู้บริหาร คุณลักษณะครู และหลักการสิ่งแวดล้อมศึกษาที่มีผลต่อการใช้กลยุทธ์สิ่งแวดล้อมศึกษา ผ่านแรงบันดาลใจในการมีจิตสาธารณะเพื่ออนุรักษ์สิ่งแวดล้อม ประชากรเป็นผู้บริหารโรงเรียนประถมศึกษา สังกัดสำนักงานเขตพื้นที่การศึกษาประถมศึกษามหาสารคาม เขต 1-3 ใช้แบบสอบถามเป็นเครื่องมือในการรวบรวมกลุ่มตัวอย่างจำนวน 400 คน และผ่านการตรวจสอบคุณภาพโดยมีค่า IOC > 0.50 ฉละมีคาความเชื่อมั่นทั้งฉบับเท่ากับ 0.992 ใช้รูปแบบสมการเชิงโครงสร้างในการพิสูจน์รูปแบบ

ผลการวิจัยค้นพบว่าโครงสร้างปัจจัยองค์ประกอบเชิงยืนยันของตัวแปรแฝงภายนอกภูมิปัญญาท้องถิ่นเพื่อการอนุรักษ์สิ่งแวดล้อม คุณลักษณะผู้บริหาร คุณลักษณะครู และหลักการสิ่งแวดล้อมศึกษา สามารถอธิบายความแปรปรวนของตัวแปรแฝงภายในแรงบันดาลใจในการมีจิตสาธารณะเพื่ออนุรักษ์สิ่งแวดล้อม ที่มีผลต่อการใช้กลยุทธ์สิ่งแวดล้อมศึกษา ด้วยขนาดร้อยละ 83.00 ตัวแปรที่มีอิทธิพลต่อการใช้กลยุทธ์สิ่งแวดล้อมศึกษาเป็นแรงบันดาลใจในการมีจิตสาธารณะเพื่ออนุรักษ์สิ่งแวดล้อมด้วยขนาด 0.65 นอกจากนี้พบว่าปัจจัยองค์ประกอบเชิงยืนยันของตัวแปรแฝงภายนอกภูมิปัญญาท้องถิ่นเพื่อการอนุรักษ์สิ่งแวดล้อม คุณลักษณะผู้บริหาร คุณลักษณะครู และหลักการสิ่งแวดล้อมศึกษา สามารถอธิบายความแปรปรวนของตัวแปรแฝงภายในแรงบันดาลใจในการมีจิตสาธารณะเพื่ออนุรักษ์สิ่งแวดล้อม ด้วยขนาดร้อยละ 88.00 ตัวแปรที่มีอิทธิพลต่อตัวแปรแฝงภายในแรงบันดาลใจในการมีจิตสาธารณะเพื่ออนุรักษ์สิ่งแวดล้อมเป็นหลักการสิ่งแวดล้อมศึกษาด้วยขนาดอิทธิพล 0.93. ดัชนีของ Chi-Square value/df มีค่า 1.274 (<5), ค่า GFI and AGFI น้อยกว่า 0.90, ค่า RMSEA and RMR น้อยกว่า 0.05 และจำนวนวิกฤตมีค่า 276.31 ซึ่งมากกว่า 200 ซึ่งแสดงให้เห็นว่า รูปแบบที่พัฒนามีความสอดคล้องกับของมูลเชิงประจักษ์

คำสำคัญ: รูปแบบ กลยุทธ์สิ่งแวดล้อมศึกษา ภูมิปัญญาท้องถิ่น การอนุรักษ์สิ่งแวดล้อม ผู้บริหารโรงเรียนประถมศึกษา

Abstract

The research objective was to develop a casual relationship model of exogenous latent variables of traditional knowledge for environmental conservation, administrator characteristics, teacher characteristics and environmental education principle that effected environmental education strategy use through inspiration of public mind for environmental conservation. Population was primary school administrator under educational area of Maha Sarakham 1-3. The questionnaire was employed to collect sample by simple random sampling of 400 primary school administrators. It had IOC of 0.50 with reliability of 0.992. Structural Equation model (SEM) was used for model verification.

The results revealed that the structural model of confirmatory factors of Traditional Knowledge for Environmental Conservation (TEC), Administrator Characteristics (AC), Teacher Characteristics (TC) and Environmental Education Principle (EE) were able to explain the variation of endogenous factors of Inspiration of Public Mind for Environmental Conservation (IPM) that caused Environmental Education Strategy Use (EES) with 83.00 percent. The variable that had the most effect to EES was IPM with effect 0.65. Moreover, confirmatory factors of TEC, AC, TC and EE were able to explain the variation of confirmatory factors of IPM) with 88.00 percent. The factor that had the most effect to IPM was EE with the effect of 0.93. The indices of Chi-Square value/df = 1.274 (<5), GFI and AGFI > 0.90, RMSEA and RMR<0.05 and critical number = 276.31 (> 200) indicated that the developed model was congruent to empirical data.

Keywords : Model; Environmental education strategy; Traditional knowledge; Environmental conservation; Primary school Administrator

1. INTRODUCTION

Commonly, the rural areas of Thailand are enriched with traditional knowledge and biological diversity accumulated from generations to generations. However, in fact the educational system always separates the people of young generation from social reality and an actual atmosphere of their living. In particular, the significant traditional knowledge in diverse aspects are the origins of Thai's living for natural and environmental conservation. During four past decades, the development anchored in economic growth greatly devastated the social and cultural structures of local community. His Majesty King Bhumibol Adulyadej has been well aware of situations in hurriedly changing world. His Majesty consequently initiated the "Philosophy of Sufficiency Economy" not only for his focuses but also for people of all nations. The environmental education strategy use would be achieved for sustainable development, the various traditional knowledge for environmental conservation must be included in various aspects of way of life for environmental conservation, religion and belief for environmental conservation, traditional medicine for environmental conservation, food for environmental conservation, and tradition and culture for environmental conservation [1][2][3][4].

Strategy is a method that was selected to execute to reach the advantageous future of certain goals or results of problem solving. It uses resource allocation to reach highest efficiency and useful utilities in planning for organization. The military or war usually employs to plan for combating to defeat and the war opponents. Nevertheless, it is also a high level plan to achieve one or more goals under definite conditions of uncertainty. Strategy is essential because the accessible resources to achieve these goals are generally limited [5] [6]. Henry Mintzberg from McGill University defined strategy as "a pattern in a stream of decisions" to contrast with a view of strategy as planning [7] [8] McKeown argues that "strategy is about shaping the future" and is the human effort to get to "desirable ends with available means". Consequently, strategy is about shaping the future and it is an endeavor of human to gain the desired outcome as the provided mean support [9].

Environmental education was introduced and declared. It must be used as an instrument to emphasize the global environmental problems. Environmental education is a learning process that makes people gain more knowledge and awareness on the environment and connected challenges, develops the essential skills and expertise to impress the challenges, and cultivates attitudes, motivations, and commitments to make decisions and take responsible action. However, Thiengkamol, uttered that to obtain the environmental education goal, it needs to inspire the global citizens to have

public mind for environmental conservation through dedication and eagerness to contribute lacking of reward, money and honor requirement [1][2][3][4][3].

In Thailand, Ministry of Natural Resources and Environment, originated the strategic plan of environment (B.E. 2555-2559) as blueprints for implementing direction for work unit on implementation including the accountable role and function to approach the governmental target in a 5-year period. There are 5 main strategies including 1) Improve structure of administrative mechanism and practice rules to be effective, 2)Increase the body of knowledge on information technology and introduce appropriate technology to a tool for direction, administration and service, 3) Increase competency of collaboration in aspect of natural resources and environment at national and international levels, 4) Develop effectiveness of implementation on administration and service providing and 5) Promote collaboration and develop the network of conservation, rehabilitation, surveillance, maintenance and monitoring on the utilization of natural resources and environment (Office of the Policy and Strategy, Ministry of Natural Resources and Environment, 2012). Even though, Australia is interested in environmental education, there is no suggestion about the environmental education strategy directly, therefore common strategy was established by Government of Western Australia in 2004 covering on National Strategy for Ecologically Sustainable Development, National Strategy for the Conservation of Australia's Biological Diversity, international projects of the United Nations Environment Program, and Decade for Education for Sustainability (2005-2014), [10].

Thiengkamol and her colleagues studied on different essential approaches with inspiration of public mind or public consciousness of environmental conservation. The inspiration is entirely dissimilar to motivation since one who does or acts or practices with the drive from inside with desire to do for public, in particular, for environmental conservation, it must be from the intuition of good role model of person, impressive event, impressive environment and various media that inspire him or her to do for other without the requisite of rewards, money, honor or admiration as well but one feel pleased to perform for others [11][12][13][14].

This research was conducted on environmental education strategy use of primary school administrators integrated with traditional knowledge for environmental conservation. The environmental education strategy included six strategies of strategy of environmental education school creation, strategy of environmental education network creation, environmental education trainer development, strategy of environmental education activity support, strategy of environmental education research and development. Succession on introduction with environmental education strategy integrated with traditional knowledge for environmental conservation, the school administrator must have suitable characteristics of vision, action plan, supervision, monitoring and evaluation for implementing according to six strategies with knowledge and understanding building, environmental awareness, attitude, responsibility and participation in projects and activities involving natural resources and environment conservation. Moreover, teachers in primary school should prepare teaching plans, construct curriculum, teaching media and environmental activities for teaching-learning process. To gain the success of environmental education strategy integrated with traditional knowledge for environmental conservation, it needs to combine with the public mind of administrators and teachers that are impressed from person as role model, impressive environment, impressive event and inspirited from media reception to sustain on natural resources and environmental conservation [1][2][3][14].

2. OBJECTIVE

The research objective was to develop a casual relationship model of exogenous latent variables of traditional knowledge for environmental conservation, administrator characteristics, teacher characteristics and environmental education principle that effected to environmental education strategy use through inspiration of public mind for environmental conservation.

3. METHODOLOGY

The research design was implemented as the followings:

3.1 The population was 604 administrators of primary schools under Office of Mahasarakham Primary Education Service Area 1-3, in Maha Sarakham Province. Multi-stage simple random sampling technique was employed to collect the sample for 400 administrators from different primary schools under Office of Mahasarakham Primary Education Service Area 1-3, in Maha Sarakham Province. [15].

3.2 The research instrument was the questionnaire for data collection. The questionnaire composed of 140 questions with 5 rating scales. Structural Equation Model (SEM) was used for model verification with LISREL program version 8.3. The content and structural validity were determined by Item Objective Congruent (IOC) with 5 experts in the aspects of traditional knowledge, environmental education, social science and social research methodology. The reliability was done by collecting the sample group of 50 administrators from primary school of Roi-Et Province who have the similar characteristics to primary school administrators of Maha Sarakham Province. The reliability was determined by Cronbach's Alpha. The reliability of traditional knowledge for environmental conservation, administrator characteristics, teacher characteristics, environmental education principle, inspiration of public mind for environmental conservation, environmental education strategy use

and the whole questionnaire were 0.814, 0.984, 0.984, 0.982, 0.971, 0.988 and 0.992 respectively. [2][3][4][9][10][13[[16].

3.3 The inferential statistics was Structural Equation Model (SEM) that was used for model verification with LISREL program version 8.3 by considering on Chi-Square value, which differs from zero with no statistical significant at 0.05 level or Chi-Square/df value with less or equal to 5, RMSEA (Root Mean Square Error Approximation), and RMR (Root Mean Square of Residual) with less than 0.05 including index level of model congruent value, GFI (Goodness of Fit Index), index level of model congruent value, AGFI (Adjust Goodness of Fit Index) between 0.90-1.00, and critical number more 200.

3.4 Primary assumption was set to analyze the Latent variables with Confirmatory Factor Analysis by considering from 1) Goodness of Fit Index (GFI) equaled to 0.99 and Adjust Goodness of Fit Index (AGFI) equaled to 0.98,2) Root Mean Square Error of Approximation (RMSEA) equaled to 0.026(RMSEA < 0.05), and 3)Chi- Square value, which had no statistically significant at level of .01 and was divided by degree of freedom lesser than or equaled to 5.

4. RESULTS

The results of this study were as the followings.

4.1 Results of Effect among Variables in Model in Terms of Direct Effect

4.1.1 Confirmatory factors of TEC had direct effect to IPM with no statistically significant at level of 0.05 with effect of 0.04 and to EES with statistically significant at level of 0.01 with effect 0.14. Moreover, confirmatory factors in aspect of TEC had indirect effect to EES with no statistically significant at level of 0.05 with effect of 0.03 and total effect to EES with statistically significant at level of 0.01 with effect of 0.17.

4.1.2 Confirmatory factors of AC had direct effect to IPM with statistically significant at level of 0.01 with effect of 0.19 and to EES with no statistically significant at level of 0.05 with effect of

0.04. Moreover, confirmatory factors in aspect of AC had indirect effect to EES with statistically significant at level of 0.01 with effect of 0.12 and total effect to EES with statistically significant at level of 0.01 with effect of 0.16.

4.1.3 Confirmatory factors of TC had direct effect to IPM with statistically significant at level of 0.01 with effect of 0.23 and EES with statistically significant at level of 0.01 with effect of 0.12. Moreover, confirmatory factors in aspect of TC had indirect effect to EES with statistically significant at level of 0.01 with effect of 0.15 and total effect to EES with statistically significant at level of 0.01 with effect of 0.16.

4.1.4 Confirmatory factors of EE had direct effect to IPM with statistically significant at level of 0.01 with effect of 0.93 and EES with no statistically significant at level of 0.05 with effect of -0.02. Moreover, confirmatory factors in aspect of EE had indirect effect to EES with statistically significant at level of 0.01 with effect of 0.60 and total effect to EES with statistically significant at level of 0.01 with effect of 0.58.

4.15 Confirmatory factors of Inspiration of IPM had direct effect to EES with statistically significant at level of 0.01 with effect of 0.65.

4.16 The structural model of confirmatory factors of TEC, AC, TC and EE were able to explain the variation of endogenous factors of IPM to cause EES with 83.00 percent as following in equation (1).

EES=0.65*IPM+0.14*TEC+0.04*AC+0.12*TC-0.02*EE....(1)

$$(R^2 = 0.83)$$

Equation (1) factors that had the most effect to EES was IPM with effect of 0.65, and subsequences were TEC, TC, AC, and EE with effect of 0.14, 0.12, 0.04 and -0.02. These can be used to explain the variation of EES with 83.00 percent.

Additionally, confirmatory factors of TEC, AC, TC and EE can be used to explain the variation of confirmatory factors of IPM with 88.00 percent. Therefore, the equation can be written as following in equation (2).

IPM=0.04*TEC+0.19*AC+0.23*TC+ 0.93*EE ....(2)

$$(R^2 = 0.88)$$

Equation (2) factors that had the most effect to IPM was EE with the effect of 0.93 and subsequences were TC), AC and TEC with the effect of 0.23, 0.19, and 0.04. These can be used to explain the variation of IPM with 88.00 percent.

4.1.7 Considering on Chi-Square value/df was 1.274 that was less than 5, therefore it was accepted that hypothetical model of research was congruent to empirical data. Moreover, it was considered on other statistical values to verify the congruence that were Goodness of Fit Index (GFI) and Adjust Goodness of Fit Index (AGFI) were 0.94 and 0.91 respectively (GFI > 0.90 and AGFI > 0.90), RMSEA <0.05 (0.045) and critical number = 276.31 which was more than 200. It indicated that model was congruent to empirical data. The results of analysis of causal relationship model and analysis of path effect as presented in figure 1 and table 1.
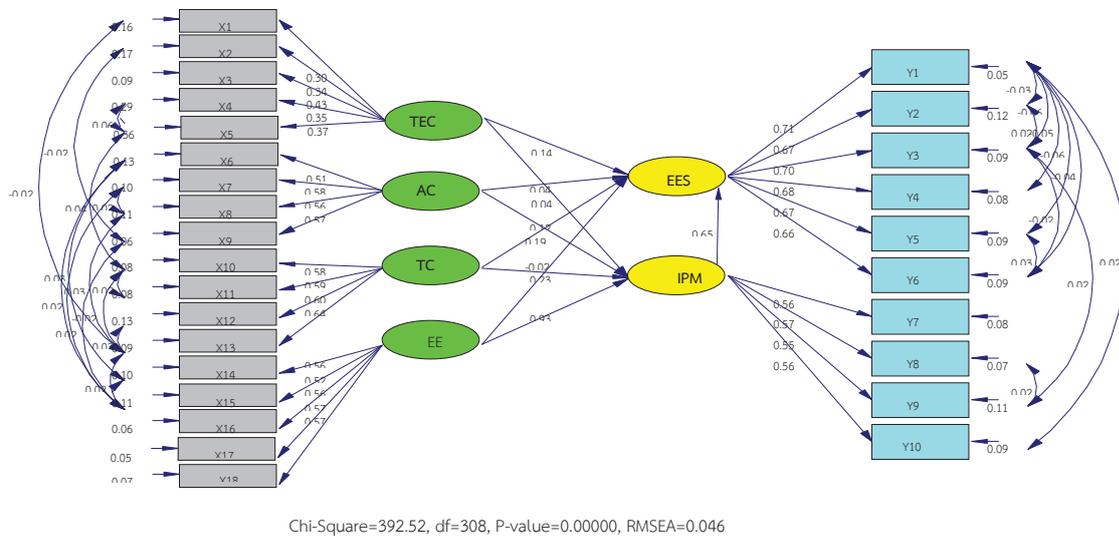
Chi-Square=392.52, df=308, P-value=0.00000, RMSEA=0.046

Figure 1: Causal relationship model of environmental education strategy integrated with traditional knowledge for environmental conservation

Table 1 Direct, Indirect and Total Effects of TEC, AC, TA and EE Affecting EES through IPM

Causal variable	Result variables					
	IPM			EES		
	TE	IE	DE	TE	IE	DE
TEC	0.04	-	0.04	0.17**	0.03	0.14**
	(0.080)		(0.080)	(0.060)	(0.060)	(0.041)
AC	0.19**	-	0.19**	0.16**	0.12**	0.04
	(0.051)		(0.051)	(0.050)	(0.050)	(0.043)
TC	0.23**	-	0.23**	0.27**	0.15**	0.12**
	(0.071		(0.071)	(0.046)	(0.049)	(0.051)
EE	0.93**	-	0.93**	0.58**	0.60**	-0.02
	(0.065)		(0.065)	(0.080)	(0.080)	(0.060)
IPM	-	-	-	0.65**	-	0.65**
				(0.053)		(0.053)
χ^2 = 392.52; df = 308			CN = 276.31		χ^2/df = 1.274	
GFI=0.94, AGFI=0.91,			RMSEA=0.046		RMR=0.15	

TE: Total Effect, IE : Indirect Effect, DE: Direct Effect

From table 1, it showed that the TEC, AC, TC and EE had direct, indirect and total effect to EES and it also had direct effect to IPM. IPM had direct effect to EES.

5. DISCUSSIONS

The findings indicated Inspiration of IPM had the most effect to EES with 0.65. is congruent to numerous studies of Thiengkamol and her colleagues [11][12][13] Simultaneously, EE had direct effect to IPM with most effect with 0.93. This

can prove that numerous observed factors of environmental attitude, environmental awareness, environmental responsibility, and environmental participation play important roles for enhancing effectiveness of EES implementation. However, TEC was subsequent latent variable affected to EES. Thus, increasing success of EES is used in the primary school by administrators, it needs to integrate EE, TEC through IPM [2] [16][27][28][29][30][17][18][19]. It is obviously seen that traditional knowledge for environmental conservation, administrator characteristics, teacher characteristics and environmental education principle influence through inspiration of public mind or consciousness to perform environmental education strategy use to achieve the environmental conservation in all aspects of environmental conservation.

According to the research results, all variables of TEC, AC, TA and EE should be introduced to apply into every primary school in Maka Sarakham Province and other primary schools in the Northeastern region including the other regions of country in Thailand to use environmental education strategy integrated with traditional knowledge for environmental conservation to support primary school student to gain more capability to take responsibility for better decision making via participation in environmental education network with public mind for environmental conservation based on training of trainer, projects and activities support, environmental education network, data base creation and environmental education research and development. Nevertheless, it might be concluded that TEC, AC, TC, EE and IPM latent variables are essential component to cause the primary school administrators to use environmental education strategy in the school through their vision, action plan, supervision, and monitoring and evaluation for teacher to prepare teaching plan, curriculum, teaching media and environmental education projects and activities to achieve the environmental conservation behavior through

Environmental Education Strategy Use. Therefore, the model of TEC, AC, TC and EE influence through IPM to EES with the direct effect of 0.14, 0.04, 0.12, -0.02 and 0.65. The primary school students are little children so they are able to learn easily and get impressed and they are important change agents for our future, particular, when integrating with local wisdom. This principle should be added the curriculum and teaching plan of primary school across the country, it will be valuable for Thai citizen in the world to perform daily life activities to reach highest benefit of maximized use of natural resources. Particularly, traditional knowledge for environmental conservation should be integrated with environmental education use for students and teachers by incorporating though the learning process based on the traditional knowledge of community whether in terms of way of life, religion and belief, medicine, food and tradition and cultural for daily live practice based on public mind of all stakeholders between school and community relation to meet genuine sustainable development [3][4][11].

REFERENCES

[1] Sukwat, S. Thiengkamol, N., Navanugraha, C., & Thiengkamol, C. 2012. Development of Prototype of Young Buddhist Environmental Education. **Journal of the Social Sciences**, 7 (1), 56-60.

[2] Thiengkamol, N. 2011e. **Environment and Development**. (4th ed.). Bangkok: Chulalongkorn University Press.

[3] World Commission on Environment and Development (WCED). 1987. **Our Common Future.** Oxford: Oxford University Press.

[4] TICA. 2013. **Traditional Knowledge and Thailand Agricultural Studies Center for Development**. Retrieved June 18, 2012, from http://tica.thaigov.net/main/en/information/2237/28988-15.-Local-Wisdom-and-Thailand-Agricultural-Studies.html

[5] Freedman, L. 2013. **Strategy: A History.** New York: Oxford University Press.

[6] Thiengkamol, N. (2007). **Globalization Administration**. Bangkok: Saengchai Publishing.

[7] Mintzberg, H. 1994. **"The Fall and Rise of Strategic Planning"**. Harvard Business Review.

[8] McKeown, M. 2008. Max Headroom. **People Management,** 14(4), pp28–32.

[9] Young, R. 2008. Interview with Max McKeown, **Strategic Direction**, 24(9), 28-30.

[10] Department of Environment 2004. **Environmental Education Strategy and Action Plan. Government of Western Australia**. Retrieved 26 August 2012 from http://www.dec.wa.gov.au/publications/doc _download/1737-environmental-education-strategy-andaction-plan.html

[11] Thiengkamol, N. 2012h. Model of Environmental Education and Psychological Factors Affecting to Global Warming Alleviation. **Mediterranean Journal of Social Sciences,** 3(11), 427-434.

[12] Donkonchum, S., & Thiengkamol, N. 2012. Model of Environmental Education and Psychological State Affecting to Global Warming Alleviation. **International Proceedings of Economic Development and Research**, 44(1), 1-5.

[13] Gonggool, D., Thiengkamol, N., & Thiengkamol, C. 2012b. Development of Environmental Education Volunteer Model through Inspiration of Public Consciousness for Sustainable Development**. European Journal of Social Sciences,** 32(1), 150-160.

[14] Saisunantharom, S. Thiengkamol, N., Thiengkamol, C. 2013a. Casual Relationship Model of Biodiversity Conservation. **European Journal of Scientific Research**, 104(3), 460-474.

[15] Lavrakas, P.J. 2008. **Encyclopedia of Survey Research Methods**. New York: Sage.

[16] Rovinelli, J., & Hambleton, K. 1977. On the use of content specialists in the assessment of criterion-referenced test item validity. **Dutch Journal of Educational Research**, 2, 49-60.

[17] Kamin, P., Thiengkamol, N., Thiengkamol Khoowaranyoo, T. 2014. Environmental Education and Public Mind Affecting Forest Conservation Behavior. **Journal of Industrial Education**, 13(3), 181-187.

[18] Dejkunchorn, D., Prasertsri, N., Thiengkamol Khoowaranyoo, T. 2014. Development Model of School Landscape Management for Environmental Conservation. **Journal of Industrial Education**, 13 (3), 157-164.

[19] Srikaewtoom, N., Thiengkamol, N., Thiengkamol, C. 2014. Development Model of Biodiversity Conservation. Environmental Conservation. **Journal of Industrial Education**, 13(3), 142-148.

[20] Srichaimool, P., Prasertsri, N., Thiengkamol, C. 2014. Development Model of Household Food Security Management. **Journal of Industrial Education**, 13(3), 149-156.