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โมเดลการวัดกลยุทธ์การเรียนรู้ด้วยหลักอภิปัญญาในการอ่านภาษาอังกฤษ

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บทคัดย่อ

การวิจัยเชิงพรรณนาแบบภาคตัดขวางนี้ มีเป้าหมายเพื่อ 1) ประเมินโมเดลการวัดกลยุทธ์การเรียนรู้ด้วยหลักอภิปัญญาในการอ่านภาษาอังกฤษ และ 2) หาค่าความตรงของโมเดลที่ได้ในกลุ่มนักศึกษาพยาบาลและสาธารณสุขไทย กลุ่มตัวอย่างจำนวน 804 คน เป็นนักศึกษาพยาบาลศาสตร์และสาธารณสุขศาสตร์ชั้นปีที่ 2 จาก 6 วิทยาลัยในสังกัดกระทรวงสาธารณสุข เครื่องมือที่ใช้ ได้แก่ แบบบันทึกข้อมูลส่วนบุคคล และแบบประเมินกลยุทธ์การเรียนรู้ด้วยหลักอภิปัญญาในการอ่านภาษาอังกฤษที่มีค่า CVI = 0.827 ความเชื่อมั่น = 0.97 วิเคราะห์ข้อมูลด้วยสถิติเชิงพรรณนา วิเคราะห์องค์ประกอบเชิงสำรวจและองค์ประกอบเชิงยืนยันด้วยโปรแกรม IBM SPSS 24 และ LISREL 10.2

ผลการศึกษาพบว่า โมเดลการวัดกลยุทธ์การเรียนรู้ด้วยหลักอภิปัญญาในการอ่านภาษาอังกฤษ วิเคราะห์ข้อมูลโดยใช้สถิติการแยกองค์ประกอบเชิงสำรวจ มี 25 ข้อคำถาม ใน 5 องค์ประกอบ ๆ ละ 5 ข้อ ได้แก่ 1) การตระหนักรู้ในตนเองในการอ่านภาษาอังกฤษ 2) การวางแผนในการอ่านภาษาอังกฤษ 3) การกำกับควบคุมในการอ่านภาษาอังกฤษ 4) การประเมินผลในการอ่านภาษาอังกฤษ และ 5) การแก้ปัญหาในการอ่านภาษาอังกฤษทั้งหมดร่วมอธิบายความแปรปรวนกลยุทธ์การเรียนรู้ด้วยหลักอภิปัญญาในการอ่านภาษาอังกฤษได้ร้อยละ 71.21 เมื่อนำมาวิเคราะห์องค์ประกอบเชิงยืนยันพบว่า โมเดลนี้มีความสอดคล้องกับข้อมูลเชิงประจักษ์ในระดับดี โดยทุกองค์ประกอบมีความเชื่อมั่นเชิงโครงสร้าง (construct reliability) จากค่าความเที่ยงของตัวแปรแฝง (composite reliability or Rho C) 0.84 – 0.92 และความตรงเชิงสอดคล้อง (convergent validity) จากค่าเฉลี่ยความแปรปรวนที่ถูกสกัดได้ (average variance extracted or Rho V) 0.52 – 0.71

อาจารย์สามารถนำแบบประเมินกลยุทธ์การเรียนรู้นี้ไปใช้ประเมินการอ่านภาษาอังกฤษของนักศึกษาพยาบาลเพื่อวางแผนส่งเสริมสมรรถนะของนักศึกษาต่อไป

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Measurement Model of Metacognitive Learning Strategies for Reading English

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ABSTRACT

The aims of this cross-sectional descriptive study were 1) to test a newly developed measurement model of metacognitive learning strategies for reading English, and 2) to investigate the validity of the model in Thai nursing and public health students. Samples were 804 second-year nursing and public health students from six colleges under the Praboromarajchanok Institute for Health Workforce Development, Ministry of Public Health, Thailand. The instrument included 1) demographic data questionnaire and 2) the metacognitive learning strategies for reading English questionnaire The content validity of the questionnaire was 0.827 and reliability was 0.97. Data were analyzed using descriptive statistics, exploratory factor analysis, and confirmatory factor analysis using IBM SPSS 24 and LISREL 10.2.

The results of exploratory factor analysis revealed that the measurement model of metacognitive learning strategies for reading English is composed of 25 items in 5 components (5 items each), including 1) self-awareness in reading English, 2) planning in reading English, 3) self-monitoring in reading English, 4) evaluation of reading English, and 5) problem solving for reading English. The sum of variances explained 71.21% of the components of metacognitive learning strategies for reading English. The confirmatory factor analysis showed that the measurement model has a high level of congruence with empirical evidence. The construct reliability of all components from composite reliability (CR or Rho C) was between 0.84 - 0.92 and the convergent validity from average variance extracted (AVE or Rho V) was between 0.52 - 0.71.

Teachers may use this questionnaire to evaluate the ability of nursing students in reading English to plan the strategies to further improve English reading skills in nursing students.

Key words: *Measurement model, Metacognition, English as a foreign language, English reading, Learning strategy*

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Background

For students who learn English as a Foreign Language (EFL), learning English is not only a curricular matter but it is also important in daily life[1]. For nursing students, mastery of the English language is a desirable skill[2], because English is essential to gain information from evidence-based knowledge in nursing, as well as from guidelines which are mainly written in English. Also, command of the English language places nurses in a position to study, work, and live in multicultural environments. Essential English language skills are reading, writing, speaking, and listening. Phillips and Hartley[3] found that reading is particularly difficult for nursing students learning the English language, which may delay their learning progress.

In Thailand, English is considered as a foreign language. Wiriyachitra[4] found that the English proficiency of Thai students was unsatisfactory in four skills (Writing, Reading, Speaking, and Listening) and English teaching in Thailand has failed to prepare Thai students for the rapidly changing world. Thai nursing students should be able to read and understand relevant information communicated or published in the English language. Unfortunately, the English reading ability of Thai students is usually below average[5]. Learning English is a process that benefits from previous knowledge, as it requires integrating new vocabularies and applying them to use English in real life. Most of Thai nursing students do not understand the meaning of English articles due to the lack of sufficient English learning strategies[6].

Different language learning strategies have been used by successful and unsuccessful students[7]. Metacognition is a strategy effectively used to improve English reading competency internationally as it enables students to read systematically[6]. Metacognition is the method to develop inside thought for self-learning[6]. Metacognitive knowledge refers to one's knowledge or beliefs about the factors that control cognitive (knowledge) processes[8]. The metacognitive process is composed of pre-reading strategies (planning), while-reading strategies (monitoring and problem-solving), and post-reading strategies (evaluating)[9]. Metacognition also includes self-awareness, which is the ability of a person to monitor, control, and reflect one's performance in learning or thinking processes[10]. Comprehensive evaluating the metacognitive learning strategies for reading English is desirable to estimate its impact on the effect of English learning in nursing students. Currently, there is no such evaluation tool for the Thai population, particularly Thai nursing students. Therefore, the researchers develop a measurement model of metacognitive learning strategies for reading English to be used with Thai nursing students.

Aims

The aims of this study were 1) to test a newly developed measurement model of metacognitive learning strategies for reading English, and 2) to investigate the validity of the model in Thai nursing students.

Research conceptual framework

Reading articles or textbook in English language is particularly difficult for nursing students who learn English as a Foreign Language, which may delay their learning progress. The previous study show that metacognition can improve the student reading English ability[7]. Metacognition is the method to develop inside thought for self-learning.[6] In this study, we used the concept of metacognition to develop a measurement model of metacognitive learning strategies for reading

English to be used with Thai nursing students, which is composed of pre-reading strategies (planning), while-reading strategies (monitoring and problem-solving), post-reading strategies (evaluating), and self-awareness[9-10].

Material and methods

Study Design and Participants

This cross-sectional study was conducted in the academic year 2017. An accessible population of 804 nursing and public health students from six colleges under Praboromarajchanok Institute for Health Workforce Development (PIHWD), Ministry of Public Health, Thailand were recruited to this study using purposive sampling. These populations were purposively selected as samples because they had an English class at the time of study.

Data Collection

After getting approval, the researcher sent letters to the directors of each nursing college and school of public health to ask for their permission to collect data. The data were collected via Google forms, from April to June 2017 using the Thai version of the questionnaires as follow:

1. The demographic data questionnaire, which includes gender, college, and the educational level during the previous academic year.

2. The metacognitive learning strategies for reading English questionnaire developed by the researchers. This questionnaire contains 50 items divided into five subscales, including self-awareness in reading English (11 items), planning in reading English (8 items), self-monitoring in reading English (13 items), evaluation of reading English (8 items), and problem-solving for reading English (10 items). A four-point Likert scale was used. For self-awareness subscales, 1 = strongly disagree, 2 = partially agree, 3 = mostly agree, and 4 = strongly agree. For planning, monitoring, evaluation, and problem-solving subscales 1 = not at all, 2 = sometimes, 3 = almost always, and 4 = always.

The content validity index (CVI = .83) was calculated to evaluate the content and construct validity[11]. To ensure language validity, we conducted a cognitive interview with 10 nursing students to assess the participants' comprehension of each item for both question's intention and meaning. The reliability testing was conducted with 30 nursing students who had similar characteristics as the samples of this study. The Cronbach's alpha coefficient of the overall instrument was 0.97 (self-awareness = 0.85, planning = 0.83, monitoring = 0.92, evaluation = 0.91, and problem solving = 0.93).

Ethical Considerations

This study obtained approval from the president of Central College Network One to conduct this research following the policy of the PIHWD, Ministry of Public Health, Thailand. Students' participation in this study was voluntary. Answering the questions does not cause any harm. Refusal to participate would not result in any disadvantages. Participants could withdraw from the study at any time. Data are strictly confidential. Results are presented as a whole picture. Individual participants cannot be identified.

Statistical Analysis

We randomly divided 804 data sets in half to run exploratory factor analysis (first half data set) and confirmatory factor analysis (second half data set)[12]. We use exploratory factor analysis (EFA) to find a factor structure inherent to the questionnaire and to confirm the factor structure. If we run a confirmatory factor analysis (CFA) on the same data as an EFA,

this will show a good fitting model. In order to avoid this pitfall we should run CFA with the data that has never been used before. IBM SPSS 24 and LISREL 10.2 were used for data analysis.

Descriptive data analysis included frequency, percentage, means, standard deviations, skewness, and kurtosis are used to describe demographic data and items of metacognitive learning strategies for reading English. All data were normally distributed. We examined the components of the model using exploratory factor analysis (EFA) and Principal Components Analysis (PCA) applying orthogonal rotation (varimax method). We found that the data was appropriate for the analysis e.g., all variables are correlated, Kaiser-Meyer-Olkin (KMO) = 0.97, Bartlett's test of sphericity < 0.001, loading factor was above 0.5 which is considered practically significant. The communality was over 0.6. Each component has eigenvalues more than one and each subscale has more than 3 items[13]. Reliability for the derived scale scores was also measured using Cronbach's alpha coefficient. Then, the confirmatory factor analysis (CFA), composite reliability (CR or Rho C), and average variance extracted (AVE or Rho V) were calculated to test measurement model of metacognitive learning strategies for reading English. To test the global model fit, we explored the first model (before model modification) and interpreted using the indices consist of the chi-square per degree of freedom ratio (X^2/df), root mean square error of approximation (RMSEA), normed fit index (NFI), and comparative fit index (CFI). Then, model modification (after model) was done by setting the correlation between item error until modification indices met criteria.

Results

Demographic data

Most participants were female (92.4%) studying at Boromarajonani College of Nursing (BCN), Changwat Nonthaburi (20.1%), BCN Bangkok (20%), BCN Chonburi (19.5%), BCN Nopparat Vajira (8.1%), Phrapokklao Nursing College (18.8%), Abhaibhubejhr College of Thai Traditional Medicine Prachinburi (7.8%) and Sirindhorn College of Public Health, Chonburi (5.6%). The mean age of participants was 19.25 ± 1.52 years (max 34, min 19). The majority (93%) were 19 years old and 1.3% were older than 30. Half of the participants had a grade-point average of the previous academic year ranged between 2.51 and 3.00.

The components of the metacognitive learning strategies for reading English

A total of 50 items of the metacognitive learning strategies for reading English questionnaires were used to identify the main component. The results from the first 402 data set revealed that the means of each item were between 2.40 -2.83, SD between 0.61- 0.73, kurtosis between 0.31 - 0.15, and skewness between 0.36 - 0.28, which corresponds with a normal distribution. Twenty-five items were excluded because their loading factors were below 0.5, cross-loading, and balancing items in each subdomain to increase the cumulative percentage of variance.

Results from the extraction of principal components using exploratory factor analysis were 25 items in 5 components (5 items each), including 1) self-awareness in reading English, 2) planning in reading English, 3) self-monitoring in reading English, 4) evaluation of reading English, and 5) problem solving for reading English. The variance demonstrated by all items was 71.21%, as shown in Table 1.

Table 1 The components of the metacognitive learning strategies for reading English (n = 402)

Items	Components				
	self-awareness	planning	self-monitoring	evaluation	problem solving
Items	5	5	5	5	5
Loading factor	0.63 - 0.76	0.65 - 0.72	0.55 - 0.71	0.66 - 0.73	0.70 - 0.74
Communalities	0.60 - 0.71	0.61 - 0.75	0.65 - 0.74	0.72 - 0.76	0.71 - 0.76
Eigenvalues	4.02	3.63	3.58	3.32	3.25
Percentage of variance	16.08	14.51	14.34	13.29	13.00
	Cumulative percentage of variance = 71.21 %				
Cronbach's alpha coefficients	0.86	0.88	0.89	0.92	0.91
	Total = 0.97				

The confirmatory analysis of the metacognitive learning strategies for reading English

The confirmatory analysis of the metacognitive learning strategies for the second half data set revealed that the mean of each item ranged between 2.64 - 2.90, SD = 0.62 - 0.72, kurtosis = 0.27 - 0.11, and skewness = 0.46 - 0.11, demonstrating a normal distribution. The results after model adjustment showed that measurement model of metacognitive learning strategies for reading English had a high level of congruence with empirical evidence: X^2=437.17, df = 257, X^2/df = 1.70, *p-value* < 0.001, Root Mean Square Error of Approximation (RMSEA) = 0.042, Normed Fit Index (NFI) = 0.99. Comparative Fit Index (CFI) = 0.99, as shown in Table 2 and Figure 1

Table 2 Adjusted model of metacognitive learning strategies for reading English (n= 402)

Model	X^2	df	X^2/df	*p-value*	RMSEA	NFI	CFI
Before	536.85	264	2.03	< 0.001***	0.051	0.98	0.99
After	437.17	257	1.70	< 0.001***	0.042	0.99	0.99

****p-value* < 0.001

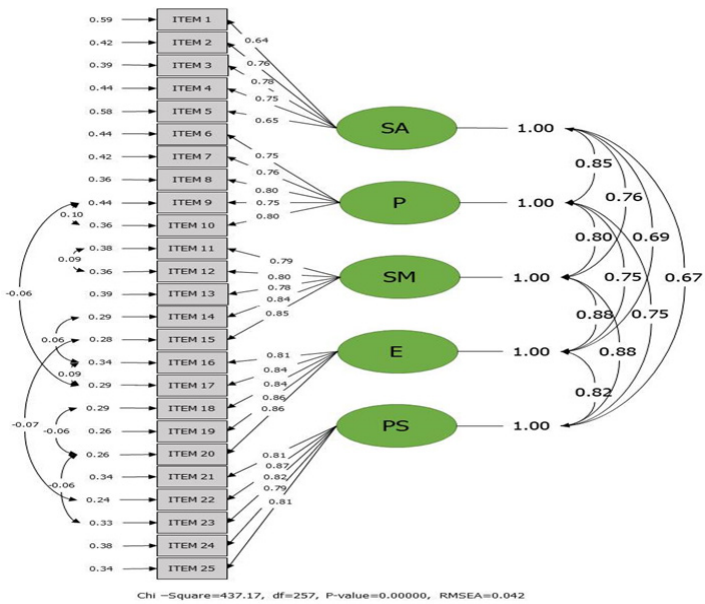

Figure 1 The measurement model of metacognitive learning strategies for reading English

The results from this study showed that the component of the measurement model of metacognitive learning strategies for reading English has a high level of congruence with empirical evidence both factor loading and square multiple correlations (R^2) for all five components, as follows:

1. Self-awareness in reading English: factor loading between 0.64 - 0.78, R^2 between 0.40 - 0.60.

2. Planning for reading English: factor loading between 0.75 - 0.80, R^2 between 0.56 - 0.64.

3. Monitoring in reading English: factor loading between 0.78 - 0.85, R^2 between 0.61 - 0.72.

4. Evaluation of reading English: factor loading between 0.81 - 0.86, R^2 between 0.66 - 0.74.

5. Problem-solving for reading English: factor loading between 0.79 - 0.87, R^2 between 0.62 - 0.75.

The construct reliabilities of all components from Rho C were between 0.84 - 0.92 and convergent validities from Rho V were between 0.52 - 0.71. All loading factors were above 0.5 which is considered as significant[14] in Table 3.

Table 3 Five main groups of metacognitive learning strategies for reading English plus 25 different characteristics and statistical evaluation (n= 402)

Constructs	Items	Factor loading	Error estimate	R^2	CR (Rho C)	AVF (Rho V)
1. Self-awareness (SA)	1. I know my ability in reading English.	0.64	0.59	0.40	0.84	0.52
	2. I know the reason for choosing strategies for reading English.	0.76	0.42	0.58		
	3. I can use reading strategies to read and understand new unfamiliar English articles.	0.78	0.39	0.60		
	4. I can memorize information from reading English well.	0.75	0.44	0.56		
	5. I know that the choice of English strategies depends on the subject that I read.	0.65	0.58	0.42		
2. Planning (P)	6. Before start reading, I plan to exercise the necessary skills for reading English, such as skimming, scanning and reading for details.	0.75	0.44	0.57	0.88	0.60
	7. Before start reading, I set an aim.	0.76	0.42	0.58		
	8. Before start reading, I will keep in mind to read only the important issues and skip unnecessary parts.	0.80	0.36	0.64		
	9. Before start reading, I guess the contents that could be found in the reading passage.	0.75	0.44	0.56		
	10. Before start reading, I connect my previous experiences with the reading passage.	0.80	0.36	0.64		

Table 3 Five main groups of metacognitive learning strategies for reading English plus 25 different characteristics and statistical evaluation (n= 402) (continued)

Constructs	Items	Factor loading	Error estimate	R^2	CR (Rho C)	AVF (Rho V)
3. Self-monitoring (SM)	11. While reading I try to think of the strategies that can improve my understanding.	0.79	0.38	0.63	0.91	0.66
	12. During reading I apply the appropriate reading English strategies.	0.80	0.36	0.64		
	13. While reading I try to finish the respective passage and understand the content.	0.78	0.39	0.61		
	14. After reading I rethink to understand the content I have read.	0.84	0.29	0.70		
	15.While reading I review my reading English strategies to find out what strategies are suitable at that moment.	0.85	0.28	0.72		
4. Evaluation (E)	16. After reading, I evaluate my reading proficiency.	0.81	0.34	0.66	0.92	0.71
	17. After reading, I reconsider alternative strategies to improve my reading skills.	0.84	0.29	0.70		
	18. After reading, I summarize what I have learned, such as knowledge and reading strategies.	0.84	0.29	0.71		
	19. After reading, I evaluate myself.	0.86	0.26	0.74		
	20. After reading, I can evaluate whether reading strategies I used can help to understand the reading passage.	0.86	0.26	0.74		
5. Problem solving (PS)	21. I ask others when I do not understand a part of the text.	0.81	0.34	0.66	0.91	0.67
	22. I read a passage repeatedly in order to understand it completely.	0.87	0.24	0.75		
	23. I interrupt reading when I do not understand the content.	0.82	0.33	0.67		
	24. I use reading strategies to understand the whole picture rather than to translate verbatim.	0.79	0.38	0.62		
	25. I use the knowledge I have gained previously for interpreting the vocabularies in an actual article.	0.81	0.34	0.66		

Discussion

In this study, we used the CFA method to confirm the theoretical factor structure and the congruence with empirical evidence[13]. This method also provides the construct reliability from Rho C was between 0.84 - 0.92 and convergent validity from Rho V was between 0.52 - 0.71. The results indicated the completeness of the measurement model. We found that the measurement model of metacognitive learning strategies for reading English is composed of 5 influential components, including 1) self-awareness in reading English, 2) planning in reading English, 3) self-monitoring in reading English, 4) evaluation of reading English, and 5) problem solving for reading English.The sum of variances (71.21 %) is representative of all components of metacognitive learning strategies for reading English. The high level of the measurement model of metacognitive learning strategies for reading English is following empirical evidence. The reliability coefficient, the construct validity, the construct reliability, and the convergent validity were acceptable for all components. We assume this is the result of developing the tool by using a comprehensive literature review covering concepts and definitions of metacognition[9] as well as the validation procedure conducted by experts. Moreover, as an additional control, the cognitive interview was applied to 10 individual nursing students before including the sample group. The cognitive interview allows the respondents to think aloud while going through each item of the questionnaire, thus expressing their thoughts towards each item. The method also provides the researchers with a clearer understanding of the respondents' perspective rather than exclusively their own. Cognitive interviews were used to pretest and validate questionnaires before the distribution of the questionnaire[15].

The literature shows that metacognitive learning strategies are composed of planning, monitoring, problem-solving, evaluating[9]. We also found that self-awareness is an important variable. Self-awareness will allow a person to control itself by setting a goal and control his/her behavior[9]. The intention behaviors successfully applied in this study suggest that the measurement model of metacognitive learning strategies is congruent with empirical evidence. The questionnaire developed in this study should be a good assessment tool because the sum of variances of all metacognitive learning strategies for reading English was more than 70%[14]. The reliability coefficient, construct validity and convergent validity were acceptable for all the components which are different from the previous data[9]. Literature reviewed shows that individual teaching strategy may be valuable, but multiple teaching strategies might be superior in developing reading comprehension[16]. Students can be flexible in using strategy suitable for particular text[16]. Our study examined the five components of a metacognition learning strategy for Thai nursing students; it may benefit teachers in assessing metacognitive learning strategies.

Conclusion

This measurement model of metacognitive learning strategies for reading English among nursing students was tested, with the results meeting all criteria. Therefore, the person who is in charge of English training for students who use English as a foreign language can apply the demonstrated strategies. However, the results of this study may not be generalized to other settings due to limited sampling.

Recommendations

Recommendation for research

Future research should explore the perspectives and experiences of nursing students related to issues and barriers to reading English.

Recommendation for education

This study has acknowledged the measurement model of metacognitive learning strategies for reading English of nursing students. Therefore, improving the reading English abilities including 1) self-awareness in reading, 2) planning for reading, 3) monitoring in reading, 4) evaluation of reading, and 5) problem solving for reading are the key components to teach nursing students in reading English.

Recommendation for practice

The findings of this research can be used to provide information regarding the measurement model of metacognitive learning strategies for reading English. Therefore, the questionnaire developed in this study could be one of the good assessment tools to evaluate the ability of nursing students in reading English.

Acknowledgments

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