

# Problems of Internship of Professional Experience in Teaching Mathematics

Apantee Poonputta<sup>1</sup> & Autthapon Intasena<sup>1</sup>

<sup>1</sup> Faculty of Education, Mahasarakham University, Thailand

Correspondence: Apantee Poonputta, Faculty of Education, Mahasarakham University, Thailand.

Received: December 11, 2021

Accepted: January 20, 2022

Online Published: March 21, 2022

doi:10.5539/ies.v15n2p182

URL: <https://doi.org/10.5539/ies.v15n2p182>

## Abstract

The purposes of the research were (1) to study the problems of internship of teachers in teaching mathematics programs and (2) to compare the problems internship of teachers regarding the classes and educational level. Mixed method research was employed for the study. Quantitative data from 242 sample teachers and interview data from 12 teachers. The research instruments were a questionnaire and an interview form. The statistics used were percentage, mean, standard deviation and t-test. Results of the research were as follows. 1. The research findings showed that the average problem of the teachers about teaching Mathematics was the total and five domains at a moderate level. Whereas, assessment and evaluation at a low level. 2. The findings indicated that the problems of the teachers about teaching Mathematics regarding the secondary school teachers about teaching Mathematics was more than that of the primary school teachers at the .05 level of the statistical significance. Whereas, bachelor degree and post graduate degree was not different.

**Keywords:** problems, internship, mathematics, education, teacher

## 1. Introduction

Mathematics is a major subject of the fundamental subjects for improving creative thinking skills, analytical skills, planning and decision-making skills and practical applications of the students. Additionally, Mathematics is a basis of many sciences in particular science and technology. It is obvious that modern technology has changed greatly many current fields to be convenient in our daily life such as society, education, politics and economics (Maensnguan, 2012).

Mathematics is a major subject of the core fundamental subjects of the basic education curriculum of 2008. In 2017, Ministry of Education of Thailand has improved the learning indicators and contents of Mathematics. The indicators and contents focus on improving essential skills for the 21<sup>st</sup> century consisting of analytical skills, critical thinking skills, problem-solving skills, creative thinking skills, application of technology, communication, and collaboration (Office of the Basic Education Commission of Thailand, 2017)

Consequently, the educational institutes regarding the National Education Act (Thailand), B.E. 2542 (1999) have taken the major responsibility for producing professional teachers and improving qualified teachers, including educational personnel to meet the higher national standards. Besides, the higher education institutes, both universities and colleges, develop human resources of educational personnel, they also find out the workplaces for the internship of professional experience in teaching of the students. The previous studies reported that the universities and teacher colleges have not emphasized the workplaces for the internship in professional experience of the students. Phu-ngoan, Khotbanthao, and Phothiwat (2013) suggested that Faculty of Education regarding the policy in producing professional teachers, should realize the importance in strengthening both primary schools and secondary schools, where are the workplace for the internship of professional experience of the students. Moreover, the teachers, mentors of schools where the students will do professional experience, should be qualified for coaching the teacher students. Additionally, the studies showed that the networks of schools for professional experience in teaching have not strengthened enough for the internship of the students.

Faculty of Education, Mahasarakham University responsible for producing professional teachers, has offered both undergraduate program in Mathematics for years. According to the Basic Education Core Curriculum of Thailand, the teachers must improve the contents, teaching preparation, teaching management, students, teaching materials and evaluation, in accordance with new national core basic curriculum for basic education. The author realizes the

problems of teachers at schools and the school network about teaching Mathematics of the teachers at schools where Mahasarakham University is responsible for supervision and the students of Faculty of Education do the internship. Therefore, the studies will provide useful information of selection and preparation of the appropriate workplace, mentors, and facilities for the internship of the students.

## 2. Method

### 2.1 Research Methodology

Mixed method research consisting of quantitative research and qualitative research was employed for convergent parallel design. The accuracy of data was assessed for more valid and perfect and presented by Creswell and Plano Clark method (2011). The quantitative research has been conducted by Mathematics teachers through questionnaires and field study for qualitative data collection by interview of the teachers.

### 2.2 Samples

The population was 316 mathematics teachers from 23 schools in Mahasarkham, Roi-Et and Kalasin Provinces, the second semester of 2019. The research samples were divided into two groups: 1) 242 teachers of the mathematics department from 23 schools for the internship of professional experience in the second semester of 2019. The sample of this research by using Taro Yamane sample size determination table with 95% confidence level with a Margin of Error of about  $\pm 5\%$  (Yamane, 1967). They were selected by stratified random sampling. 2) 12 research participants for qualitative research were three mathematics teachers from three primary schools and nine mathematics teachers from three secondary schools in Mahasarkham, Roi-Et and Kalasin Provinces.

Table 1. Population and samples

Classes	School network of undergraduate program in Mathematics	Population	Samples
Primary school	5	73	56
Secondary school	18	243	186
Total	23	316	242

### 2.3 Research Instrument

I) The questionnaire was divided into three main parts. 1) Checklist questionnaire for general information, 2) 30 items of a five-point-rating scale questionnaire on problems of Mathematics instruction focusing on six areas: curriculum and contents, instructional preparation, teaching management, students, teaching materials, and assessment and evaluation, and 3) open ended questionnaire for other problems and suggestions. The index of item-objective congruence [IOC] for the questionnaire assessed by content validity was 1.00 (IOC > 0.50). After that the questionnaire was tried out to 20 research participants who were not the target samples. Then, the discrimination index was analyzed by item-total correlation and the value of the questionnaire was ranged from .38 to .94 (the critical region for one-tailed test is:  $r > 0.37$ ). Lastly, the reliability index assessed by Cronbach's alpha was .98.

II) The major issues were interviewed Problems about Teaching Mathematics and the guidelines for teaching Mathematics consisting of curriculum and contents, teaching preparation, instructional management, students, teaching materials, and assessment and evaluation.

### 2.4 Data Collection

Initially, the author had to make the agreement with the 2<sup>nd</sup> year students and 5<sup>th</sup> year students of the Mathematics Program, Faculty of Education, Mahasarakham University, about technique for data collection as follows.

I) The official letter was written by the author for the 5<sup>th</sup> year students for asking a permission from school directors in Mahasarkham, Roi-Et and Kalasin Provinces, where they did professional experience internship for data collection by questionnaires.

II) The qualitative data was collected by the 2<sup>nd</sup> year students of the Mathematic Program, Faculty of Education, Mahasarakham University. They had to make an appointment with the target population for the interview.

### 2.5 Data Analysis

1) The quantitative data consisted of 1.1) The general data was analyzed by a statistical procedure: frequency and percentage. 1.2) The data of the problems was analyzed by mean and standard deviation. Interpret the mean as follows: Mean 4.51-5.00 Highest level, Mean 3.51-4.50 High level, Mean 2.51-3.50 Moderate level, Mean

1.51-2.50 Low level and Mean 1.00-1.50 Lowest level. 1.3) t-test for independent samples was employed for comparing the problems regarding the different classes, educational levels, and Effect size (Cohen, 1977)

2) Data Triangulation was employed for qualitative data analysis at the different time periods and different teachers, The author interviewed both the primary school and secondary school teachers and the content analysis and descriptive report were employed for the study.

### 3. Results

#### Part 1 Quantitative

1) The research study that the most participants were 56 primary school teachers (23.14%) and 186 secondary school teachers (76.86%), 108 instructors of bachelor degree (44.63%), 134 instructors of post graduate degree (55.37%). The research samples had 6-20 -hour- work load a week (61.57%), working at big size schools (49.59%), under the basic educational service area (89.26%), located in Maharashtra Province (50%); five most frequent used teaching methods were lecture (83.47%), comparative learning (61.98%), induction (52.48%) deduction (49.59%) and Science Technology Engineering and Mathematics Education (STEM) (38.84%).

#### 2) Problems in teaching mathematics

The research findings showed that the overall problem of teaching mathematics was at moderate level. The five moderately rated items of the problems were instructional management, students, curriculum and contents, teaching materials, and assessment and evaluation respectively in Table 2.

Table 2. Problems about teaching mathematics of the teachers

Problems about Teaching Mathematics	Mean	S.D.	Degree of Opinion
1. Curriculum and Contents	2.82	0.70	Moderate
2. Teaching Preparation	2.51	0.71	Moderate
3. Instructional Management	3.43	0.67	Moderate
4. Students	3.21	0.76	Moderate
5. Teaching Materials	2.70	0.76	Moderate
6. Assessment and Evaluation	2.50	0.83	Low
Total	2.86	0.51	Moderate

The comparison of the problems of the teachers about teaching and learning mathematics.

The findings indicated that the overall problem of the secondary school teachers about teaching Mathematics was more than that of the primary school teachers at the .05 level of the statistical significance. The problems of the secondary school teachers and the primary school teachers regarding curriculum and contents, teaching preparation, instructional management, and teaching materials were different at the .05 level of the statistical significance. Whereas the overall problem of the secondary school teachers and the primary school teachers regarding assessment and evaluation was not different at the .05 level of the statistical significance, and Cohen's D ranged from -0.11 to -0.30 in Table 3.

Table 3. Comparison of the problems of the teachers about teaching and learning mathematics between primary school and secondary school

Problems about Teaching Mathematics	primary school (n=56)		secondary school (n=186)		t	p	Effect size (Cohen's)
	Mean	S.D.	Mean	S.D.			
1. Curriculum and Contents	2.66	0.75	2.87	0.67	1.93	0.03	-0.30
2. Teaching Preparation	2.35	0.55	2.56	0.74	2.31	0.01	-0.30
3. Instructional Management	3.30	0.72	3.46	0.65	1.56	0.06	-0.24
4. Students	3.11	0.69	3.24	0.79	1.14	0.13	-0.17
5. Teaching Materials	2.56	0.78	2.75	0.75	1.66	0.05	-0.25
6. Assessment and Evaluation	2.43	0.76	2.52	0.85	0.71	0.24	-0.11
Total	2.73	0.47	2.90	0.52	2.12	0.02	-0.33

The findings indicated that the overall problem about teaching Mathematics of the teachers with bachelor degree

and post graduate degree was not different at the .05 level of the statistical significance. The two problems of the teachers with teachers with postgraduate degree about teaching materials and assessment and evaluation were more than those of the teachers with bachelor degree at the .05 level of the statistical significance. Whereas, the four problems of the teachers with postgraduate degree and bachelor degree about teaching Mathematics regarding curriculum and contents, teaching preparation, instructional management, and students were not different at the .05 level of the statistical significance, and Cohen's D ranged from -0.07 to -0.26 in Table 4.

Table 4. Comparison of the problems of the teachers about teaching and learning mathematics between bachelor degree and post graduate degree

Problems about Teaching Mathematics	bachelor degree (n=108)		post graduate degree (n=134)		t	p	Effect size (Cohen's)
	Mean	S.D.	Mean	S.D.			
1. Curriculum and Contents	2.74	0.74	2.88	0.66	1.54	0.06	-0.20
2. Teaching Preparation	2.46	0.67	2.55	0.74	1.01	0.16	-0.13
3. Instructional Management	3.40	0.70	3.45	0.64	0.57	0.28	-0.07
4. Students	3.25	0.79	3.18	0.75	-0.67	0.25	0.09
5. Teaching Materials	2.61	0.77	2.80	0.72	2.01*	0.02	-0.26
6. Assessment and Evaluation	2.39	0.87	2.58	0.78	1.72*	0.04	-0.23
Total	2.81	0.54	2.91	0.49	1.47	0.07	-0.19

## Part 2 Qualitative

According to interview of 12 teachers, the data was analyzed and presented in the descriptive report as follows.

### 1) Problems in teaching Mathematics

1.1) Curriculum and contents: a) The teachers were confused about the practical guidelines of Mathematics Curriculum of 2017, the improved curriculum. b) The contents were arranged and organized inappropriately and discontinuously. c) The contents were complex, difficult and more for teaching Mathematics. d) The details of Mathematics textbook did not cover the core curriculum of Mathematics and there were too many pictures.

Examples of the interview of the teachers

“The complex contents of the new curriculum in each educational level mainly cause the students feel bored and too difficult contents. As a result, the students has not achieved the learning objectives and indicators.”

Interviewee 4

“Some contents of the new curriculum have been deleted, therefore, the instructional management is not efficient and the contents have not provide basic knowledge for the students. The problems make the teachers have to waste the time for reviewing basic knowledge to the students causing the assigned lesson plans.”

Interviewee 6

1.2) Teaching preparation: a) The teachers made lesson plans unsuitable to the curriculum. b) Course description and structure of the course were not updated. c) The teachers did not have sufficient time for preparing the lessons because of more work loads

1.3) Instructional management: The students had different learning backgrounds of both knowledge and skills. They were rarely ready to learn. Additionally, they were enthusiastic to learning and participate in learning activities. 4) The teachers seldom took care of their students because of too many students in one class. 5) There was enough time to learn because of many holidays and extra activities. Lastly, the teachers were not skillful in teaching techniques.

“There are many activities in school affected the teaching management in classes. Although the teachers have to ma up classes, the time is not enough for teaching management. These problems have to delete some contents and teach the contents briefly affecting the teaching efficiency.”

Interviewee 1

“Various method have not been used for teaching management and most Mathematics teachers always use inductive and deductive methods for teaching Mathematics.”

Interviewee 5

1.4) Students: a) Most of the students were lack of problem-solving skills, communication skills, mathematical transfer, explaining and understanding mathematical meanings. b) They were crazy in using mobile telephone while they were studying in class. c) They were rarely responsible for works and always delayed to hand in their homework or exercises. They were not courteous and interested in learning Mathematics. They had a negative attitude towards learning Mathematics.

“Most students dislike Mathematics because it is a difficulty subject for them. Additionally, their background knowledge of Mathematics is not sufficient for further study especially plus, minus, division of whole number and fraction.”

Interviewee 1

“Most students dislike to learn Mathematics because they cannot answer the problems”

Interviewee 11

1.5) Teaching materials: a) There were not various and modern learning materials for the students because of financial support. b) There were very few modern equipment and educational technology available for the students such as projector, computer and so on. c) There was not an internet network in school and not accessibility to the internet. d) The equipment was not ready to use for educational purposes such as projector, television, speakers and so on. e) Mathematics textbooks did not cover based on the core Mathematics curriculum, and there were too many pictures rather than details.

“There is very little electronic media or appliances such as projector computer. The teachers have to spend much time in making teaching materials by themselves. Moreover, most teaching materials are appropriate for teaching Mathematics in senior secondary level because the contents of Mathematics are various and abstract, which are difficult in making teaching materials of the teachers.”

Interviewee 7

“The weak point of using teaching materials is not appropriate and various. Additionally, the teachers only provide workbooks to students because it is very comfortable for teaching and learning Mathematics, including lack of budget of making various teaching materials.”

Interviewee 10

1.6) Assessment and evaluation: a) Traditional assessment technique was used for learning assessing learning outcomes. b) The criteria for learning assessment were not clear and the assessing instrument was not concrete. c) All learning objectives were assessed and evaluated clearly. d) The teachers were not skillful in creating the criteria and assessing instruments. The teachers did not understand the new techniques for learning assessment precisely.

“Most students always copy their classmate when they have Mathematics test”

Interviewee 3

“The teachers are not confident in new assessment and evaluation. However, they usually use various methods for assessment and evaluation such as exercises and test.”

Interviewee 6

2) The guidelines for teaching Mathematics were as follows.

2.1) Contents: The contents should be improved, simplified and suitable to the time and students.

2.2) Teaching preparation: Course description and curriculum structure should be improved.

2.3) Instructional management: There should extra classes for improving basic knowledge of the students.

2.4) Students: There should be more extra activities for improving mathematical skills of the students.

2.5) Teaching materials: Teaching materials should be available and easy to find by the students.

2.6) Assessment and evaluation: There should be many different technics in assessment and evaluation.

#### 4. Discussion

1) The problems of the teachers about teaching mathematics

1.1) The overall problem of the teachers about curriculum and contents was at a moderate level. The problem may be caused by using the same contents of basic education level, reordering the contents, deleting some contents and adding new contents. The factors caused the problems about teaching and learning Mathematics at a

moderate level. Aksorn Charoentat ACT Co., Ltd. (2017) stated that the improvement of the Basic Education Core Curriculum of 2008 focused on simplifying, deleting, adding and ordering the contents suitable to the students and relating to their daily life. The institute for the Proamotion of Teaching Science and Technology has analyzed the primary information for designing and developing a draft of the core basic education curriculum by working with the experts and teachers through public hearing. The institute has worked collaboratively with Cambridge International Examinations (CIE) of the United Kingdom focusing on the three major areas of curriculum management and assessment and evaluation. The curriculum reflected on new teaching techniques and perfect contents based on the international standards. The improved curriculum emphasized mathematical skills and the important skills in the 21st century relating to their really life. Consequently, the curriculum has been designed and developed appropriately for the students and the actual situation (The institute for the Promotion of Teaching Science and Technology, 2018). The research results were consistent with the study of Pramarn and Pramarn (2016). Their study insisted that the average problem of the primary school teachers of Physical Education subject in Ayutthaya and Angthong Provinces about implementing the Basic Education Core Curriculum of 2008 was at a moderate level. The teachers did not understand the curriculum precisely.

1.2) The overall problem of the teachers about teaching preparation was at a moderate level. The problem may be caused by making lesson plans of the teachers, and the teachers were very confident in teaching with well-organized learning activities and teaching materials (Jaithiang, 2010). It is important that the teachers had to study the major components of lesson plans and the major components of lesson plans were designed appropriately and well for the students consisting of teaching technique, teaching materials and assessment and evaluation (Vanichwatanavorachai, 2015). The research results were consistent with the study of Seesamer and Khantoa (2012). Their study revealed that the average opinion of the school administrators and teachers of Khon Kaen Basic Educational Service Area Office 4 about the problems of implementing the basic education curriculum of 2008 was at a moderate level. Suaeram (2009) asserted that the problem of the teachers in schools under Buriram Basic Educational Service Area Office 2 about teaching preparation for teaching Mathematics was at a high level.

1.3) The problem of the teachers about instructional management was at a moderate level. The result may be caused by teacher training development of modern teaching techniques for instructional management. Additionally, Ministry of Education has reformed strategies for producing and improving efficient teachers. National Strategy (2018-2037) has focused on human resource development by providing financial support of 10,000 baht a person (Teachers and Basic Education Personnel Bureau, 2018). Moreover, Office of the Basic Education Commission of Thailand, (2019) has organized continuously the training courses for improving the efficiency and competency of school administrators, teachers and educational personnel based on their problems and needs. Additionally, the teacher development networks have been established for improving the efficiency and competency of professional school administrators, teachers and educational personnel focusing on authentic assessment of the achievement and works of the students. Wiratkasem (2014) stated that the problem of the teachers in Chonburi City Municipality schools about implementing the Basic Education Core Curriculum was at a moderate level.

1.4) The problem of the teachers in schools for professional experience internship about teaching Mathematics regarding the primary and secondary school students was at a moderate level. The results of both qualitative data and quantitative data insisted that the primary and secondary school students had very few mathematical skills and they had the negative attitude towards learning Mathematics. The results may be caused by the conventional techniques of the teachers focusing on learning achievement rather than mathematical processing skill and ability. Khruengkham and Umpapol (2014) claimed that the teacher-centered model was always used for instructional management. Additionally, the teachers rarely used teaching materials in class of different achievement students.

1.5) The overall problem of the teachers about teaching materials of Mathematics was at a moderate level. There were not the internet networks available in some schools where the students of Mahasarakham University did professional experience internship. The research results may be caused by the shortage and inefficient internet networks for online teaching and learning. Ghavifekr, Kunjappan, Ramasamy, and Anthony (2016) stated that one of the major problems about online teaching and learning was disconnection and inaccessibility to the internet network. 1) The problem may be caused by the limitation and knowledge of the teachers about the application of information communication technology (ICT) for instructional purposes. Khanna and Prasad (2020) asserted that both of the teachers and students had encountered the problems of online learning and COVID-19 condition. They were not accessible to the internet network and some students did not know the application of digital technology for online learning. 2) There were very few various teaching materials and

modern digital technology for online learning because of shortage of educational budget support. Kensri et al. (2020) stated that the major problem of teaching Physical Education in primary schools consisted of insufficient sports equipment for the students and lack of educational budget support.

1.6) The overall problem of the teachers about learning assessment and evaluation of Mathematics was a low level. The results may be caused by the improvement of assessment and evaluation method of authentic assessment and evaluation based on the Basic Education Core Curriculum of 2008 (Basic Education Curriculum Development of 2017). Pramarn and Pramarn (2016) argued that the overall problem primary school teachers about assessment and evaluation in Ayutthaya and Angthong Provinces based on the Basic Education Core Curriculum of 2008 was at a moderate level.

## 2) Comparison of the problems about teaching mathematics

2.1) The overall problem of the secondary school teachers about teaching Mathematics was more than that of the primary school teachers at the .05 level of the statistical significance. The results may be caused by quality of the contents of the secondary school teachers. They have improved the contents of both fundamental courses and extra courses by editing, deleting, adding and organizing suit to the students based on the Basic Education Core Curriculum of 2008. The contents of the fundamental courses consisted of eight topics of number and algebra, two topics of assessment and geometry. The contents of the extra courses-statistics and possibility consisted of four topics (Office of the Basic Education Commission of Thailand, 2017).

2.2) The overall problem of the teachers with higher degree about teaching materials was more than that of the teachers with bachelor's degree at the .05 level of the statistical significance. The results may be caused by knowledge and skills in using information communication technology (ICT) more than the teachers with bachelor's degree. The teachers with bachelor's degree have used very few modern and various assessment methods. Wirakaserm (2014) argued that the overall attitude of both secondary school teachers and primary school teachers with the different educational backgrounds towards the problems on implementing the Basic Education Core Curriculum of 2008 was not different.

## 3) The problems of teaching Mathematics regarding the qualitative data were as follows:

3.1) Curriculum and contents: a) The teachers were confused about the practical guidelines of Mathematics Curriculum of 2017, the improved curriculum. b) The contents were arranged and organized inappropriately and discontinuously. c) The contents were complex, difficult and more for teaching Mathematics. d) The details of Mathematics textbook did not cover regarding the curriculum and there were too many pictures.

3.2) Teaching preparation: a) The teachers made lesson plans unsuitable to the curriculum. b) Course description and structure of the course were not updated. c) The teachers did not have sufficient time for preparing the lessons because of more work loads

3.3) Instructional management: a) The students had different learning backgrounds of both knowledge and skills. b) They were rarely ready to learn. c) Additionally, they were enthusiastic to learning and participate in learning activities. d) The teachers seldom took care of their students because of too many students in one class. e) There was enough time to learn because of many holidays and extra activities. Lastly, the teachers were not skillful in teaching techniques.

3.4) Students: a) Most of the students were lack of problem-solving skills, communication skills, mathematical transfer, explaining and understanding mathematical meanings. b) They were crazy in using mobile telephone while they were studying in class. c) They were rarely responsible for works and always delayed to hand in their homework or exercises. They were not courteous and interested in learning Mathematics. They had a negative attitude towards learning Mathematics.

3.5) Teaching materials: a) There were not various and modern learning materials for the students because of financial support. b) There were very few modern equipment and educational technology available for the students such as projector, computer and so on. c) There was not an internet network in school and not accessibility to the internet. d) The equipment was not ready to use for educational purposes such as projector, television, speakers and so on. e) Mathematics textbooks did not cover based on the core Mathematics curriculum, and there were too many pictures rather than details.

3.6) Assessment and evaluation: a) Traditional assessment technique was used for learning assessing learning outcomes. b) The criteria for learning assessment were not clear and the assessing instrument was not concrete. c) All learning objectives were assessed and evaluated clearly. d) The teachers were not skillful in creating the criteria and assessing instruments. The teachers did not understand the new techniques for learning assessment precisely.

## 5. Suggestions

### 5.1 Suggestions for Practical Application

- 1) The school administrators should work with the organization relating to human resource development to organize and provide training courses for Mathematics teachers.
- 2) The training courses of teaching techniques for instructional management, making lesson plan and assessment and evaluation should be provided for both primary school teachers and secondary school teachers of Mathematics.
- 3) There should be fundamental courses and extra classes for the students who have the different educational background.
- 4) The teachers should employ various method and learning activities for improving the attitude of the students towards Mathematics.
- 5) The teachers should use teaching materials that they can find by their own and let the students learning by doing them.
- 6) Various learning assessment and evaluation should be employed for learning outcomes of mathematics such as concrete and authentic assessment and rubric scale criteria. The training courses of new approach to measurement and evaluation should be provided for Mathematics teachers.

### 5.2 Suggestions for Further Study

- 1) Active learning models should be conducted for further study of Mathematics teachers and mentors of students who do professional experience in teaching Mathematics.
- 2) The research and development of mathematical processing skill should be conducted to the teachers at schools where the students of Mathematics Program do professional experience.

## Acknowledgments

The author would like to express her sincere thanks to Faculty of Education, Mahasarakham University for the financial support in 2020.

## References

- Aksorn Charoentat ACT Co., Ltd. (2017). *Understanding for learning standards, indicators of mathematics, science, geography, social study, religion and culture (Improvement issue of 2017)*. Bangkok: Aksorn Charoentat ACT Co., Ltd. Retrieved from <http://sea12.go.th/spv/images/PDF/learningstandards.pdf>
- Cohen, J. (1977). *Statistical power analysis for behavioral sciences*. New York: Academic Press.
- Creswell, J. W., & Clark, P. V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, California: Sage Publications, Inc.
- Ghavifekr, S., Kunjappan, T., Ramasamy, L., & Anthony, A. (2016). Teaching and learning with ICT Tools: Issues and challenges from teachers' Perceptions. *Malaysian Online Journal of Educational Technology*, 4(2), 38-57. Retrieved from <https://files.eric.ed.gov/fulltext/EJ1096028.pdf>
- Jaithiang, A. (2010). *Teaching principles* (5th ed.). Bangkok: Odeonstore.
- Kensri, W., Kwanboonchan, S., & Malarat, A. (2020). Situations, problems and needs of primary schools' learning management in physical education for border patrol police teacher. *Journal of Research and Curriculum Development*, 10(1), 72-90. Retrieved from <https://so03.tci-thaijo.org/index.php/jrcd/article/view/237461/>
- Khanna, D., & Prasad, P. (2020). *Problems faced by students and teachers during online education due to COVID-19 and how to resolve them* (pp. 32-35). IEEE. <https://doi.org/10.1109/ICET51153.2020>
- Khruengkham, P., & Umpapol, H. (2014). Development of mathematical instruction using cooperative learning package affecting learning achievements virtues on generosity and learning satisfaction of mathayomsuksa 1 students at that narai witaya school. *Journal of Graduate School*, 11(52), 89-104. Retrieved from <https://so02.tci-thaijo.org/index.php/SNGSJ/article/view/26745/22665>
- Maensnguan, S. (2012). *Behavioral science of teaching mathematics 2*. Bangkok: Ramkhamhaeng University Press.
- Office of the Basic Education Commission of Thailand. (2017). *Indicators and core contents of mathematics department (improvement issue of 2017) based on the basic education core curriculum of 2008*. Bangkok:

The Agricultural Cooperative Federation of Thailand Press Limited.

- Office of the Basic Education Commission of Thailand. (2019). *Annual report of 2017 office of the basic education commission, ministry of education*. Bangkok: Office of the Basic Education Commission, Ministry of Education of Thailand.
- Phu-ngoen, L., Khotbanthao, S., & Phothiwat, S. (2013). The proposed policy for teacher production in the faculties of education of rajabhat universities in the northeast. *Rommayasan 11* (pp. 29-41). Retrieved from [https://doi.nrct.go.th/ListDoi/listDetail?Resolve\\_DOI=10.14456/rommayasan.2013.12](https://doi.nrct.go.th/ListDoi/listDetail?Resolve_DOI=10.14456/rommayasan.2013.12)
- Pramarn, S., & Pramarn, P. (2016). Problems of the basic education core curriculum A.D. 2008 using of primary school physical education teachers in phranakhon si ayutthaya and ang-thong provinces. *VRU Research and Development Journal Humanities and Social Science, 11*(2), 117-125. Retrieved from <https://so06.tci-thaijo.org/index.php/vrurdihsjournal/article/view/65731/54328>
- Seesamer, C., & Khanto, S. (2012). State and problem of using the core curriculum of fundamental education year 2008 in khonkaen primary education service area office 4. *Journal of Education, Graduate Studies Research Khon Kaen University, 6*(1) 30-38. Retrieved from <https://so02.tci-thaijo.org/index.php/EDGKKUJ/article/view/50655/41909>
- Suaeram, P. (2009). *Problems about teaching mathematics of teachers under buriram basic educational service area*. Bangkok: Ramkhamhaeng University.
- Teachers and Basic Educational Personnel Development Bureau. (2019). *Teachers development project of office of the basic education commission for professional development and educational quality*. Bangkok: Office of the basic education commission, ministry of education of Thailand.
- The Institute for the Promotion of Teaching Science and Technology. (2018). *Manual of curriculum implementation (improvement issue of 2017) based on the basic education core curriculum of 2008*. Bangkok: The institute for the promotion of teaching science and technology (IPST).
- Vanichwatanavorachai, S. (2015). *Teaching methods*. Nakhon prathom: Faculty of Education, Silpakorn University.
- Wiratkasem, T. (2014). The Problems of using the school curriculum from the opinion of the pilot school teachers under muang chonuri municipality office, muang chonuri, chonuri Province. *Sripatum Chonburi Journal, 11*(1), 119-126. Retrieved from [https://www.chonburi.spu.ac.th/journal/booksearch/upload/1361-018\\_theproblems.pdf](https://www.chonburi.spu.ac.th/journal/booksearch/upload/1361-018_theproblems.pdf)
- Yamane, T. (1967). *Statistics: An Introductory Analysis* (2nd ed.). New York: Harper and Row.

## Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).