CONFIRMATORY FACTOR ANALYSIS OF THE 21ST CENTURY LEARNING AND INNOVATION SKILLS OF LEARNERS UNDER THE OFFICE OF THE BASIC EDUCATION COMMISSION

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ABSTRACT

This research aimed to develop indicators for the 21st Century Learning and Innovation Skills of learners under the Office of the Basic Education Commission and to examine the harmony of the 21st Century Learning and Innovation Skills of learners’ model with empirical data. The sample consisted of 130 school administrators and academic teachers at Northeastern Elementary Schools under the Office of the Basic Education Commission, Obtained by multi-stage random sampling method. The instrument used in the research was the questionnaire with a total confidence value of 0.94. The data were analyzed using basic statistical calculation and the second Confirmatory Factor Analysis with a statistical package.

The results showed that the 21st Century Learning and Innovation Skills of learners under the Office of the Basic Education Commission had 3 components and 26 indicators. The weights of the elements ranged from 0.80-0.95 and were statistically significant at 0.01 for all values. In order of importance from least to greatest, they are Communication and Collaboration (0.95), Critical Thinking and Problem Solving (0.82), and Creativity and Innovation (0.80), respectively. The component weights of all indicators were high and were statistically significant at the 0.01 level. And the 21st Century Learning and Innovation Skills of learners model under the Office of the Basic Education Commission is harmonized with empirical data, which is based on the harmonization index, which is \( \chi^2 = 264.16, \text{ df } = 253, \) Relative \( \chi^2 = 1.04, \) P-value =.302, RMSEA =.02, GFI =.86, AGFI =.81, RMR =.04, it is shown that the model is constructed validity.

Keywords: Learning and Innovation Skills, Model, Confirmatory Factor Analysis

I. INTRODUCTION

Education contributes to the development of human potential, which is of paramount importance, is an important factor in leading the advancement in various fields in setting the quality standards of learners at the basic education level. Focus on the development of the quality of learners to be perfect human beings as stated in the curriculum by defining the quality of learners into 6 parts, namely good health and aesthetics, morality, ethics and desirable values, skills in self-seeking, love of learning, and continuous self-development, ability to Systematic thinking, creative thinking, consciously solving problems, having knowledge and skills required according to the curriculum, working skills, love to work, able to work with others. and have a good attitude towards honest occupation (Office of the Basic Education Commission. 2011). Especially, the change in the social era is about to change from Knowledge-Based Society to Conceptual Age, which is the era of innovation in understanding to be competent in the era of educational change until the skills are born. To be used in their work and life according to the important mission of basic education institutions, it is necessary to provide teaching and learning following the 2008 Basic Education Core Curriculum (Office of the Basic Education Commission. 2020). The development of educational quality requires the implementation of 3 systems. that is, the educational management system, the teaching and learning management system, and the educational supervision system, which must be coordinated with the implementation of relevant personnel, ranging from administrators at all levels, teachers, and study
supervisors, which must have various information related to the administration of education to be used in planning actions to achieve results with efficiency and effectiveness (Ruangmontri, K., & Namwan, T., 2017).

However, according to the National Education Plan 2017-2036 by the Office of Education Council Secretariat, the Ministry of Education has outlined the goals and directions of the country's education management in developing the potential and capabilities of Thai people of all ages to their full potential. Knowledge and continuous self-learning throughout life. Driven by the vision "All Thai people receive quality lifelong education and learning, live happily in line with the philosophy of Sufficiency Economy and global change in the 21st century" (Sintapanon, S. 2018). The development of the quality of education in Thailand at present has important educational management principles according to the basic education core curriculum focusing on the quality of the learners in education to keep pace with the changes in the era of knowledge and technology, grow rapidly. Ministry of Education in the era of educational management reform in the second decade (2009-2018) has announced a vision about the modern Thai people that modern Thai people must learn for life, be conscious, have intelligent, capable and have morals, responsibility to family, nation and be a good citizen of the world (Office of the Basic Education Commission. 2011). Consistent with Lowriendee, W. et al. (2017), discusses the key concepts of the 21st century that learners need to know and understand their importance to themselves and society and to be able to implement them in living in a society with change quickly and thoroughly, consistent with Thamatasenahant, S. (2019) describes the quality of current education that The world has stepped into a full learning society, knowledge is very important to the development and competition of personnel and organizations, in which the quality of learners, all stakeholders, especially teachers who Teaching plays an important role in creating learning for quality learners. Like Namwan, T. (2018) discusses the development of effective teacher-to-learner quality, building a culture of learning, open classroom, and applying 21st-century learning skills in line with context and local conditions and roles are divided The duty of the Parties to cooperate in the realization of the quality of education.

In which Najunthong, J. (2017) discusses the conceptual framework for learning in the 21st century, it can be seen that learning and innovation skills are important skills that will develop and connect learners to the other two skills: Life and. Career Skills, and Information Media and Technology Skills to prepare students to enter the world of work in a more complex and technologically advanced economy where learning and innovation skills include critical thinking and problem solving, communication and collaboration, and creativity and innovation (Partnership for 21st Century Skills, 2009). Therefore, if learners do not have learning skills and innovations, they will result in problems in learning and applying knowledge to livelihoods according to Panich, V. (2012), which said that if learning skills are lacking, Knowledge and innovation will keep up with the world and make life difficult in society. Therefore, it is necessary to design learning to develop this skill for learners.

From the above importance, it can be seen that the learning management to developing the 21st Century Learning and Innovation Skills of learners under the Office of the Basic Education Commission for learners will be effective in part depending on their role. Teachers are important. For that reason, the researcher is interested in developing a validation component model of the 21st Century Learning and Innovation Skills of learners at the Office of the Basic Education Commission under the Office of the Basic Education Commission. This research aims to provide a clear and relevant approach to internal supervision according to the strategic management approach for the 21st Century Learning and Innovation Skills of learners under the Office of the Basic Education Commission, which will result in a link to Improve the quality of education and develop students' future skills effectively and effectively.

II. OBJECTIVES

1 To develop indicators for the 21st Century Learning and Innovation Skills of learners under the Office of the Basic Education Commission

2 To examine the harmony of the 21st Century Learning and Innovation Skills of learners’ model under the Office of the Basic Education Commission with empirical data.

Research Conceptual Framework


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Praison, A. (2015), Thanormchayathawat, B., et al (2016), it was found that the 21st Century Learning and Innovation Skills of learners under the Office of the Basic Education Commission had three components: 1) Creativity and Innovation, 2) Critical Thinking and Problem Solving and 3) communication and cooperation work, there are details of 26 indicators. Therefore, from the above concepts, the research framework can be summarized as illustrated.

III. METHODOLOGY

1 Population and sample group: The population used in this research consisted of 4,048 school administrators and academic teachers under the Office of Primary Education Service Area, Office of the Basic Education Commission. The samples were administrators of schools and teachers at school academics. Under the Office of Primary Education Area, Northeastern Region, Office of the Basic Education Commission, 130 people. In which Hair and et al (2010) stipulate that the minimum sample size should be 100 and there should be at least 5-10 people per indicator. There were 26 indicators in this study, so the sample size was 130 people and multi-stage random sampling was used.

2 The variables used in the research were 26 observable variables divided into 3 components: 1) creativity and innovation, 2) critical thinking and problem solving, and 3) communication and collaboration.

3 The research instrument was a questionnaire on components and indicators of the 21st Century Learning and Innovation Skills of learners under the Office of the Basic Education Commission, which was a rating scale of 26 items with validity. The content (CVI) was 1.00, the discriminant power for each item was between 0.55-0.83, and the whole article's confidence factor (α) was 0.94.

4 Data collection: the researcher collected the data by himself by submitting a total of 200 questionnaires, 173 questionnaires were returned, representing 86.50 percent. After checking the completeness of the responses, 130 questionnaires were used for data analysis.

5 The data analysis uses basic statistical analysis of variables, correlation coefficient analysis between variables in the model to determine the correlation characteristics of the variables, and preliminary check and Confirmatory Factor Analysis to examine the harmony of the 21st Century Learning and Innovation Skills.
Skills of learners model under the Office of the Basic Education Commission with empirical data using a statistical package.

IV. RESULTS

1. Results of preliminary data analysis.
The results of the analysis of basic statistical values of the overall variables revealed that all variables have a normal distribution in curves. The observed variables regarding learning skills and innovations in the 21st century among students under the Office of the Basic Education Commission were at a high level, most of them averaged between 3.84-4.42. All observed variables had a low standard deviation between 0.42-0.68.

The results of the correlation analysis between the observed variables on the 21st Century Learning and Innovation Skills of learners under the Office of the Basic Education Commission using the Pearson correlation coefficient, and when considering Bartlett's test of sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy showed that the correlation matrix between observed variables in all latent variable groups differed from the identity matrix at a statistically significant level of 0.01. It was shown that all observed variables were highly correlated and suitable for use in second-order confirmation element model analysis.

2. Second Place Confirmatory Factor Analysis
The second Confirmatory Factor Analysis of the 21st Century Learning and Innovation Skills of learners’ model under the Office of the Basic Education Commission, details are shown in the figure.

![Innovative Model of Secondary School Teachers](Image)

Figure 2: Innovative Model of Secondary School Teachers

In the second Confirmatory Factor Analysis, the 21st Century Learning and Innovation Skills of learners model under the Office of the Basic Education Commission found that it was harmonious with empirical data considering the harmonization index was: $\chi^2 = 264.16, \text{df} = 253, \text{Relative } \chi^2 = 1.04, \text{P-value} = .302, \text{RMSEA} = .02, \text{GFI} = .86, \text{AGFI} = .81, \text{RMR} = .04$

When considering the model composition weight of the 21st Century Learning and Innovation Skills of learners affiliated with the Office of the Basic Education Commission in Confirmatory Factor Analysis. The second was
found that the weights of the three components were high and statistically significant, ranging from 0.80 to 0.95, in descending order of component weights, namely communication and collaboration (0.95), thinking. Critical and Problem Solving (0.82), and Creativity and Innovation (0.80) respectively. The weighting of these elements indicates that the 21st Century Learning and Innovation Skills of learners stems more from communication and collaboration elements than others, which vary with the 21st Century Learning and Innovation Skills of learners were 90.25, 67.24 percent, and 64.00 percent, respectively.

V. DISCUSSION

In this research, the researcher would like to discuss the results of 2 issues. The first point is the result of the development of elements and indicators for the 21st Century Learning and Innovation Skills of learners based on relevant theories and preliminary quality checks. Issue 2: The results of the examination of the harmonization of the 21st Century Learning and Innovation Skills of learners’ model under the Office of the Basic Education Commission with the empirical data are as follows:

1. The results of the development of components and indicators of the 21st Century Learning and Innovation Skills of learners under the Office of the Basic Education Commission from the synthesis of conceptual frameworks and theories related to the 21st Century Learning and Innovation Skills of learners, were obtained. Elements or qualifications associated with the 21st Century Learning and Innovation Skills of learners for three areas are (1) Creativity and Innovation, (2) Critical Thinking and Problem Solving, and (3) Communication and Collaboration. However, all three components had a total of 26 indicators, of which the 21st Century Learning and Innovation Skills of learners' development of the elements and indicators of the Office of the Basic Education Commission was consistent with Chapman's core concept (2010); Kay, & Greenhill (2011); Partnership for 21 Century Skills (2009; Panich, V. (2012); Siripattrachai, P. (2013); Phuttasorn, E. (2013); Sintapanon, S. (2018); Namprama, P. (2014); Praison, A. (2015); Thanormchayathawat, B., et al (2016); Najunthong, J. (2017) as follows:

1.1 Creativity and innovation consisted of nine indicators: (1) using brainstorming techniques to create diverse ideas. (2) Create something new Enhance thinking and intelligence. (3) having thorough detail in thinking, analyzing, and evaluating To the development of creative work. (4) Focus on developing, emphasizing practice, and communicating new ideas. to others effective. (5) Be open-minded and accept new perspectives from collecting information and reflecting on the results. (6) Demonstrate originality and creativity in work and understand the application of new ideas. (7) Understand that failure is frequent. It's an opportunity to learn. (8) Applied innovation Build on ideas to create innovations. And (9) bringing innovations into practice and benefiting creative application.

1.2 There are nine indicators of critical thinking and problem solving, namely (1) the use of reasoning effectively and appropriately according to the situation. (2) Able to think analytically from subsections to produce results that affect the big picture. (3) It is effective in analyzing and assessing the situation for acceptance and credibility. (4) Analyze and assess testimony and arguments to find alternatives effectively. (5) Synthesize and link information and the results can be summarized. (6) Interpret information and draw conclusions based on the most reliable analysis. (7) Reflect critically based on experience and learning process. (8) Problems can be solved by methods Various techniques. And (9) identify and ask key questions that clarify perspectives and lead to better solutions.

1.3 There were eight indicators of communication and collaboration: (1) expressing ideas effectively with different communication skills in a variety of contexts; (2) effective listening skills that can build valuable cognitive skills Attitudes and interest. (3) Use communication for various purposes, including informing, teaching, motivating, and persuading. (4) Able to use a variety of media and technologies Be effective and know the effects that can be used. (5) Communicate effectively in many forms in different environments or contexts. (6) Able to work with diverse teams and accept differentiation efficiency. (7) Flexible and willing to Compromise to achieve collective goals. And (8) are responsible for the work done and see the value of working in a group.

2. The results of examining the harmonization of the learning skills model and innovation in the 21st century among students under the Office of the Basic Education Commission with empirical data found that it was harmonious with empirical data. Determining from the Harmony Index values can be obtained from $\chi^2 = 264.16$, df = 253, Relative $\chi^2 = 1.04$, P-value =.302, RMSEA =.02, GFI =.86, AGFI =.81, MR =.04. It shows that the elements and indicators of the 21st Century Learning and Innovation Skills of learners belong to the Office of the Basic Education Commission, between the characteristics that appear in the theoretical framework and those that are realistic, harmonious, and consistent.
The Confirmatory Factor Analysis found that the 21st Century Learning and Innovation Skills of learners under the Office of the Basic Education Commission in 3 aspects explained the variability of the 21st Century Learning and Innovation Skills of learners under the Office of Education Commission. The basics are not equal where communication and collaboration have a maximum component weight of 0.95. Creativity and innovation had the lowest component weight of 0.80, which reflects that the variability of the 21st Century Learning and Innovation Skills of learners stems from more communication and collaboration elements than any other aspect, while the findings of Joseline M. Santos (2017); Praison, A. (2015); Paiwithayasiritham, C. (2014) and Ongardwanich, N. (2013) are consistent with the concept of Partnership for 21st Century Skills (2009). Beyer (1991) and Panich, V. (2012), Critical thinking and problem solving, and creativity and innovation influence the 21st Century Learning and Innovation Skills of learners, also affiliated with the Office of the Basic Education Commission. From the data, it is seen that the weight of the components of all aspects is high, indicating that the 21st Century Learning and Innovation Skills of learners under the Office of the Basic Education Commission need to have all three components to affect the quality development of learners effectively.

RECOMMENDATIONS

1. Research results using recommendation

The results showed that the 21st Century Learning and Innovation Skills of learners under the Office of the Basic Education Commission came from more communication and collaboration elements than any other aspect. Therefore, the 21st Century Learning and Innovation Skills of learners should adopt both elements as leading elements which will help drive other elements along. While creativity and innovation should be intensively promoted and teacher development so that the 21st Century Learning and Innovation Skills of learners are relevant.

2. Further research recommendation

This research is a study of expectation conditions only. Therefore, to cover all issues, it is important to evaluate the actual characteristics so that the results reflect further implementation and that a combination of analytical techniques may be used to help make the indicators reliable more.

REFERENCES


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