

## Research Article

# The effect of CIPPA instructional model and inquiry method on nursing students' achievement and scientific attitude

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### ABSTRACT

A good comprehension in the both theoretical and practical principles aspects is crucial for nursing students to achieve scientific achievement and attitude. The purpose of this research was observing the effect of CIPPA instructional model on nursing students' scientific achievement and attitude. The population of this study was 110 nursing students who were in first semester of the academic year 2018/2019. The samples were selected and divided equally into two groups by using cluster random sampling technique. The first group was taught by using inquiry method instructional model while the other was taught using CIPPA instructional model. The research instruments were three plans of inquiry method and CIPPA instructional model, Biology for Health Science Achievement and Students' Scientific Attitude tests. The data analysis techniques used mean, standard deviation, and t-test. The study results showed that there was no significant difference between the two groups observed in both scientific achievement [ $t(53) = 0.42, p = .81$ ] and attitude [ $t(53) = 1.12, p = .313$ ]. Interestingly, albeit that students' perseverance and responsibility reached the highest score yet their rationality placed in the lowest level. Hence, more intensive and detail attention need to be given in all aspects of students' scientific attitude.



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## INTRODUCTION

Science has a very important role in today's and future world society. Science deals with everyone in everyday life and in various works and technologies (Combi, 2016; Dufva & Dufva, 2019; Severinghaus, 2014). Tools and appliances that humans use to facilitate life and work are all closely related to science (Garcia, 2000; Ingthorsson, 2013; Ramirez & Cayón-Peña, 2017; Tal & Dierking, 2014). Science helps humans to develop their way of thinking, namely thinking logically, thinking creatively, analyzing, and thinking critically (Almeida & Franco, 2011; Sellars et al., 2018; Spector & Ma, 2019; Uluçınar & Ari, 2019). Science helps people to practice their skills to solve problems systematically and make decisions using a variety of appropriate and accurate information.

Science is a culture of the modern world which is a knowledge-based society (Afgan & Carvalho, 2010; Carrillo, 2015; Phillips, Yu, Hameed, & El Akhdary, 2017; Vali, 2013; Wang, 2018). People need to learn science in order to have knowledge and understand of natural rain and man-made technology as well as be able to apply knowledge with reason, creatively and morality (The Ministry of Education of Thailand, 2008). Consistent with the vision of science learning in accordance with the standard curriculum of the basic education that learning science is a lifelong learning since scientific knowledge is a story about the ever-changing world's nature. Everyone must learn to apply learning results in their lives, careers, and the preservation of natural resources and the environment sustainably (The Ministry of Education Thailand, 2001). Related to the topics, the report from the achievement that appears in the course report of biology for health sciences of the first year nursing students at Pathumthani University-Thailand found that some students have a low average academic achievement. This problem should get a proper solution. It is necessary to have student-centered teaching and learning, which encourages students to learn theory as well as action.

One instructional model that has the potential to overcome this problem is the CIPPA instructional model. The teaching and training for thinking skill by using various instructional models and processes focusing on thinking such as CIPPA instructional model by Tissana Kammanee (Ariratana, 2010). CIPPA was focus on the learner as a center in learning activities (Hengchaiyo, 2017) or a student-centered learning (Klinbumrung, Tansriwong, & Akatimagool, 2015). CIPPA was the one perfect model to be used because it is a learner-centered model which open the opportunities for students to participate in every steps of learning process and students are motivated to think and explore the knowledge by themselves (Swekwi & Songkampol, 2019). CIPPA provide the children freedom of learning, in which they had a chance to study themselves, as well as the collaboration that they learned together as a group or team (Thita & Ariya, 2020). Therefore, it helps the learners to learn skills in terms of content, principles, theory, and practice. Thus, finally, they are able to create knowledge by themselves. This is regarded as sustainable learning (Institute for the Promotion of Teaching Science and Technology, 2003).

Several studies have been conducted by researchers in Thailand related to the CIPPA instructional model, for example research with the subject of students in Prathom Suksa 4, semester 1, the Academic year 2018, Suan Sunandha Rajabhat University Demonstration School (Camhongsa & Youpensuk, 2020), research on the feasibility and suitability of e-learning learning designs using learning strategies (In-saard, 2013), learning achievement in the course politics, economy and society (Boonklum, 2015), dan learning result of innovation and information technology in education third year students in the Bachelor of Education Program (Hanrin, 2014). Other researchers developed a child-centered instruction module based on the CIPPA instructional model (Swekwi & Songkampol, 2019), develop and investigate the efficiency of the mathematics instructional packages using CIPPA instructional model (Plerin, 2011), effectiveness in reducing students' anxiety in English writing classes (Thepwan, 2015), Thai literature learning achievement and attitude of students (Chandai, 2017), and student's achievement of learning process of hand washing to prevent the communicable diseases (Balsong & Balsong, 2014), and learning achievement in science learning area of students (Bundasak, 2015).

Based on a review of various previous researches, there has been no research related to the CIPPA instructional model in biology for health sciences learning, especially with the subject of nursing students. Several applications of the CIPPA instructional model in science learning are carried out at the secondary school level. Meanwhile, there are no studies that compare or link the CIPPA instructional model with inquiry-based learning.

From the problems mentioned above, including the advantages of inquiry-based learning and the CIPPA instructional model, researcher as a biology course instructor for health sciences appreciated the importance of comparing academic achievement and scientific attitudes of first year nursing students. The purpose of this research was observing the effect of CIPPA instructional model on nursing students' scientific achievement and attitude. The research results will be used as guidelines for determining the most appropriate and effective teaching methods for further development of teaching and learning for nursing students.

## METHOD

### Type of research

This research was a quasi-experimental research in the classroom. The content of this research is in NS1102 Biology for Health Sciences. The topics was the structure and function of cells, cell division, and chemical reactions in cells. Researcher studied the 2 experimental groups by testing before and after the experiment. (Pretest-posttest design with nonequivalent group according to the research methodology of Cook and Campbell (1979).

## Population and samples

The population in this research was 110 students who are in the first year of nursing students at Pathumthani University for the first semester of academic year 2019. The samples were clustered (Cluster Random Sampling) including first year nursing students group 1 and 2, then easily randomized to select the room for the experiment. There were 55 of first year nursing students in group 1, learning through inquiry method and other 55 students in group 2, and learning through management by CIPPA instructional model.

## Instrument and procedures

The Research tools include 3 Inquiry Method learning plans (2-3 hours per plan, total 12 hours) and 3 CIPPA learning plans (2-3 hours per plan, total 12 hours). The collected data included the achievement test in Biology for Health Science with 4 multiple-choice totaling 80 questions with IOC of 0.65-1.00. The reliability of the achievement test was done using KR-20 (Kuder Richardson - 20). The result showed that the classification power ( $r$ ) was 0.20-0.64 and the difficulty ( $p$ ) was 0.45- 0.80. Science attitude test of students were used to measure 8 scientific attitudes, consisting of curiosity, reasoning, not being quick to draw conclusions, open-mindedness, and use of critical thinking, orderliness and prudence, honesty, responsibility and perseverance. The scientific attitude test, a measure of Likert's method value, was in the form of positive messages and negative messages in 32 items with IOC values between 0.67-1.00.

## Data analysis

The data analysis technique used the t-test analysis (Independent Sample t-test) to analyze the comparison of academic achievement of students learning through the inquiry method and the group that received CIPPA. Analysis of scientific attitude of students characteristic was a rating scale of 5 levels by analyzing the mean value and standard deviation.

## RESULTS AND DISCUSSION

The result of scientific achievement data analysis of the students' learning through inquiry method and students' learning through CIPPA was presented in [Table 1](#).

**Table 1.** Summary of scientific achievement data analysis comparison of the students' learning through inquiry method (control class) and students' learning through CIPPA (experiment class)

Scientific achievement	N	Mean	S.D.	$\alpha$	t	Sig.	Description
Control CLASS (Inquiry method)	55	50.08	1.45	0.05	-0.42	0.81	There is no significant difference
Experimental class (CIPPA)	55	50.11	1.49				

Based on the result of data analysis presented in [Table 1](#), it showed no difference in students' scientific achievement between two studied groups. This may be due to the process of organizing inquiry-based learning activities considered as another activity that is student-centered which helps to encourage students to study and understand the lesson by themselves. Meanwhile, the CIPPA teaching and learning is a principle that can be used as a guideline in biology teaching.

To find out the difference in means of the test result between experimental class and control class, t-test was conducted. Based on the data presented in [Table 2](#), the significant value 0.313 was greater than the  $\alpha$  value (0.05), it can be concluded that there was a difference in the test result between the students' learning through inquiry method (control class) and students' learning through CIPPA (experimental class). In conclusion, it can be said that the CIPPA instructional method affected students' scientific attitude of the experimental class.

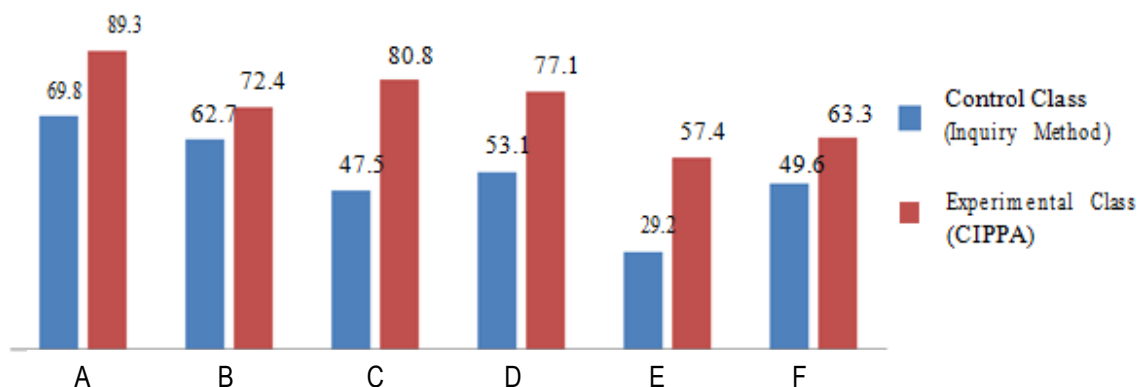
**Table 2.** Summary of data analysis comparison of scientific attitude of students' learning through inquiry method (control class) and students' learning through CIPPA (experimental class)

Scientific attitude	N	Mean	S.D.	t	$\alpha$	Sig.	Description
Control class (Inquiry method)	55	89.07	4.63	1.12	0.05	0.313	There is a significant difference
Experimental class (CIPPA)	55	82.04	4.65				

Based on the result of data analysis presented in Table 3 and Figure 1, it can be seen that the experimental class (CIPPA) have higher percentage level than the control class (Inquiry Method) in all. The highest scientific attitude when considering each item was perseverance and responsibility but the lowest was rationality

**Table 3.** Summary of data analysis comparison of Scientific Attitude of students' learning through inquiry method (control class) and students' learning through CIPPA (experimental class)

Class	Percentage of Scientific Attitude (%)					
	A	B	C	D	E	F
	Perseverance and responsibly	Curiously	Honesty	Participating in opinions and accepting opinions	Rationality	Open-mindedness
Control class (Inquiry method)	69.8 Good	62.7 Good	47.5 Enough	53.1 Enough	29.2 Poor	49.6 Enough
Experimental class (CIPPA)	89.3 Very Good	72.4 Very Good	80.8 Very Good	77.1 Very Good	57.4 Good	63.3 Good



**Figure 1.** Graph of students' feelings or practices regarding scientific attitude

The data analysis presented in Table 1, the result showed no difference in students' scientific achievement between two studied groups. This may be due to the process of organizing inquiry-based learning activities considered as another activity that is student-centered which helps to encourage students to study and understand the lesson by themselves while the CIPPA teaching and learning is a principle that can be used as a guideline in biology teaching.

The results of this study are in line with several previous studies that have shown the positive impact of the CIPPA instructional model on students' scientific achievement. The application of the CIPPA instructional model to the 3rd year students of the Bachelor of Education Program shows that this model can improve learning achievement and satisfaction (Hanrin, 2014). In addition, the application of the CIPPA instructional model to the ninth graders students shows that the learning achievement of students were higher than those of the students taught with the conventional method (Hengchaiyo, 2017). The same results were also obtained in the subject of students in Prathom 4, Suan Sunandha Rajabhat University Demonstration School (Camhongsa & Youpensuk, 2020). In addition, at the elementary school students level in the aspect of "how to wash hands to prevent disease", the application of the CIPPA instructional model provides high learning achievement results (Balsong & Balsong, 2014). Thus, it can be said that the CIPPA instructional model is equivalent to a model commonly used in the world, namely the inquiry method. The inquiry method itself has been recognized as supporting students' scientific achievement, in this case, for example, as reported by several experts. Acar (2014) reported that there were scientific reasoning, situational knowledge, and achievement differences between the two groups at the beginning of instruction. Wen et al (2020) reports that results indicate that a guided inquiry learning environment can support students with different levels of school science achievement to highly engage in science inquiry. Yuliati, Parno, Yogismawati, and Nisa (2018) also reported that the inquiry method influences the scientific literacy and concept achievement of physics.

The result was consistent with the research of Pawong (2005) who had studied and compared the learning achievement in science and interaction of secondary school students who had been taught by CIPPA and the search for knowledge and there was no difference shown. Buaprai (2009) studied CIPPA instructional model by comparing learning achievement before and after learning found that after the students had received CIPPA, they had higher academic achievement. Chinda and Thepwan (2015) studied the effectiveness of the CIPPA instructional model in reducing students' anxiety in English writing classes. The results of the study reveal that

after the CIPPA based learning activities, the students' anxiety in English writing class reduced significantly at a statistical level of 0.05. It was also found that the anxiety in relation to the students themselves reduced the most, followed by the anxiety regarding the teacher and the anxiety in respect to the students' classmates respectively. In addition, collectively, the students' satisfaction with the CIPPA instructional model were at a high level. More to the point, to put the students' satisfaction in order from highest to lowest, they were pleased with learning contents, assessment and evaluation, learning materials and resources, and teaching and learning activities respectively. Other research on the course politics, economy and society was conducted by Boonklum (2015) has shown that the learning achievement results of the sample group instructed based on the CIPPA instructional model in Semester 2/2014 were significantly higher than those of the students instructed in a control classroom.

The scientific attitude test result between experimental class and control class, t-test was conducted. Based on the data presented in Table 2, it can be concluded that there was a difference in the test result between the students' learning through inquiry method (control class) and students' learning through CIPPA (experimental class). CIPPA have higher percentage level than inquiry method. In conclusion, it can be said that the CIPPA instructional method affected students' scientific attitude of the experimental class.

Thus, it can be said that the CIPPA instructional model is equivalent to a model commonly used in the world, namely the inquiry method. The inquiry method itself has been recognized as supporting students' scientific achievement, in this case, for example, as reported by several experts. The above result was consistent with the research of Suphon (2013) conducted research on how CIPPA instructional model affected the academic achievement and scientific attitude. There was no significant difference between the database system course at the statistically significant level of 0.05. On the contrary, it found that scientific attitudes in the form of perseverance, responsibility as for the opinions and acceptance and the reasoning of students in the population group had changed for the better. As also reported by Hengchaiyo (2017) that the scientific attitudes in ninth graders students who got the application of the CIPPA instructional model were higher than those of the students taught with the conventional method.

However, although in this study CIPPA is better than the inquiry method (which has become "globalized") in increasing the scientific attitude, it must be understood that much research is still needed in the future. We still understand that the inquiry method is still one of the most widely used and proven methods for increasing the scientific attitude as we have found many reports in various publications (Cho & Woo, 2017; Dewi, Saputri, Nurkhalisa, & Akhlis, 2020; Hastuti, Nurohman, & Setianingsih, 2018; Mayangsari, Yusrizal, & Mustafa, 2020; Rohaeti, Prodjosantoso, & Irwanto, 2020; Smit et al., 2017; Vácha & Rokos, 2017; Wildan, Hakim, Siahaan, & Anwar, 2019). At a minimum, we can understand that the CIPPA instructional model has the same potential success as the inquiry method.

## CONCLUSION

Based on the data analysis result and discussion, it showed that CIPPA instructional model affected scientific achievement and scientific attitude of nursing students in the experimental class. This teaching method can be applied to teach biology. The suggestion for next research is that additional data should be collected through interviews or group discussions with students about the learning process in order to be used as in-depth feature information for experimental studies to gain useful details for improving the instructional management by using CIPPA instructional model.

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