ISSN 2773-9368 (Online)
Rangsit Journal of Educational Studies
Vol.8, No.1, pp.13-25, January-June 2021
DOI: 10.14456/rjes.2021.2

The Construct Reliability and Validity of the Thai Version of the Southeast Asia Teachers Competency Framework (T-SEA-TCF)

*Nathara Mhunpiew, Yi Dan, Pantira Unarat
Educational Administration and Leadership Program
Graduate School of Human Sciences, Assumption University, Thailand.
*Corresponding author; E-mail: wipaMhn@au.edu

Received 2020-12-04; Revised 2021-02-04; Accepted 2021-02-05;
Published online: 2021-05-31

Abstract
Teacher competency has always been a comprehensive ability closely linked to educational outcomes in schools. The formulation of the Southeast Asia Teachers Competency Framework (SEA-TCF) questionnaire provides quantifiable indicators for improving the overall performance of teachers in Southeast Asia. Given that the validity of questionnaires in different contexts may not always be consistent, this study examined the reliability and construct validity of the Thai version of the Southeast Asia Teacher Competency Framework (T-SEA-TCF) using SPSS, Amos, as well as Excel software. The research results showed that it has excellent internal consistency. Besides, its construct validity including factor loadings, convergent validity, and discriminant validity was tested by confirmatory factor analysis (CFA), indicating that the T-SEA-TCF was equally valid in the Thai context. A larger sample size and modifications to some of the items would contribute to a more effective T-SEA-TCF.

Keywords: *Teacher Competency, T-SEA-TCF, Reliability, Validity, Confirmatory Factor Analysis*

1. Introduction

It has become a global consensus that teachers responsible for imparting knowledge and skills to students and training qualified graduates for society play a vital role in all education stages (Biraimah & Jotia, 2013; Call, 2018; Nurhadi & Lyau, 2017). Therefore, training eligible professional teachers to complete quality education brings challenges to the education field (Goh & Wong, 2015). Teacher competency recognizes students' achievement as having a critical impact (Sadiman, 2004; Yuayai et al., 2015). The lower the teacher's competency, the lower the students' learning ability (Jusuf et al., 2019). In other words, teacher competency refers to a series of teaching-related knowledge, skills, and behaviours that teachers must possess, master, and complete (Estriyanto et al., 2017). Understandably, a comprehensive quality is when teachers can apply their knowledge, professional ability, and values flexibly to solve teaching problems creatively (Vecaldo et al., 2017). Therefore, in order to provide high-quality education, in addition to the necessary teaching skills and quality of work, teachers should also have social and other professional abilities related to teachings

(Jusuf et al., 2019), such as motivation to work (Sadiman, 2004), patience, and appropriate expectations for the successful completion of teaching tasks, etc. (Yuayai et al., 2015).

Different countries and regions have various teacher competency frameworks at other times. In the context of an international trend towards geographical ambiguity and cooperation in the field of education for joint development (Vesamavipool et al., 2015), the Southeast Asia Teachers Competency Framework (SEA-TCF) was jointly developing by the Ministries of Education of 11 countries in Southeast Asia as a guide to revitalizing teacher education (SEAMEO, 2018). The usefulness of this framework shared by many scholars in Southeast Asia (Abanador & Laganao, 2020) has been used in Thailand to measure teacher competence (Choicharoen & Nuansri, 2016; Kulratanarak, 2014). Nevertheless, the original version of SEA-TCF got published in English. It serves as a guiding framework and also being a self-assessment questionnaire for teachers' competence. However, the reliability and validity of its translation in non-English contexts should get further tested. Unfortunately, for the Thai versions of SEA-TCF, it is currently used by various scholars it has not been verified for statistically rigorous questionnaire validity.

Therefore, the purpose of this study is to test the reliability and construct validity of the Thai version of the Southeast Asia Teachers Competency Framework (T-SEA-TCF) to ensure that it is consistent with the meaning and logical structure expressed in the original version as well as its effectiveness in the Thai context.

2. Literature Review

The proposal of standardized teacher competency framework can be traced back to 1946 when National Commission on Teacher Education and Professional Standards in the United States put forward the idea of raising teachers' teaching ability to the professional level (Call, 2018). Although there has been controversy over whether it is necessary to standardize teacher competency in the following decades, from content to form, with the development of more relevant empirical studies, the relationship between teacher competency and student achievement has already proven to be noticeable (Sadiman, 2004). As a result, the formulation of teacher competency standards or frameworks became one of the most important means to improve teacher quality and student achievement. Furthermore, for such an observable and updatable competency-based framework, they reference rapid assessment of teacher performance. Notably, in terms of mentality, quality, technical competence, and adaptability (Powell et al., 2014). At the same time, it also reflects the demand for education development at the national level. For example, the British government had already expressed its expectation of establishing minimum teaching and conduct standards for teachers in England and Wales (Call, 2018). In contrast, Australia proposed to reform the teacher competency standard, which should include teaching ability, work attitude, and teaching practice based on the fact that their students tend to decline in the Programme for International Student Assessment (PISA) rankings (Call, 2018).

The standard or framework of teacher competency is not immutable but adjusted in line with the development over time. At the end of World War II, for example, the United States created a Fulbright Senior Scholar Program to improve the professional skills of university faculty and scholars (Biraimah & Jotia, 2013). In the USA, according to their current situation of globalization, various researches were heavily highlighted on an innovative solution for new educational challenges such as student diversity issue. Thus, the framework of teacher competency becomes a new focus for all education departments worldwide. Since 1961, American teachers have been required to be internationally competitive. Fulbright-Hays programs are already established to address this new demand, which requires teachers to have inclusive teaching practices, cross-cultural background knowledge, and multilingual teaching to help teachers and students develop an international perspective (Biraimah & Jotia, 2013). From the perspective of global industrial development, teacher competency standards are changing accordingly with the reform of informatization. Today, with the advent and development of the fourth Industrial Revolution, student learning has become more autonomous and personalized (Ally, 2019). The way knowledge is constructed and delivered is changing and evolving rapidly under such circumstances; teachers' development in the digital age has been given a new task. For example, the six-dimensional competency strategy for teachers developed by three leading teacher education institutions (TEIs) in the Asia-Pacific region focuses on ICT skills to help teachers teach more effectively in the new era (Lim et al., 2011). It is possible to say that teacher competency standards are the product of the times, which requires regional or national level standards or frameworks to update and redefine teacher competency to meet the needs.

In addition to the influence of the times, national and regional factors also play a decisive role in teacher competence standards. In other words, the teacher competency framework does not have global attributes, and different countries have teacher competence standards that meet their national development and requirements. Malaysia was the first country in Southeast Asia to adopt competency-based teacher standards, using the Malaysian Teacher Standards (MTS) developed in 2008 as a reference indicator for teacher professional development (Goh & Wong, 2015). It focuses on four dimensions of teaching practice, control, positive communication, and being an experienced teacher to develop a quality teaching force (Goh & Wong, 2013). Myanmar's teacher competency standards are centering on building learning teachers, aiming to respond to challenges and opportunities of the knowledge age by establishing a learning society (Goh & Wong, 2013). Indonesia defines teacher competency as four aspects: pedagogy, professional, personality, and social, and corresponding standards got formulated according to different levels of education, which is a series of skills that teachers must internalize and master (Estriyanto et al., 2017). One of the main tasks of the strategic plan for education in Cambodia is to improve teachers' quality by developing a teacher competency framework, emphasizing that the competency training for both 'pre' and in-service teachers should align with national needs (Goh, 2012). Realizing that too much emphasis on intensity and competition is no longer appropriate for the Singaporean context. Singapore, a model of

educational excellence in the Asia-pacific region, proposes to increase student creativity and innovation. Hence, teacher competency standards are aligned with this new demand, while the government gives schools more autonomy and teacher empowerment (Goh, 2012).

In summary, the formulation of teacher competency framework has always been consistent with the times and countries' needs. Such difference in requirements caused by various national conditions is evident in Southeast Asian countries. However, despite the differences, the rapid development of technology and economy has gradually blurred geographical boundaries, prompting governments to cooperate in various aspects for joint action, and cooperation in the educational field is one of the priorities (Vesamavibool et al., 2015). In the context of regional integration, organized in Bangkok, Thailand, the education ministries of 11 Southeast Asian countries jointly formulated the Southeast Asia Teacher Competency Framework (SEA-TCF) as a guide for teachers in Southeast Asia to revitalize teacher education (SEAMEO INNOTECH et al, 2018).

The SEA-TCF contains four essential competencies that consist of 12 general competencies, 31 enabling competencies, and 136 success descriptors, each of which corresponds to a behavior that the teacher expects to perform (Abanador & Laganao, 2020; SEAMEO INNOTECH et al, 2018). To make it a quantifiable tool that is usable for self-evaluation of teacher competencies, a self-rating questionnaire of teacher competency in Southeast Asia had already been developing as well, which contains four dimensions with 31 items, which are:

Section 1: Knowing and understanding what to teach means that teachers can deepen and expand their knowledge of the subjects they teach, understand educational trends, policies, and curricula, and keep abreast of local, national, regional, and global developments in education.

Section 2: Helping students learn, which refers to the ability of teachers to understand students' abilities, use the most effective teaching strategies, and evaluate and provide feedback on students' learning styles.

Section 3: Engaging the community means that teachers can work with parents and guardians to engage the community to help students learn and encourage respect and diversity.

Section 4: Becoming a better teacher every day, which refers to the teachers' ability to know themselves and others, to practice humanity, and to practice teaching (SEAMEO, 2018).

The SEA-TCF self-rating competency checklist is widely used in Southeast Asian countries to help teachers check and improve their professional competencies. Its validity has also been demonstrated, for example, by Philippine Scholars Abanador and Laganao (2020). They used the Pearson Product Moment Correlation Coefficient to test the validity of the

original English version of the questionnaire and found it to have qualified predictive validity. Some academics in Thailand, such as Choicharoen and Nuansri (2016), who adopted the questionnaire to compare the competencies of 375 Thai teachers in the Central Region by school size, found that their overall competency was high level. Kulrattanarak (2014) developed a teacher education curriculum based on SEA-TCF, including a prototype curriculum and evaluation methods.

Nevertheless, the initial version of SEA-TCF was in English. Although, they translated into Thai version by some researchers in order to use for data collection from Thai participants. Unfortunately, none of them was testing for statistically rigorous questionnaire validity. For example, a Thai version of SEA-TCF published by Krurusapha (The Teachers' Council of Thailand, 2019) has no evidence to show that it has been tested for statistical validity. However, Choicharoen and Nuansri (2016) had conducted the content validity tested on the SEA-TCF (Thai version) for their study by using Item-Objective of Congruence (IOC). While scores between 0.8 and 1.0 indicated good content validity, this does not prove an excellent structural validity that should get examined with emphasis (Fornell & Larcker, 1981; Gefen et al., 2000). Due to the differences in semantics between Eastern and Western vocabulary, the translated Thai version should undergo further reliability and validity tests to ensure that it is consistent with the meaning and logical structure expressed in the original version. Therefore, this research aims to test the reliability and validity of the Thai version of the Southeast Asia Teacher Competency Framework (T-SEA-TCF) to ensure its effectiveness in the Thai context.

3. Research Methodology

3.1 Participants

This study included all the 167 Thai teachers in a private secondary school in Chachoengsao province, Thailand. A total of 167 questionnaires got distributed, and 160 were returned, with a recovery rate of 95.8%, including 35 males (21.9%), 125 females (78.1%), among which undergraduate degree were 122 (76.3%), master's degree were 37 (23.1%), and one was below undergraduate (0.6%). Additionally, 51 participants (32%) were aged between 25 and 40 years, while 109 participants (68%) were aged between 41 and 60 years.

3.2 Procedure and measures

This study adopted the framework of the original English version of SEA-TCF (four dimensions and 31 items) and referenced the Thai version published by Krurusapha (The Teachers' Council of Thailand, 2019). In order to make it more in line with the actual situation of the target school, the researchers conducted a pre-test with the teachers from the school. They made some adjustments through their feedback on questionnaire items of Krurusapha's version. Then, researchers summarized and compared the contents of the questionnaire, discussed the translation's ambiguities, and determined the final Thai version of SEA-TCF (T-SEA-TCF). Sections 1-4 represents the four dimensions. A four-point Likert scale consistent

with the original questionnaire was adopted, with scores from 1 to 4 representing: 1 = I cannot do this yet, 2 = I have started to do this, but need to learn more, 3 = I can do this very well, and 4 = I can do this with confidence, and I can teach others. Subsequently, the researchers obtained the principal's permission at the target school to issue and withdraw the questionnaire with his assistance before distributing it to the teachers.

3.3 Data analysis

There was three software used for data analysis in this study: A Statistical Package for Social Science (SPSS), Excel, and Amos. First, SPSS was used to calculate the Cronbach's α of T-SEA-TCF to test its reliability. Then Amos was used to carry out Confirmatory Factor Analysis (CFA) for the questionnaire's Construct Validity test, aiming to verify whether the relationship between the dimensions and corresponding items was following the theoretical relationship designed by the initial researchers. In this study, T-SEA-TCF got translated from the original English version without changing the logical relationship between dimensions and items. Therefore, the CFA in this step was used to test whether the relationship between the four translated dimensions and the corresponding 31 items was consistent with the original version. This step involved two indicators that need to be calculated by Excel: Convergent Validity and Discriminant Validity.

4. Results

4.1 Reliability

In this study, the reliability of the T-SEA-TCF was tested using Cronbach's α calculated by SPSS. According to previous scholars' suggestion, .70 or above is an acceptable value, and when it is greater than .90, it indicates that the questionnaire has excellent internal consistency (George, 2011). The overall Cronbach's α for the T-SEA-TCF was .942. The four dimensions were .764, .882, .830, and .915, respectively, indicating a good internal consistency as shown in table 1, the Reliability of T-SEA-TCF.

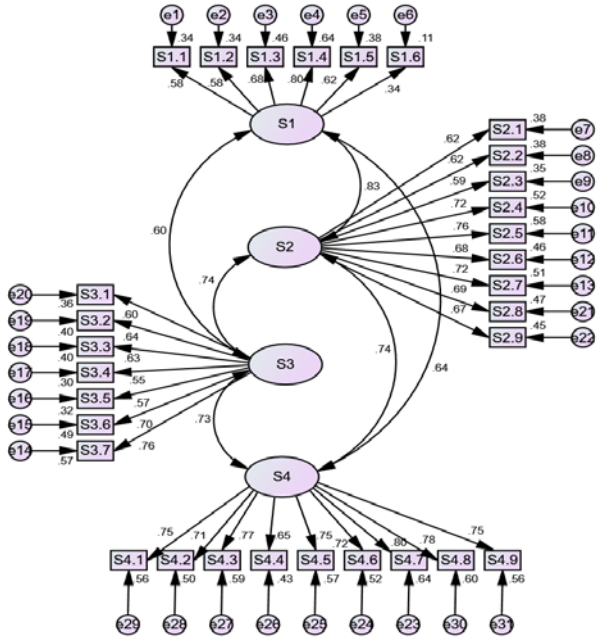
Table 1. The Reliability of T-SEA-TCF

Dimensions	Cronbach's α	Total score
Section 1	.764	.942
Section 2	.882	
Section 3	.830	
Section 4	.915	

4.2 Validity

In this study, the construct validity of T-SEA-TCF got verified by confirmatory factor analysis (CFA). The first step was to use Amos software to build the T-SEA-TCF measurement model, as shown in Figure 1.

Figure 1. The Construct Validity of T-SEA-TCF



Notes: SI = Section 1, S2 = Section 2, S3 = Section 3, S4 = Section 4.
S1.1-S1.6 respectively represent the six items in Section 1, and so on.

The second step is to analyze the factor loadings of the model by showing the relationship between each dimension and each item through the factor loadings (standardized regression weights) and considering deleting or modifying the items if the factor loadings are too low. As suggested by Field (2013), .30 is an acceptable value. In this study, factor loadings for all items were greater than .50, with values ranging from .34 to .80. Except for S1.6 (.34), however, all items were greater than .30; these details are shown in Table 2.

Table 2. Factor Loadings of Each Item

Factor	Item	Factor Loading
Section 1	S1.1	.58
	S1.2	.58
	S1.3	.68
	S1.4	.80
	S1.5	.62
	S1.6	.34
Section 2	S2.1	.62
	S2.2	.62
	S2.3	.59
	S2.4	.72
	S2.5	.76
	S2.6	.68
	S2.7	.72
	S2.8	.69
	S2.9	.67
Section 3	S3.1	.60
	S3.2	.64
	S3.3	.63
	S3.4	.55
	S3.5	.57
	S3.6	.70
	S3.7	.76
Section 4	S4.1	.75
	S4.2	.71
	S4.3	.77
	S4.4	.65
	S4.5	.75
	S4.6	.72
	S4.7	.80
	S4.8	.78
	S4.9	.75

The third step was to discriminate the model's convergent validity, determined by average variance extracted (AVE) and composite reliability (CR). The AVE refers to the sum of the square of the factor loading values, which represents the comprehensive explanatory ability of potential variables for all measured variables. In contrast, the CR value uses the square of the sum of the factor loadings to represent the questionnaire's internal consistency. The AVE values calculated for each T-SEA-TCF factor ranged from a minimum of .379 to a maximum of .553. In addition, the CR values ranged from .777 to .917, as shown in the following Table 3.

Table 3. AVE and CR of T-SEA-TCF Model

Dimensions	AVE	CR
Section 1	.379	.777
Section 2	.458	.883
Section 3	.409	.827
Section 4	.553	.917

The final step was the determination of discriminant validity, which was measured by comparing the square root value of the AVE with the Pearson's correlation coefficient (Pearson's r) of the four dimensions or factors. If AVE's square root value is greater than the correlation coefficient between that factor and the other factors, the questionnaire has good discriminant validity (Gefen et al., 2000). Using Excel and SPSS software, the square root values of AVE for each factor of the T-SEA-TCF (.616, .677, .640, and .744) were greater than their correlation coefficients with each of the other factors. For example, Pearson's r for Section 1 and the other three dimensions were .520, .327, and .398, respectively, all of which were smaller than the square root of AVE for Section 1 (.616), and so on, as shown in Table 4.

Table 4. Square Root of AVE and Pearson's

Dimensions	Section 1	Section 2	Section 3	Section 4
Section 1	.616			
Section 2	.520**	.677		
Section 3	.327**	.624**	.640	
Section 4	.398**	.672**	.598**	.744

Note. **. Correlation is significant at the 0.01 level (2-tailed).

5. Discussion

Cronbach's α, which is used to evaluate the consistency of continuous and ordered categorical variables, was utilized to analyze the reliability of T-SEA-TCF. According to George (2011), the consistency of items is related to the measurement content; the larger the Cronbach's α, the stronger the internal consistency. Usually, the value of it is between 0 and 1. If the value of Cronbach's α does not exceed 0.6, it is generally considered that the internal consistency is insufficient, and the corresponding items need to be modified or deleted; when it reaches 0.7-0.8, the questionnaire has considerable reliability. Simultaneously, when it reaches 0.8-0.9, the reliability is regarded as excellent. In this study, the four dimensions' Cronbach's α of T-SEA-TCF were above 0.7. The total score reached .942. It can be indicated as excellent reliability, similar to Choicharoen and Nuansri's (2016) study (.97). This result showed that T-SEA-TCF items had high internal consistency, and all of them can be retained.

Moreover, this study used Amos software to establish a measurement model to test the construct validity of T-SEA-TCF. As the construct validity refers to the degree to which a test measures the theoretical structure and characteristics to be measured, or it relates to the degree

to which the test data can explain a specific structure or characteristic of the pre-established theory. In short, it refers to the consistency between experiment and theory; that is, the experiment actually measures the hypothetical construction theory (Gefen et al., 2000). Generally, the confirmatory factor analysis (CFA) is a common and effective method for testing construct validity. It examines whether the relationship between a factor (dimension) and the corresponding item conforms to the theoretical relationship designed by the researcher (Fornell & Larcker, 1981). In this study, T-SEA-TCF is a Thai translation of the original English version, and it does not change the logical relationship and structure of the initial questionnaire. Therefore, CFA based on the questionnaire's measurement model is suitable for this study. The factor loading is an important reference criterion that reflects whether the association between the items and each factor (dimension) is significant (Field, 2013). The higher the factor loadings, the greater the explanatory power of the dimension for the corresponding items.

According to Field's (2013) suggestion, an item with a factor loading below .30 should get deleted because it cannot effectively reflect the corresponding factor. In this study, all items' factor loadings ranged from .34 to .80, which were all above .50 except for S1.6 (.34), and Section 4 had the highest loadings for each item, ranging from .65 to .80. Thus, it indicates a strong logical structural relationship for these dimensions. However, although the data in this questionnaire showed that all items could be retained, while the score of S1.6 was at a critical point and significantly lower than other items, possibly due to an insufficient accuracy in translation, which may lead to the teacher's misunderstanding of the item, or the item may be more closely related to other dimensions. Therefore, in subsequent research, consideration could be given to exploring and adjusting this item's translation in more detail or attempting to place it into other dimensions.

In the convergent validity section, the AVE and CR values are the reference indicators. The higher the AVE, the better the factor's ability to explain both the items it corresponds to, and generally, the minimum acceptable value is .36. Besides, a higher value of CR indicates greater internal consistency (Fornell & Larcker, 1981). In this study, the AVE values for the four dimensions of the T-SEA-TCF ranged from .379 to .553, which all were greater than .36. In addition, the CR values ranged from .777 to .917, which were greater than the reference value (.60) suggested by Fornell and Larcker (1981). The above indicators showed that this questionnaire has qualified aggregation validity, especially the CR values for all metrics indicate a high level of internal consistency. Nonetheless, there is room for improvement because the minimum standard for AVE is .36, but greater than .5 is ideal (Fornell & Larcker, 1981). Considering among the four dimensions of the T-SEA-TCF, only Section 4 (.553) has reached the ideal value, while Section 1 (.379) was almost at the critical point (.36). It is, suggested that the ability of the items in Sections 1, 2 and 3 to simultaneously explain the common factor was weaker than that of Section 4, especially Section 1, which may be related to the lower factor loading of S1.6 analyzed in the previous step. Thus, when S1.6 had a weaker

ability to interpret Section 1, the convergent validity of the whole dimension decreased accordingly. Therefore, adjusting the content translation of items with relatively low factor loadings could be considered in subsequent studies.

Discriminant validity is validated with reference to AVE and Pearson's r, where the square root of AVE indicates the convergence of the factors and Pearson's r illustrates the correlation between the factors. In this regard, if the convergence of the factor itself is found to be significantly stronger than the correlation between it and the other factors when the two are compared, it means that the content described by each dimension is clearly distinguished. Thus, the questionnaire has discriminant validity (Gefen et al., 2000). In this study, the square root values of AVE for each dimension of T-SEA-TCF were more significant than their Pearson's r with each of the other dimensions; the highest value in Section 4 was consistent with the results of the previous two steps. It is indicated that Section 4 had the strongest logical relationship with each item. In addition, the other three dimensions had reached standard values, which reveals that T-SEA-TCF's discriminant validity has passed the test.

6. Conclusion

Teacher competency is a comprehensive ability closely linked to educational outcomes in schools and the evolution of the educational environment. It is a challenge to ensure that Thai teachers have the best performance in the context of the trend towards regional integration. Formulating the Southeast Asia Teachers Competency Framework (SEA-TCF) provides quantifiable indicators for improving Thai teachers' overall performance. This study examined the reliability and construct validity of the Thai version of the Southeast Asia Teacher Competency Framework (T-SEA-TCF) using SPSS, Amos, as well as Excel software; its results showed the excellent internal consistency of the T-SEA-TCF. Besides, its construct validity including factor loadings, convergent validity, and discriminant validity was tested by confirmatory factor analysis. It indicated that the T-SEA-TCF was equally valid in the Thai context and can be used as an effective self-assessment tool to investigate in Thai schools, as this standardized guidebook, which aims to revitalize education, will regulate teacher performance.

7. Limitations

Despite the potential contributions, it is essential to be aware of some of the shortcomings of this study. First, this study took place at a private school in Chachoengsao province with selected participants from all Thai teachers at this school; this restrictive sample size may lead to variability in the results. Although the sample size was adequate for testing the reliability and validity of a questionnaire, a larger sample may improve the accuracy of the data, especially for those who passed the test in this study but still have room for improvement. Thus, it is suggested for future studies to increase the number of participating schools and sample size. Secondly, the factor loadings of some items in this questionnaire were not high enough, resulting in a convergent validity that met the standard but was still slightly inadequate.

It would be necessary to revise these items in the subsequent research and repeat the experiment several times until all indicators were at a high level, which would improve the applicability and validity of the T-SEA-TCF.

8. The Authors

Nathara Mhunpiew, Ph.D., is a Lecturer at the Graduate School of Human Sciences, Assumption University, program in Doctor of Philosophy in Educational Administration and Leadership

Yi Dan is a Ph. D. Candidate, program in Doctor of Philosophy in Educational Administration and Leadership

Pantira Unarat is a Ph.D. Candidate, program in Doctor of Philosophy in Educational Administration and Leadership

9. References

Abanador, P., & Laganao, E. (2020). Revitalizing the college of education prior to the criterion-related validity assessment of the success descriptors of Asian teaching competencies. Retrieved from http://dx.doi.org/10.2139/ssrn.3555009

Ally, M. (2019). Competency profile of the digital and online teacher in future ducation. *International Review of Research in Open and Distributed Learning*, 20(2). Retrieved from https://doi.org/10.19173/irrodl.v20i2.4206

Biraimah, K. L., & Jotia, A. L. (2013). The longitudinal effects of study abroad programs on teachers' content knowledge and perspectives: Fulbright-Hays group projects abroad in Botswana and Southeast Asia. *Journal of Studies in International Education*, 17(4), 433-454.

Call, K. (2018). Professional teaching standards: A comparative analysis of their history, implementation, and efficacy. *Australian Journal of Teacher Education,* 43(3), 93-108.

Choicharoen, T., & Nuansri, M. (2016). An analysis of Thai teacher's competency according to the southeast Asian teacher's competency framework in the 21st century: A case study of the central region area. *Journal of Graduate Studies Valaya Alongkorn Rajabhat University*, 10(1), 144-153.

Estriyanto, Y., Kersten, S., Pardjono, P., & Sofyan, H. (2017). The missing productive vocational high school teacher competency standard in the Indonesian education system. *Journal of Technical Education and Training (JTET), 9*(1), 26-44.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics and sex and drugs and rock'N' roll* (4th ed.). California: SAGE Publications.

Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research,* 18(3), 382-388.

Gefen, D., Straub, D. W., & Boudreau, M. C. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communication of AIS,* 4(7), 2-77.

George, D. (2011). *SPSS for windows step by step: A simple study guide and reference, 17.0 update, 10/e*. Pearson Education India.

Goh, P. S. C. (2012). The Malaysian teacher standards: A look at the challenges and implications for teacher educators. *Educational Research for Policy and Practice,* 11(2), 73-87.

Goh, P. S. C., & Wong, K. T. (2013). Beginning teachers' conceptions of competency: Implications to educational policy and teacher education in Malaysia. *Educational Research for Policy and Practice,* 13(1), 65–79.

Goh, P. S. C., & Wong, K. T. (2015). Exploring the challenges for teacher educators. *Journal of Research, Policy & Practice of Teachers and Teacher Education*, 5(1), 37-45.

Jusuf, R., Sopandi, W., Wulan, A. R., & Sa'ud, U. S. (2019). Strengthening teacher competency through icare approach to improve literacy assessment of science creative thinking. *International Journal of Learning, Teaching and Educational Research, 18*(7), 70-83.

Kulrattanarak, L. (2014). *Development of Prototype Teacher Education Curriculum Based on the Competency Framework for Southeast Asian Teacher of the 21st Century* (Unpublished Doctoral Dissertation, Chulalongkorn University).

Lim, C. P., Chai, C. S., & Churchill, D. (2011). A framework for developing pre-service teachers' competencies in using technologies to enhance teaching and learning. *Educational Media International,* 48(2), 69-83.

Nurhadi, D., & Lyau, N. M. (2017). A conceptual framework for the development of twenty-first-century vocational teachers' professional competencies. *International Forum of Teaching & Studies,* 13(2, 8-20).

Powell, A., Rabbitt, B., & Kennedy, K. (2014). iNACOL blended learning teacher competency framework. *International Association for K-12 Online Learning.* Retrieved from *https://aurora-institute.org/wp-content/uploads/iNACOL-Blended-Learning-Teacher-Competency-Framework.pdf*

Sadiman, A. S. (2004). Challenges in education in Southeast Asia. *In International Seminar on "Towards Cross Border Cooperation between South and Southeast Asia: The Importance of India's North East Playing Bridge and Buffer Role.* Retrieved from https://www.seameo.org/vl/library/dlwelcome/publications/paper/india04.htm

SEAMEO INNOTECH, SEAMEO, & Teachers' Council of Thailand. (2018). *Southeast Asia Teachers Competency Framework (SEA-TCF).* Retrieved from https://www.ksp.or.th/ksp2018/wp-content/uploads/2019/10/SEA-TCF-BOOK-ENG.pdf

The Teachers' Council of Thailand. (2019). *Southeast Asia Teachers Competency Framework (SEA-TCF, Thai translation of the original English version).* Retrieved from https://www.ksp.or.th/ksp2018/2019/10/10210/

Vecaldo, R. T., Andres, A. B., Carag, C. G., & Caranguian, C. B. (2017). Pedagogical competence and academic performance of pre-service elementary teachers in Tuguegarao City, Philippines. *Asia Pacific Journal of Multidisciplinary Research, 5*(1), 47-54.

Vesamavibool, S., Urwongse, S., Hanpanich, B., Thongnoum, D., & Watcharin, K. (2015). The comparative study of professional standards for Thai teachers and for Asian teachers. *Procedia-Social and Behavioral Sciences,* 191, 2280-2284

Yuayai, R., Chansirisira, P., & Numnaphol, K. (2015). Developing competency of teachers in basic education schools. *Educational Research and Reviews,* 10(12), 1758-1765.