The Development of an Instrument for Measuring Interprofessional Collaborative Practice Competency of Health Sciences Students

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Abstract

Different interprofessional frameworks have been developed. To evaluate students' collaborative practice competency correctly, it is necessary to find a reliable, suitable, and valid instrument. This study aimed to develop a tool to measure interprofessional collaborative practice competency of Thai health sciences Students. This research and development were divided into 5 phases: 1) Studying core competency and behavioral indicators; 2) examining content validity of the behavioral indicators; 3) creating a competency measurement tool and determining scoring criteria; 4) testing the tool and checking its reliability, and 5) assessing interprofessional collaborative practice competency of health sciences students.

The results showed that the interprofessional collaborative practice competency consisted of 6 key components: 1) patient-centered care, 2) role clarification, 3) team functioning, 4) collaborative leadership, 5) learning and reflection, and 6) knowledge. There were 30 behavioral indicators with the index of item-objective congruence (IOC) between 0.6-1.00 and the content validity index (CVI) of 0.92. The reliability of the whole tool was 0.93 and each aspect was 0.76, 0.77, 0.75, 0.79, 0.81, 0.77, respectively. The tool was able to classify the competency of health science students between those who had and did not have experience in participating in interprofessional teaching programs. The psychometric analysis of this tool supported its value in measuring the interprofessional collaborative practice competency of Thai health science students. As this study was a cross-sectional study, further assessment for the interprofessional collaborative practice competency among Thai health science students with the longitudinal design is needed.

Keywords: *Interprofessional Collaborative Practice Competency; Health Science Students*

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Introduction

The health care system has become more complex nowadays because of the increasing of chronic diseases and the increasing of older people. As a result, some discrepancies in health care services such as medical error or irrational drug use have occurred. These problems cannot be resolved by only one profession alone, but they require collaborative practices among health care teams.[1,2] The challenge is that at the present, collaborative practice among different professions is more complicated than in the past due to lack of respect for each other, lack of teamwork skills, and lack of knowledge about the roles of other professions.[3]

Therefore, it has been an effort to develop interprofessional education (IPE) in many countries to reduce conflicts among health professions. The World Health Organization defined the IPE as means of teaching and learning that allowed students from two or more professions to learn about, learn from, and learn with each other for effective collaboration among health professions, resulting in improving health outcomes of patients.[4] When students from different professions learn together, it will help them to adjust their interdisciplinary attitudes and promote their readiness to work with multidisciplinary team after they graduate.[3, 5] In Thailand, the National Health Professional Education Foundation started to develop the IPE in 2014.[6] At the present, the IPE has been carried out in many educational institutions, including Colleges of Nursing under the Ministry of Public Health, Thailand. [7-9]

The education institute under the Ministry of Public Health, Thailand is a public higher education institute for the productions of the public health workforce and developing a health workforce to serve the shortage of healthcare personnel of the Ministry of Public Health, Thailand.[10] After graduation, these graduates have to work with other professions. Therefore, as the role of faculty members of this institute, we recognize the importance of developing tools to assess the competence of interprofessional collaboration practice among these health science students. Based on the review of literature, it showed that although the IPE has been implemented for long periods of time, the tools or frameworks for assessing multidisciplinary competency have been varied and their components have been different. Different definitions have been given in different countries, and most of them are frameworks for assessing competencies that are appropriate for people in Western countries.[3] For example, the Canadian Interprofessional Health Collaborative (CIHC) identified six components of collaborative practice: 1) patient-centered care, 2) interprofessional communication, and 3) role clarification, 4) team functioning, 5) collaborative leadership, and 6) interprofessional conflict resolution.[10] In Thailand, the National Health Professional Education Foundation suggested guidelines and principles for interprofessional education and identified the IPE competency into 5 components, included: 1) ethics and shared values, 2) roles and responsibilities, 3) teamwork and leadership, 4) learning and reflection, and 5) communication.[6] It can be seen that both conceptual frameworks have some similarities and differences in some components.

Therefore, the purpose of this study was to develop a tool for measuring interprofessional collaborative practice competency of Thai health sciences students by combining both the Western and the Eastern conceptual frameworks together. We expected that it will help us to have a more complete and clearer tool

for assessing interprofessional collaborative practice competency for Thai health science students. Our specific research objectives were: 1) to examine the components of the interprofessional collaborative competency of health science students, 2) to develop a tool to measure the interprofessional collaborative practice competency of health sciences students, and 3) to compare the interprofessional collaborative practice competency of health sciences students between who did not have and who had experiences in participating in the interprofessional educational program.

Methods

The study was a research and development (R&D) design, divided into 5 phases.

Phase 1) Studying core competency and behavioral indicators: We first developed a pool of items verbatim based on the literature review and the in-depth interview from 20 persons, included 10 faculty members who had experience in teaching students in the interprofessional education program, and 10 preceptors who had experience as mentors of students in the interprofessional education program. The interview took approximately 30-45 minutes for each person and then used the content analysis method to analyze data.

Phase 2: Examining content validity of the behavioral indicators: The items pool from phase 1 were reviewed to assess content validity by 5 experts, including 3 Deputy Directors of the Academic Affairs at Nursing Colleges in Thailand who had experience in teaching students in the interprofessional education program and 2 sub-committee of the National Health Professional Education Foundation, Thailand. After the experts determined the appropriateness, clarity of the language used, and the consistency between the indicated behavior and its definition, the content validity index was calculated.

Phase 3: Creating a competency measurement tool and determining scoring criteria: Researchers created the tool format and set scoring criteria. Then, we asked 3 experts in measurement and evaluation to determine the suitability of the format, assessment method, and scoring criteria.

Phase 4: Testing the tool and checking its reliability: Researchers tested the reliability of the tool by testing with 50 health science students in Colleges under the Ministry of Public Health, Thailand. Participants were asked to self-assessed their interprofessional collaborative practice competency. Then, the data were analyzed for the Alpha Cronbach coefficient.

Phase 5: Testing the construct validity by assessing the interprofessional collaborative practice competency of health science students: We collected participants' demographic characteristics, including gender, age, religion, and grade point average (GPA). The interprofessional collaborative practice competency was examined using a five-point scale of a total of 48 items. This survey involved 280 health science students from 3 Colleges under the Ministry of Public Health, Thailand, which had prepared the interprofessional education program together. The sample size was calculated using the G*Power program, the test power was .95, the error was .05, and the effect size was .25.

Statistical Analysis

The tool's construct validity was evaluated by using an exploratory factor analysis method. A principal factor method was used for factor extraction,

varimax rotation (with an eigenvalue>1.0), and factor loading greater than 0.3 as criteria. The independent t-test was also used with interprofessional education experience (had/did not have) to confirm its construct validity. The test was conducted to determine whether there was a significant difference in the interprofessional collaborative practice competency scores between students who had and did not have experience in participating in the interprofessional program. Cronbach's alpha coefficient was calculated for reliability. Frequency and percentage were used to analyze the demographic data of the samples. Mean and standard deviation were also used to examine the interprofessional collaborative practice competency of the samples.

Ethical Considerations : The ethics review board of SCPHP College, Thailand approved this study.

Results

Content Validity

Throughout the literature review and the in-depth interview process with 20 faculty and preceptors who had experiences in teaching students in the interprofessional program, the first version of the tool composed of 8 main key components: 1) patient-centered care, 2) interprofessional communication, 3) role clarification, 4) team functioning, 5) collaborative leadership, 6) interprofessional conflict resolution, 7) learning and reflection, and 8) knowledge. In addition, 40 items of the behavioral indicators were first developed for an original scale. Then, based on the assessing by 5 experts, the results showed that the Item-Objective Congruence (IOC) for the first version of the tool was between 0.6-1.00 and the Content Validity Index (CVI) was 0.92, the 8 key main components were founded as same as those in phase I. However, the behavioral indicators of the competency were added from 40 to be 48 items for the second round. We then asked 3 experts in measurement and evaluation to determine the scoring criteria. The results of this phase helped us to be clearer for the objective of the measures; the assessors (health science students, friends, and supervisors (instructor/mentor); assessment methods by responding a five-point sub-scale (from least likely to comply with that behavior = 1 to most likely to comply with that behavior=5). The total score ranged from 1 to 5, with higher scores indicating greater collaborative practice competency.

Construct Validity

We tested the construct validity of the tool by comparing interprofessional collaborative practice competency between Thai health science students who had and did not have experience in participating in the interprofessional teaching program. The results of the study showed that most of the samples were female (88.93%). The age of samples ranged from 19-37years (mean=21.31, S.D.=2.11. About 96.07% were Buddhist. The cumulative grade point average ranged from 2.00 to 3.81 (mean=2.83, S.D.=0.36 (Table 1)

Table 1 Demographic characteristics of samples (n=280).

Variable	n	%
Gender		
Male	31	11.07
Female	249	88.93
$\bar{X}\bar{X}$		
Age (years); (=21.31; S.D. = 2.11, Min = 19, Max = 37)		
≤20	10	3.57
21-25	260	92.86
26–30	6	2.14
31-35	3	1.07
≥ 35	1	0.36
Religion		
Buddhist	269	96.07
Christian	10	3.57
Islam	1	0.36
$\bar{X}\bar{X}$		
GPA (= 2.83, S.D. = 0.36, Min = 2.00, Max = 3.81)		
2.00 – 2.50	53	18.93
2.51 – 3.00	150	53.57
3.01 - 3.50	61	21.79
3.51 – 4.00	16	5.71

For the factor analysis, the results of the study showed that the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.94, indicating that it was appropriate to perform factor analysis on these data. Bartlett's Test of Sphericity was significant (0.000), indicating that data were adequate for factor analysis to be performed. The factor analysis revealed 6 components with eigenvalues exceeding 1, explaining a total of 55.72% of the variance, with component 1 contributing 34.54%, component 2 contributing 5.17%, component 3 contributing 4.63%, component 4 contributing 4.13%, component 5 contributing 3.77%, component 6 contributing 3.48%. It was decided to retain 6 components for further investigation. Then, to ensure the discrimination among factors, we determined a cutoff point of 0.5 for factor loadings. If the loading of a component was less than 0.4. Eighteen items were excluded. The further confirmatory factor analysis was carried out on the remaining 30 items, resulting in items loading higher than 0.40. Factor 1 called "patient-centered care" comprised of 6 items; Factor 2 called "role clarification" comprised of 6 items; Factor 3 called "team functioning" comprised of 4 items; Factor 4 called "collaborative leadership" comprised of 5 items; Factor 5 called "learning and reflection" comprised of 5 items, and factor 6 called "knowledge" comprised of 4 items. The factor results are displayed in Table 2.

Table 2 The factor analysis of the interprofessional collaborative practice competency.

Item	Factor loading					
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
1. Listen to all parties involved, such as patients, families, and communities in providing care for clients.	0.79	0.16	0.01	0.13	0.00	0.22
2. Appropriately encourage patients and their families to participate in a patient's care plan.	0.45	0.45	0.18	0.06	0.22	0.22
3. Provide easy information to patients and their families that help them to make an appropriate decision.	0.49	0.38	0.09	0.05	0.17	0.07
4. Respect patients' decisions and values in their self-care.	0.60	0.00	0.24	0.23	0.11	0.10
6. Prepare a patient' care plan by concerning the context and cultural diversity of the patients.	0.41	0.40	0.02	0.10	0.30	0.22
8. Effectively communicate with the interprofessional team.	0.22	0.51	0.48	0.02	0.16	0.08
10. Carefully listen to the opinions of the interprofessional team.	0.56	-0.02	0.49	0.17	0.15	-0.03
12. Express your own opinions and feelings to the patients without judgment.	0.21	0.46	0.14	0.25	0.03	-0.05
14. Demonstrate respect for the roles and responsibilities of the interprofessional team.	0.23	0.23	0.68	0.05	0.20	0.14
17. Integrate your competence/role in providing services.	0.06	0.66	0.11	0.26	0.12	0.23
19. Appropriately plan and collaborative work in the interprofessional team.	0.01	0.48	0.15	0.19	0.17	0.39
20. Able to work with the interprofessional teams appropriately.	0.13	0.12	0.57	0.24	0.11	0.38
21. Follow the rules by showing respect and honor to team members.	0.10	0.16	0.48	0.40	0.1	0.26
22. Have unity and accept the decisions of the team members.	0.00	0.11	0.58	0.53	0.09	0.14

Table 2 The factor analysis of the interprofessional collaborative practice competency. (Con.)

Item	Factor loading					
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
25. Create an atmosphere for working together.	0.07	0.27	0.14	0.63	0.22	0.05
26. Use participatory decision-making principles.	0.27	0.15	0.00	0.61	0.25	0.21
29. Analyze causes and factors that cause errors in accordance with the situation.	0.03	0.51	0.15	0.39	0.19	0.30
30. Use empirical data/evidence to resolve conflicts.	0.09	0.55	-0.04	0.22	0.18	0.37
32. Use reasons to resolve conflicts.	0.26	0.09	0.09	0.66	0.14	0.19
33. Coordinate to reduce various misunderstandings.	0.07	0.30	0.26	0.61	0.13	0.14
35. Create an atmosphere for acceptance of differences.	0.13	0.25	0.14	0.50	0.21	0.29
36. Seek consensus when conflicts arise by giving everyone's opportunity to express their opinions.	0.30	0.26	0.08	0.31	0.60	0.11
38. Reflect on the findings that you have learned.	0.35	0.03	0.06	0.23	0.59	0.24
39. Reflect on the issues that you would like to learn more about to improve interprofessional work.	0.06	0.02	0.09	0.23	0.74	0.18
40. Able to communicate what has been learned from working with interprofessional areas.	0.05	0.28	0.16	0.09	0.67	0.18
42. Reflect on future interprofessional work plans.	0.02	0.24	0.30	0.16	0.64	0.19
43. Appropriately apply knowledge in your own profession to take care of patients.	0.17	0.12	0.26	0.08	0.15	0.65
44. Appropriately apply knowledge in related sciences, such as population, health economics, public health science, etc. to take care of patients.	0.09	0.20	0.11	0.12	0.10	0.66
47. Effectively integrate your own sciences and interprofessional to take care of patients.	0.19	0.20	0.03	0.18	0.30	0.66
48. Use up-to-date information of all professionals to take care of patients.	0.08	0.11	0.13	0.25	0.20	0.65

Factor 1 was named "Patient-centered care"; factor 2 was named "Role clarification"; factor 3 was named "Team functioning"; factor 4 was named "Collaborative leadership"; factor 5 was named "learning and reflection"; and factor 6 was named "Knowledge". Values with factor loadings greater than 0.40 as absolute values are indicated with shaded areas.

Internal consistency

We analyzed correlations between each subscale with the total score by using bivariate correlations. The results of the study revealed the presence of all coefficients at 0.5 and above (Table 3), indicating that all subscales were highly correlated with the total scale. Thus, the tool is a reliable and valid instrument comprising 30 items within 6 subscales.

Table 3 Pearson-product moment correlation coefficients between the rotated factors on the scale for the interprofessional collaborative practice competency.

Factor	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Factor 1	-	.595**	.553**	.565**	.574**	.505**
Factor 2		-	.586**	.651**	.594**	.607**
Factor 3			-	.630**	.540**	.533**
Factor 4				-	.617**	.565**
Factor 5					-	.578**
Factor 6						-
Total 30 items	.790**	.844**	.780**	.835**	.814**	.769**

**p≤.01

Then, the total scores for each factor were compared in relation to a learning experience in attending the interprofessional education between students who had and did not have experience in participating in the interprofessional teaching program. The findings of the study showed that the tool was able to classify the competency of these two groups. Students experiencing in participating the interprofessional teaching program had scored on the overall interprofessional collaborative practice competency and in each aspect higher than those who had no prior experience of participating in interprofessional teaching program, with the statistically significant at the .05 level, except for the patient-centered competence. (Table 4)

Table 4: The difference scores of the interprofessional collaborative practice competency between students who had and did not have experience in participating in the interprofessional teaching program. (n=280)

Factors	No experience (n=163)		Had experience (n=117)		Mean Differences		Independent t-test
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	
1. Patient-centered care	4.42	0.40	4.50	0.41	0.08	0.05	1.736
2. Role clarification	4.19	0.40	4.33	0.46	0.14	0.05	2.560*
3. Team functioning	4.28	0.51	4.59	0.43	0.31	0.06	5.497*
4. Collaborative leadership	4.26	0.48	4.50	0.45	0.23	0.06	4.142*
5. Learning and reflection	4.17	0.50	4.38	0.48	0.20	0.06	3.439*
6. Knowledge	4.28	0.48	4.48	0.48	0.20	0.06	3.432*
Total	4.27	0.36	4.45	0.36	0.19	0.44	4.205*

*p≤.05

Reliability

By testing the first version of the tool for its reliability with 50 health science students in Colleges under the Ministry of Public Health, Thailand, the results of the study showed that the whole scale had a Cronbach's alpha of 0.98, and values for each aspect were 0.89, 0.76, 0.85, 0.79, 0.85, 0.92, 0.84, 0.88, respectively. After that, we tested the reliability of the 30-item version. The results of the study showed that the overall reliability for the tool was 0.93 and the reliability for the subscales were 0.76, 0.77, 0.75, 0.79, 0.78, and 0.77, respectively.

Discussion

The results of the study showed that the interprofessional collaborative practice competency of Thai health sciences students consisted of 6 key components, including 1) patient-centered care, 2) role clarification, 3) team functioning, 4) collaborative leadership, 5) learning and reflection, and 6) knowledge. When comparing to the 6 components defined by the Canadian Interprofessional Health Collaborative (CIHC),[11] it had been found that the additional components reported from this study were learning and reflection, and knowledge. This may be because reflection is an important competency in

health science education. Particularly, in the nursing profession as it is a competency that promotes experiential learning in a clinic and helps learners to connect theory into practice.[12] Reflective practice is an important method to combine theory and practice together because when one reflects something, he or she needs to consider each experience seriously based on his/her own existing knowledge with the aim of learning and changing behaviors.[12] This is an appropriate way in developing healthcare professional expertise because changing context and growth of health knowledge have been expanding at an advanced level every day.[13]

In addition, to improve quality of care and increase patient safety, all health personnel, including doctors, nurses, or other health care providers need to have both broad and in-depth knowledge in one's own field and related fields such as pharmacology, anatomy, or physiology as this fundamental knowledge will help them for physical examination or symptom interpretation.[14] This may be related to the change in the global context. As we can see that health conditions nowadays are more complex and health service systems are in advance. Therefore, health personnel need to continuously develop their competencies in their own and related fields of knowledge.[14] The finding of this study was congruent with a previous study that reported that ongoing professional development is a need and expectation for nurses across all career stages as it helped them to ensure competency and quality patient care throughout the span of their careers.[15]

When comparing the main components of the interprofessional collaborative practice competency found in this study with the components defined by the National Health Professional Education Foundation, Thailand,[6] it has been found that there was 1 additional main component of the interprofessional collaborative practice competency found in this research, namely: knowledge. There was also a separation of teamwork and leadership competency. This might be because, during the 21st century, Thailand has undergone many changes in health systems such as the promulgation of the National Health Security Act, having a proactive policy to take care of people in each area by dividing the management into health zones or having more complex health conditions of Thai people. Therefore, working as a solo professional is unable to cope with such changing situations, but multidisciplinary work is needed.[2] Consequently, health education is necessary to adapt to the changes of the health care system by adjusting the teaching and learning methods to enable graduates to have competencies to work in a changing environment and can effectively take care of Thai people.[16-17]

Some terms used in both resources might be different, but the performance indicators were similar. For example, whereas the National Health Professional Education Foundation[6] used the term "ethics and shared values in the first main component, this study used the term "patient-centered care" instead. However, the behavioral indicators of both sides were similar. This might be because patient-centeredness is an approach to improve the quality of health care that has been promoted extensively in recent years.[18] When health care providers work with the concept of patient-centered care, it has been shown to be associated with treatment compliance, lead to better health outcomes, reduced readmissions and consultations, and consequently, reduced healthcare costs.[19-20] It is not surprising that the patient-centered care component had been considered as one competency for interprofessional collaborative

practices.

The results of the study showed that the sample group who participated in the interprofessional education program had significantly higher scores of the interprofessional collaborative practice competency in both overall and for 5 components, namely: role clarification, team functioning, collaborative leadership, learning and reflection, and knowledge than those with no experience in participating in the interprofessional education program (p=.05). There was only the patient-centered care component that both groups had similar scores. This might be because the interprofessional education enhanced learners to learn the roles and responsibilities of each profession, helped them to know how to work as a team and how to reflect their thoughts.[8] While the concept of patient-centered care is a concept that the Colleges under the Ministry of Public Health, Thailand have adopted as a conceptual framework for defining the identity of the graduates, containing: service mind, analytical thinking, and the participation of service care. All educational institutions under the Ministry of Public Health, Thailand have used this concept in teaching all students. Therefore, it is not surprising that why all health science students realized the importance of patient-centered care.

Implication for practices

The tool developed from this study can be used for assessing interprofessional collaborative practice competency of Thai health science students. The limitation of this study was that the findings of this study were based on the self-evaluation of students. As a result, it may be possible that individuals may be likely to assess themselves on the positive side. Therefore, as the assessors of this developed tool can be many persons, future research to compare individual's competency scores assessed by instructors, mentors, preceptors, or colleagues, as well as students by themselves may be useful in order to provide the most comprehensive and accurate assessment.

Conflicts of Interest: The authors have no conflicts of interest to declare.

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