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Development of 21st Century Skill Scales as Perceived by Students

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Abstract

Based on the policy of Thailand's Ministry of Education which emphasizes on the development of youth in the country for the 21st century world with focuses on enhancing the quality of Thai people in order to be immune for any changes and progresses of the country in the future, it is necessary that there must be an appropriate tool to measure the 21st century skills of the students. The objective of the study is to develop and assess of the qualities of 21st century skills scales as perceived by students. The 21st century skill scales comprise of 3 factors which are; 1) Learning and Innovation Skills, 2) Information, Media and Technology Skills, and 3) Life and Career Skills derived from Partnership for 21st Century Skills. The data was collected from Thai students aged 13 – 15 years old before being analyzed for the construct validity by the confirmatory factor analysis, which indicated a good fit of the model. The internal consistency test by Cronbach's alpha value has found the acceptable reliability which indicated that this tool is useful for students who are interested to conduct the assessment of 21st century skills of the students for planning and improving the teaching for the development of students to be capable of dealing with any changes of the world.

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1. Introduction

The competition in the 21st century depends on the quality of the nation's population (Hargreaves & Shirley, 2009), in line with the policy of Thailand's Ministry of Education of developing the nation's youths during the 21st century by aiming to enhance Thai citizens with immunity to changes and national progresses in the future. Only those with the knowledge and skills in dealing with continuous changes and adapting oneself to new situations will

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be successful. The skills of the 21st century can help us learn and adapt to changes all the time. Therefore, the skills of the new century are the key to shifting one's economic status, while those without these skills must remain stagnant to jobs that require little skills and have low wages. Expertise in the 21st century skills thus became an essential right of citizens in the present age (Autor, Levy & Murnane, 2003; Partnership for 21st Century Skills, 2008). For Thailand's students to achieve success as citizens and with working in the global economy, we must be certain that they possess these skills in the 21st century. According to the importance of 21st century skills as previously mentioned, it made the researcher became interested to study and develop scales for measuring 21st century skills by considering components from both Thai and foreign 21st century skills, especially those skills that are suitable with the state of Thai society. In the present, the definition from Partnership for 21st Century Skills is used as the main definition in studying and developing the skills scale, and are comprised of 3 main factors, which are 1) Learning and Innovation Skills, 2) Information, Media and Technology Skills, and 3) Life and Career Skills (Partnership for 21st Century Skills, 2008, 2009). Measuring 21st century skills is an important mechanism in reflecting the abilities of individuals on whether they are ready for specialized professions in the 21st century. So far, there were a variety of mechanisms for measuring 21st century skills in other countries. For instance, Osman, Soh and Arsad (2010, 2011) have developed 21st century skills tools of Malaysians for science students. As for studies of 21st century skills, no scale for measuring 21st century skills that is standardized and suitable to Thai society has been found. This would have been done for the purposes of allowing students to test themselves and involved persons to monitor, and preparing students for the international labor markets. Therefore, it is during junior high school that students prepare to choose their academic pathways to study in high school and profession pathways, in order to begin learning the skills required for their careers in the future. Thus, preparations should begin during junior high school level, so that changes can be made in time. Consequently, the purpose of the research is to develop and assess of the qualities of 21st century skills scales as perceived by junior high school students.

2. Research Methodology

2.1 Sample

The sample group contains junior high school students, affiliated with the Office of the Board of Basic Education, Ministry of Education. The group size is 836 students, with a mean age of 13.70 years (SD= 1.01). Most consist of 522 female students (62.4%) and 298 Matthayom 2 (Grade 8) students (35.6%).

Table 1 Indicators of 21st Century Skills and Example Questions

Factors	Indicators	Number of questions	Example questions
Learning and innovation skills	- Creativity and innovation - Critical thinking and problem solving - Communication and collaboration	12	- Creating new inventions for submission to teacher - Helping friends to solve problems - Planning work in a series of steps
Information, media and technology skills	- Information literacy - Media literacy - Information, communications and technology literacy	12	- Excellent research of information from various sources when writing reports - Able to separate different news -Able to find information using search engines such as Google, yahoo, etc.
Life and career skills	- Flexibility and adaptability - Initiative and self-direction - Social and cross-cultural skills - Productivity and accountability - Leadership and responsibility	20	- Reprimands from teachers allow me to improve and enhance myself - Always creating timetables for studies and revision - Always talking to new friends - Volunteering to work for that benefit the community
	Total	44	

2.2 Measures

The 21st century skills scales contain a total of 44 questions. Each question is a Likert scale item with five possible answers/selections, ranging from matching one's behavior the least (1) to matching one's behavior the most (5). The questions were created from indicators from each factor of 21st century skills, as seen in Table 1.

2.3 Analysis

These 21st century skills scales focused on examining validity by considering factor structures of 21st century skills. They were analyzed using second-order confirmatory factor analysis to display a structure from the input answers. A model fit was also considered, which was estimated by several indices including the chi-square value (χ^2), the Comparative Fit Index (CFI) with CFI ≥ .90 (Bentler, 1992; Hu and Bentler, 1999), the Standardized Root Mean Square Residual (SRMR) should not exceed0 .08 (Hu & Bentler, 1999), the root mean square error of approximation (RMSEA) should be ≤ 0.10 (Hu and Bentler, 1999; MacCallum et al., 1996), the goodness-of-fit (GFI), the adjusted GFI, and the reliability check by considering the internal consistency reliability from Cronbach's alpha coefficient.

3. Results

Measurement of the 21st century skills scales' quality was assessed by an analysis of validity and reliability.

3.1 Validity

From studying the relationships of the observed variables, it was discovered that all variables are related to each other, with statistically significant results (p = 0.01).

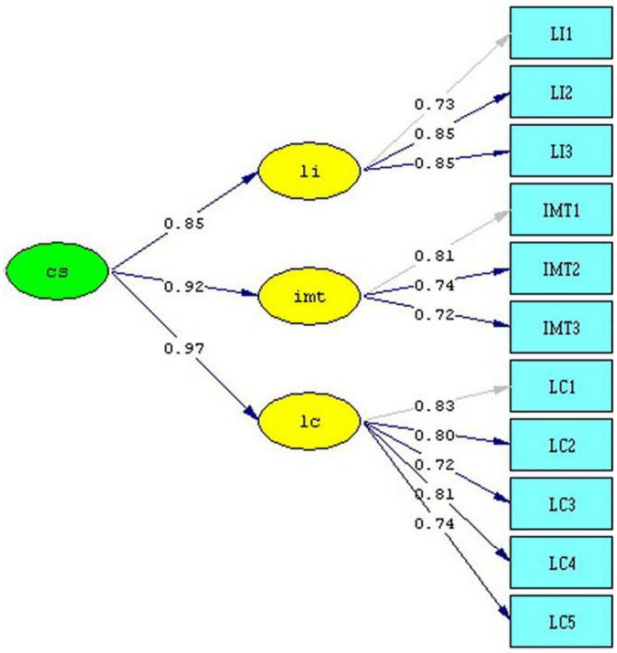

Fig. 1 Results of the confirmatory factor analysis. *Note.* LI: learning and innovation skills; IMT: information, media and technology skills; LC: life and career skills.

It can be noticed that the variable has a correlation coefficient of a range from 0.42 - 0.68 when verifying the scale's construct validity by the second-order confirmatory factor analysis. The model fit was satisfactory, with the following indices for model-fit evaluation: $\chi^2 = 38.65$, df = 31, p = 0.16, CFI = *1.00*, GFI = 0.99, AGFI = 0.98, SRMR = 0.012, and RMSEA = 0.017, according to the figure 1.

3.2 Reliability

The reliability values of each dimension were examined by using Cronbach's alpha coefficient. The rating scale provided Cronbach's alpha reliability coefficient was 0.96, as seen in Table 2.

Table 2 Cronbach's alpha coefficient for the 21st century skills scales

Dimension	Cronbach coefficient (α)
Learning and innovation skills	0.85
Information, media and technology skills	0.87
Life and career skills	0.93
21st century skills	0.96

4. Conclusion and Discussion

From the results of the second-order confirmatory factor analysis, it was found that the model of 21st century skills has the fit of the model to the data. Once considering life and career skills, they appear to be the most relevant to 21st century skills. Therefore, developments of 21st century skills should give importance to life and career skills, with the aims of students gaining flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, and leadership and responsibility. This research allowed for the development of 21st century skill scales through rating scales that have qualities in reliability and validity at a good level and are standardized for junior high school students, in order to bring the research results for efficient uses. If the scales are used, characteristics of the target group must be taken into consideration, and if it is necessary to use these scales with different target groups, they should be altered to be suitable for the group to be used with, as well as having quality assessments of the scales at every time they are used. Furthermore, results should also be interpreted by other methods, such as observation and checklists, in order to receive data on 21st century skills that are more true, accurate and precise.

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