CHAPTER 4

Research Findings

The research findings of the study on “the Evaluation Model for Developing Instruction Management of Science Teachers in Reading, Critical Thinking, and Writing of Students in Basic Education Institutes” were presented in three major items as follows.

4.1 The results of the study of instructional management conditions, knowledge and understanding in instructional management, needs and necessity in developing science teachers’ instructional management, and general conditions of science teachers enhancing the abilities in reading, critical thinking, and writing of basic education students

4.2 The results of the construction and quality identification of the evaluation model for developing science teachers’ instructional management enhancing the abilities in reading, critical thinking, and writing of basic education students

4.3 The utilization results of the evaluation model for developing science teachers’ instructional management enhancing the abilities in reading, critical thinking, and writing of basic education students

The research findings in each item were illustrated as follows.

4.1 The Results of the Study of Instructional Management Conditions, Knowledge and Understanding in Instructional management, and Needs and Necessity in Developing Science Teachers' Instructional Management Enhancing the Abilities in Reading, Critical Thinking, and Writing of Basic Education Students

In this item, the researcher presented the results of the study of instructional management conditions, knowledge and understanding in instructional management, and needs and necessity in developing instructional management of science teachers. The results were obtained from questioning 741 science teachers in the following five issues.

4.1.1 General conditions of questionnaire respondents

4.1.2 Instructional management conditions

4.1.3 Knowledge and understanding in instructional management

4.1.4 Needs and necessity in developing instructional management

4.1.5 General conditions of science teachers

4.1.1 General Conditions of Questionnaire Respondents

Table 4.1 Number and Percentage of General Information of Questionnaire Respondents

General Information	Number (741)	Percent
(1) Class levels:		
Primary level	642	86.64
Junior high school level	99	13.36
Total	**741**	**100.00**
(2) Experience:		
Less than 31 years	94	12.70
31-40 years	147	19.80
41-50 years	108	14.60
More than 50 years	392	52.90
Total	**741**	**100.00**

Table 4.1 (continued)

General Information	Number (741)	Percent
(3) Education background (highest):		
Master's degree	131	17.70
Bachelor's degree	610	82.30
Total	**741**	**100.00**
(4) Training on instructional management in reading, critical thinking, and writing		
Ever	407	54.90
Never	334	45.10
Total	**741**	**100.00**
(5) Experience in instructional management in reading, critical thinking, and writing		
Ever	345	46.60
Never	396	53.40
Total	**741**	**100.00**
(6) Media used in instructional management in reading, critical thinking, and writing		
Textbooks	617	88.53
Newspapers	17	2.30
Journals	6	0.81
Articles	53	7.15
Others	9	1.21
Total	**741**	**100.00**
(7) Consultation on instructional management in reading, critical thinking, and writing		
Ever	138	18.60
Never	603	81.40
Total	**741**	**100.00**
(8) Evaluation operation in reading, critical thinking, and writing		
Alone	451	60.90
With those relevant	290	39.10
Total	**741**	**100.00**
(9) Reports on the evaluation results in reading, critical thinking, and writing		
Records in a report form/school record	606	81.80
Others	135	18.20
Total	**741**	**100.00**

According to Table 4.1 illustrating the general information of the questionnaire respondents, it was found that most of the teachers taught at primary level (66.80 percent). Most of them were older than 50 years old (52.90 percent) and held a Bachelor's degree (82.30 percent). The respondents who ever attended and never attended the training on management in reading, critical thinking, and writing possessed quite similar ratio. Also, those who experienced and did not experience in instructional management, reading, critical thinking, and writing were found in quite similar number. Textbooks were mostly used as a medium in instructional management, reading, critical thinking, and writing (88.53 percent). Most of them never got consultation on instructional management in reading, critical thinking, and writing (81.40 percent). In terms of evaluating reading, critical thinking, and writing, they mostly performed this alone (60.90 percent). The records in a report form/school record were found as the highest form of reporting the evaluation results in reading, critical thinking, and writing (81.80 percent).

4.1.2 Instructional Management Conditions

Table 4.2 Mean and Standard Deviation of Science Teachers' Opinions toward Instructional Management Conditions Enhancing the Abilities in Reading, Critical Thinking, and Writing of Students

Instructional Management Operation	$\bar{X}$	S.D	Operational Level
1) Teaching preparation	3.44	0.53	Moderate
2) Instructional process	3.45	0.60	Moderate
3) Summary records, reports, storage, and learning outcome utilization	3.46	0.59	Moderate
Total	**3.45**	**0.54**	**Moderate**

According to Table 4.2, it was found that the science teachers entirely operated the instructional management that enhanced the abilities in reading, critical thinking, and writing by students at a moderate level. When considering each item, the operation was also at a moderate level.

Table 4.3 Mean and Standard Deviation of Science Teachers' Opinions toward Instructional Management Conditions Enhancing the Abilities in Reading, Critical Thinking, and Writing of Students in Terms of Teaching Preparation

	Instructional Management Operation	$\bar{X}$	S.D	Operational Level
1)	The indicators enhancing the abilities in reading, critical thinking, and writing as set in the curriculum were explored.	3.38	0.64	Moderate
2)	The indicators enhancing the abilities in reading, critical thinking, and writing based on the Basic Education Curriculum B.E. 2551 were identified.	3.39	0.67	Moderate
3)	The indicators enhancing the abilities in reading, critical thinking, and writing in order to integrate with science subject were analyzed.	3.59	0.69	High
4)	The contents in instructional management enhancing the abilities in reading, critical thinking, and writing in accordance with the indicators were identified.	3.62	0.69	High
5)	Tools evaluating reading, critical thinking, and writing which was in accordance with the indicators were identified.	3.50	0.69	Moderate
6)	The content order for developing students was arranged from easiest to most difficult.	3.57	0.70	High
7)	Evaluating tools which were in accordance with the indicators of reading, critical thinking, and writing were identified.	3.52	0.69	High
8)	The report methods on the development and evaluation results of students in reading, critical thinking, and writing were variously determined.	3.33	0.80	Moderate
9)	The presentation methods on the development and evaluation results of students in reading, critical thinking, and writing were variously determined.	3.32	0.77	Moderate
10)	The development and evaluation plan on reading, critical thinking, and writing was determined cooperatively by those relevant.	3.30	0.76	Moderate
11)	The development and evaluation plan on reading, critical thinking, and writing was determined in accordance with school contexts.	3.39	0.71	Moderate

Table 4.3 (continued)

Instructional Management Operation	$\bar{X}$	S.D	Operational Level
12) The development and evaluation plan on reading, critical thinking, and writing that allowed students to practice with reading assignment was determined.	3.49	0.68	Moderate
13) The development and evaluation plan on reading, critical thinking, and writing that was integrated into learning areas based on the curriculum was determined.	3.34	0.69	Moderate
14) The lesson plans enhancing the abilities in reading, critical thinking, and writing were planned both per unit and per hour.	3.47	0.67	Moderate
15) The instructional management methods enhancing the abilities in reading, critical thinking, and writing were designed.	3.13	0.80	Moderate
16) Media production and utilization enhancing the abilities in reading, critical thinking, and writing was planned.	3.33	0.70	Moderate
17) Tool production and utilization of testing and evaluating results in accordance with the indicators of reading, critical thinking, and writing were planned.	3.52	0.72	High
Total	**3.44**	**0.53**	**Moderate**

According to Table 4.3, it was found that the science teachers performed the instructional management enhancing the abilities in reading, critical thinking, and writing of students in terms of preparation in an overall picture at a moderate level. When considering each item, the operational level was moderate except for "The contents in instructional management enhancing the abilities in reading, critical thinking, and writing in accordance with the indicators were identified," "The indicators enhancing the abilities in reading, critical thinking, and writing in order to integrate with science subject were analyzed," "The content order for developing students was arranged from easiest to most difficult," "The content order for developing students was arranged from easiest to most difficult," "Evaluating tools which were in accordance with the indicators of reading, critical thinking, and writing were identified," and "Tool production and utilization of testing and evaluating results in accordance with the

indicators of reading, critical thinking, and writing were planned" which were at a high level ($\bar{X}$ = 3.62, 3.59, 3.57, 3.52, and 3.52, respectively).

Table 4.4 Mean and Standard Deviation of Science Teachers' Opinions toward Instructional Management Conditions Enhancing the Abilities in Reading, Critical Thinking, and Writing of Students in Terms of Instructional Process

	Instructional Management Operation	**$\bar{X}$**	**S.D**	**Operational Level**
1)	Activities enhancing the abilities in reading, critical thinking, and writing in accordance with the curriculum indicators were held.	3.64	0.75	High
2)	The atmosphere of the instructional management enhancing the abilities in reading, critical thinking, and writing was created.	3.36	0.71	Moderate
3)	The abilities in reading, critical thinking, and writing integrating with the learning areas were evaluated.	3.56	0.67	High
4)	Reading, critical thinking, and writing from authentic reading practice were evaluated.	3.47	0.68	Moderate
5)	Learning behavior on reading, critical thinking, and writing of students was tested and evaluated.	3.49	0.69	Moderate
6)	Students' attitudes toward reading, critical thinking, and writing were tested and evaluated.	3.45	0.78	Moderate
7)	Students' abilities in reading, critical thinking, and writing which were determined in the lesson plans were tested and evaluated.	3.35	0.71	Moderate
8)	There were tests and evaluation both before and after each lesson in order to modify and develop.	3.46	0.70	Moderate
9)	Students were evaluated individually on reading, critical thinking, and writing.	3.45	0.70	Moderate
10)	Students were evaluated in class on reading, critical thinking, and writing.	3.39	0.69	Moderate
11)	After teaching a particular lesson, teachers' teaching advancement was evaluated.	3.50	0.67	Moderate
12)	Students' learning advancement was followed up constantly.	3.53	0.69	High
13)	There was a cooperation with those relevant in evaluating reading, critical thinking, and writing of students.	3.48	0.73	Moderate
	Total	**3.45**	**0.59**	**Moderate**

According to Table 4.4, it was found that the science teachers performed the instructional management based on the indicators of the instructional management enhancing the abilities in reading, critical thinking, and writing of students in terms of the instructional process in an overall picture at a moderate level. When considering each item, "Activities enhancing the abilities in reading, critical thinking, and writing in accordance with the curriculum indicators were held," "The abilities in reading, critical thinking, and writing integrating with the learning areas were evaluated," and "Students' learning advancement was followed up constantly" were operated at a high level ($\bar{X}$ = 3.64, 3.56, and 3.53, respectively).

Table 4.5 Mean and Standard Deviation of Science Teachers' Opinions toward Instructional Management Conditions Enhancing the Abilities in Reading, Critical Thinking, and Writing of Students in Terms of Summary Records, Reports, Storage, and Learning Outcome Utilization

	Instructional Management Operation	**$\bar{X}$**	**S.D**	**Operational Level**
1)	Learning outcomes of reading, critical thinking, and writing of each class were recorded.	3.41	0.74	Moderate
2)	Learning outcomes of reading, critical thinking, and writing of each individual were recorded.	3.40	0.72	Moderate
3)	Learning outcomes of reading, critical thinking, and writing gained from the production students practiced were recorded.	3.40	0.72	Moderate
4)	The abilities in reading, critical thinking, and writing of students were judged based on their production they practiced.	3.39	0.72	Moderate
5)	Learning outcomes in reading, critical thinking, and writing of each individual were reported.	3.57	0.73	High
6)	Learning outcomes in reading, critical thinking, and writing of each class were reported.	3.45	0.75	Moderate
7)	Learning outcomes in reading, critical thinking, and writing that reflected students' advancement and development were reported.	3.49	0.71	Moderate
8)	Students were given a chance to participate in storing the learning outcomes in reading, critical thinking, and writing.	3.50	0.72	Moderate

Table 4.5 (continued)

Instructional Management Operation	$\bar{X}$	S.D	Operational Level
9) Learning outcomes in reading, critical thinking, and writing were stored in an easy-to-understand format.	3.49	0.67	Moderate
10) Learning outcomes were applied into developing students and teachers' teaching constantly.	3.51	0.70	High
Total	**3.46**	**0.59**	**Moderate**

According to Table 4.5, it revealed that the science teacher performed the instructional management enhancing the abilities in reading, critical thinking, and writing of students in terms of summary records, reports, storage, and learning outcome utilization in an overall picture at a moderate level. When considering each item, every item was at a moderate level except for "Learning outcomes on reading, critical thinking, and writing of each individual were reported" and "Learning outcomes were applied into developing students and teachers' teaching constantly" that were at a high level ($\bar{X}$ = 3.57 and 3.51, respectively).

4.1.3 Knowledge and Understanding in Instructional Management

Knowledge and understanding found among science teachers affiliated with Uttaradit Primary Educational Service Area Offices 1 and 2 and Phitsanulok Primary Educational Service Area Office 3 toward the concepts of instructional management enhancing the abilities in reading, critical thinking, and writing in accordance with the Basic Education Curriculum B.E. 2551 were collected from the sample groups via a true-false test containing 24 items. Then, the data were processed by means of frequency distribution and percentage. The results were classified into three groups which were (1) a high-level group that possessed knowledge and understanding toward the instructional management enhancing the abilities in reading, critical thinking, and writing in accordance with the Basic Education Core Curriculum B.E 2551 between 18 and 24 points (more than 70 percent), (2) a moderate-level group that possessed knowledge and understanding toward the instructional management enhancing the abilities in reading, critical thinking, and writing in accordance with the Basic Education Core Curriculum B.E 2551 between 12 and 17 points (between 50 and 70

percent), and (3) a low-level group that possessed knowledge and understanding toward the instructional management enhancing the abilities in reading, critical thinking, and writing in accordance with the Basic Education Core Curriculum B.E 2551 between 0 and 11 points (lower than 50 percent). The analysis results were shown as follows:

Table 4.6 Number and Percentage of the Sample Groups Classified by the Level of Knowledge and Understanding toward Instructional Management

Science Teachers' Knowledge and Understanding	Number	Percent
A high level (18-24 points)	122	16.46
A moderate level (12-17 points)	476	64.24
A low level (0-11 points)	143	19.30
Total	**741**	**100.00**

According to Table 4.6, most of the science teachers possessed knowledge and understanding toward instructional management enhancing the abilities in reading, critical thinking, and writing at a moderate level.

4.1.4 Needs and Necessity in Developing Instructional Management

Table 4.7 Needs and Necessity in Developing Instructional Management Enhancing the Abilities in Reading, Critical Thinking, and Writing

List	I	D	PNI	No.
1) Scope determination of reading, critical thinking, and writing	4.10	3.36	0.217	2
2) Indicator determination of reading, critical thinking, and writing	4.13	3.46	0.193	15
3) Indicator examination on reading, critical thinking, and writing	4.16	3.45	0.203	12
4) Lesson plans on reading, critical thinking, and writing	4.10	3.41	0.200	13
5) Assignment determination of reading, critical thinking, and writing	4.10	3.40	0.204	11
6) Teaching method determination of reading, critical thinking, and writing	4.13	3.41	0.212	5
7) Scoring criteria determination toward the abilities in reading, critical thinking, and writing	4.13	3.42	0.208	9

Table 4.7 (continued)

List	I	D	PNI	No.
8) Tool production used to evaluate reading, critical thinking, and writing	4.12	3.37	0.222	1
9) The operation of instructional activities on reading, critical thinking, and writing	4.17	3.45	0.207	10
10) Evaluation operation toward students' learning, attitudes, and abilities as well as teachers' teaching	4.13	3.42	0.210	7
11) The follow-up of instructional advancement in reading, critical thinking, and writing	4.13	3.41	0.212	5
12) Outcome reports on instructional management in reading, critical thinking, and writing	4.13	3.42	0.209	8
13) Outcome presentation on instructional management in reading, critical thinking, and writing that reflected students' advancement or development, such as portfolios	4.15	3.46	0.200	13
14) Learning outcome storage in reading, critical thinking, and writing in an easy-to-understand format	4.17	3.43	0.215	4
15) The application of learning outcomes in reading, critical thinking, and writing to plan and develop students constantly	4.20	3.45	0.22	3

Remark: "I" referring to "likely condition;" "D" referring to "authentic condition;" and "PNI" referring to the Priority Need Index.

According to Table 4.7, the science teachers needed and were necessary to be developed in the instructional management enhancing the abilities in reading, critical thinking, and writing in every item quite similarly (PNI between 0.193 and 0.222). The first three items were "Tool production used to evaluate reading, critical thinking, and writing," "Scope determination of reading, critical thinking, and writing," and "The application of learning outcomes in reading, critical thinking, and writing to plan and develop students constantly," respectively.

4.2 The Results of the Construction and Quality Identification of the Evaluation Model for Developing Science Teachers' Instructional Management Enhancing the Abilities in Reading, Critical Thinking, and Writing of Basic Education Students

4.2.1 The Results of the Model Construction

According to the study in Item 4.1, the contexts, needs, and necessity in developing the instructional management which enhancing the abilities in reading, critical thinking, and writing of basic education students were explored. The researcher applied the findings from Item 4.1 to be fundamental data in constructing the evaluation model for developing science teachers' instructional management which enhanced the abilities in reading, critical thinking, and writing of basic education students. The empowerment evaluation concept of Fetterman (1996) and the educational evaluation concepts of Nevo (1983), Sirichai Kanjanawasee (2009), and Yaowadee Rangchaikul (2003) were applied as evaluation concepts in the evaluation model for developing science teachers' instructional management which enhanced the abilities in reading, critical thinking, and writing of basic education students. These consisted of (1) evaluation objectives, (2) objects evaluated, (3) evaluation operation, (4) evaluation result judgement, and (5) result reports and utilization in developing instructional management as shown and detailed in Figure 4.1 as follows:

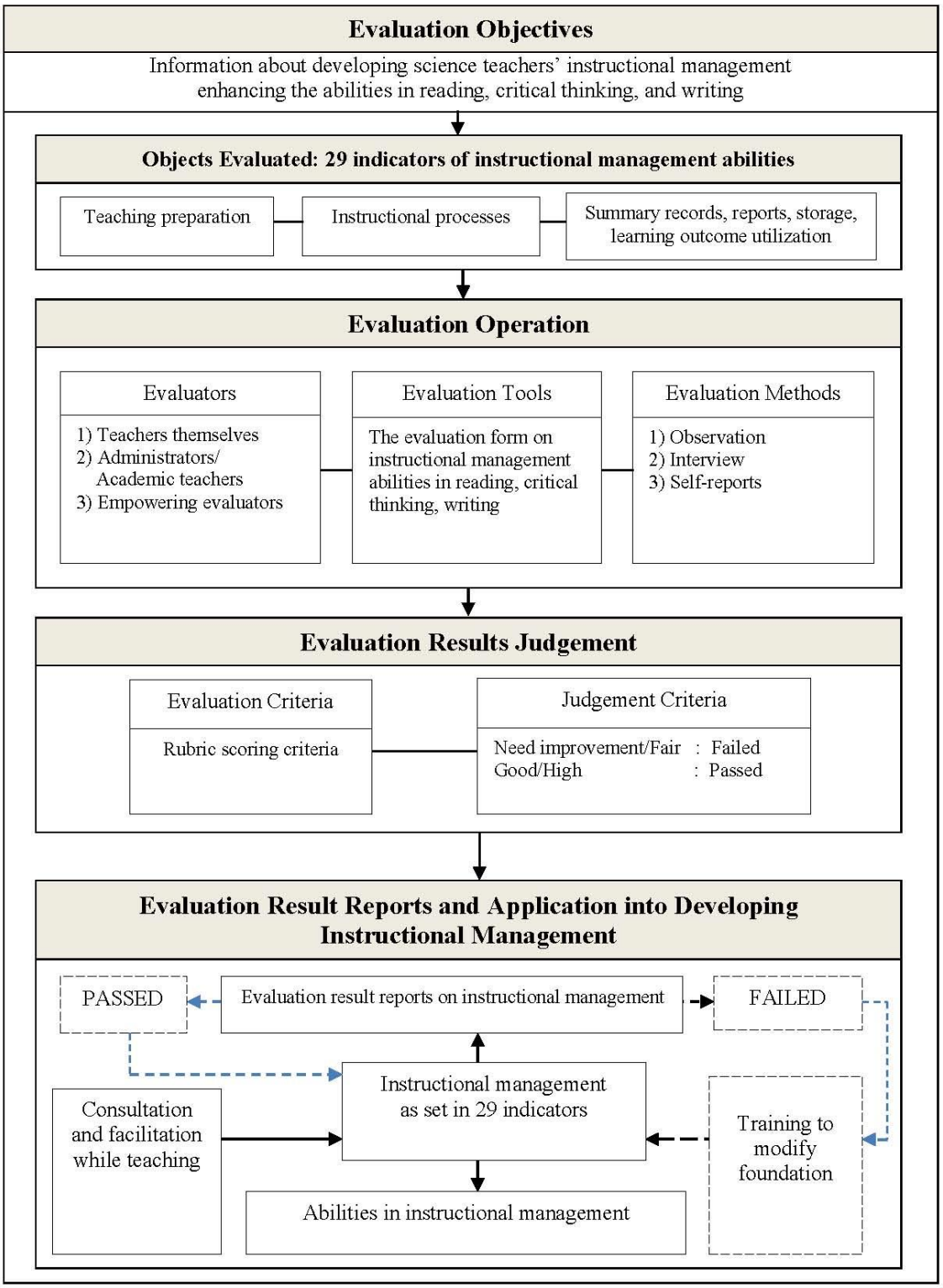

Figure 4.1 The Evaluation Model for Developing Science Teachers' Instructional Management Enhancing the Abilities in Reading, Critical Thinking, and Writing of Basic Education Students

(1) Evaluation Objectives

To obtain feedback information for science teachers so that they could employ it to develop the instructional model enhancing the abilities in reading, critical thinking, and writing of basic education students both at primary education level and at junior high school level.

(2) Objects Evaluated

The objects evaluated were the abilities in reading, critical thinking, and writing of basic education students, which the researcher had analyzed the components and indicators of the instructional model enhancing the abilities in reading, critical thinking, and writing of basic education students via the exploratory factor analysis. The results consisted of three aspects, 16 indicators in teaching preparation, nine indicators in instructional process, and four indicators in summary records, reports, storage, and learning outcome utilization. The details were shown as follows:

2.1 Teaching preparation consisted of 16 indicators as follows:

2.1.1 The indicators enhancing the abilities in reading, critical thinking, and writing which was in accordance with the Basic Education Curriculum B.E. 2551 were identified.

2.1.2 The indicators of reading, critical thinking, and writing which were integrated with science learning areas were identified.

2.1.3 The learning objectives and the indicators of reading, critical thinking, and writing required for students were identified.

2.1.4 Scientific contents which could be taught in order for students to achieve the indicators of reading, critical thinking, and writing based on their age ranges were identified in the curriculum.

2.1.5 The indicators enhancing the abilities in reading, critical thinking, and writing in accordance with the Basic Education Curriculum B.E. 2551 were identified.

2.1.6 Media used in reading, critical thinking, and writing about science based on age ranges were identified.

2.1.7 Various media used in reading, critical thinking, and writing were identified.

2.1.8 Media used in reading, critical thinking, and writing which were in accordance with lessons or situations were identified.

2.1.9 Activities leading to lessons linking former knowledge and new knowledge were identified.

2.1.10 Activities in reading, critical thinking, and writing allowing students to practice authentically were identified.

2.1.11 Tools evaluating the abilities in reading, critical thinking, and writing in science in authentic situations were constructed.

2.1.12 Situations for reading, critical thinking, and writing in science which were appropriate to the age and stimulated thinking were constructed.

2.1.13 Activities enhancing students to summarize lessons by themselves were identified.

2.1.14 Technologies linking with lessons were identified.

2.1.15 Media used to reading, critical thinking, and writing in science in accordance with lessons was provided and produced.

2.1.16 Various methods evaluating the results of reading, critical thinking, and writing in science were employed.

2.2 Instructional processes consisted of nine indicators as follows:

2.2.1 Activities allowing students to repeatedly practice via reading, critical thinking, and writing in science were held.

2.2.2 Activities enhancing authentic practice of reading, critical thinking, and writing in science were held.

2.2.3 Techniques of questioning and stimulating students to think from reading in science were employed.

2.2.4 Activities allowing students to think and assess thinking of their own after reading in science were held.

2.2.5 Activities enhancing students to summarize lessons by themselves after reading, critical thinking, and writing in science were held.

2.2.6 Instructional media that were in accordance with lessons were employed.

2.2.7 Environment and media facilitating reading, critical thinking, and writing in science were provided.

2.2.8 Learning outcomes which were in accordance with learning objectives were evaluated.

2.2.9 Attitudes toward learning were evaluated.

2.3 Summary records, reports, storage, and learning outcome utilization consisted four indicators as follows.

2.3.1 Learning outcome summaries of an individual and a class were recorded.

2.3.3 Learning outcomes of an individual and a class were reported.

2.3.3 Learning outcomes of an individual and a class were stored.

2.3.4 Learning outcomes were used to planning in improving the students' quality continuously.

(3) Evaluation Operation

Instructional management evaluation was the evaluation of components and indicators of knowledge and abilities in science teachers' instructional management which expressed as working behavior. This could be observed from behavior, operational methods, operational production, and production quality. This consisted of the followings.

3.1 Evaluators

As for this research, the evaluators' roles were determined as follows:

3.1.1 Science teachers performing the self-evaluation as set in the indicators of instructional management

3.1.2 Relevant parties, namely at least one administrator or academic teacher, evaluating the science teachers via observing teaching or operational results which were empirical clues or evidence

3.1.3 Empowering evaluators, namely experts or educational supervisors possessing knowledge or experience, affiliated with a department out of the schools. These people would observe teaching or operational results which were empirical clues or evidence.

3.2 Evaluation tools

The evaluation tools were the evaluation form of science teachers' abilities in instructional management in reading, critical thinking, and writing of basic education students which consisted of three aspects, namely teaching preparation, instructional processes, and summary records, reports, storage, and the learning outcome utilization. The tools were in a format of scoring rubrics consisting of scoring scales and scoring criteria which could identify the differences of production or work efficiency obviously. The criteria determination was in a form of holistic rubrics which scored by considering the overall production and work efficiency of each indicator illustrated with explanation of a quality level of instructional level clearly. This evaluation served to be the evaluation toward instructional management abilities that were expressed by those evaluated whether they had to modify or adjust or not and in which level.

As for the ability evaluation of science teachers' instructional management, the quality levels were determined in four levels as follows (the Institute for the Promotion of Teaching Science and Technology: 2002).

Scores	Interpretation
0	The quality level was "need improvement" which needed urgent improvement. Those evaluated could not express behavior as identified in the scoring criteria.
1	The quality level was fair which needed to be improved to the higher level. Those evaluated expressed key behavior at a lower level than that determined in the criteria.
2	The quality level was good but still needed to be developed partially. Those evaluated expressed key behavior as determined in the scoring criteria, but there still were minor drawbacks.

3 The quality level was very good which could be a model for others. Those evaluated expressed behavior as identified completely which was higher than the scoring criteria.

3.3 Evaluation Methods

As for the evaluation methods used to evaluate the abilities in instructional management enhancing the abilities in reading, critical thinking, and writing of science teachers as those evaluated, they consisted of teaching observation, document observation, interview as determined as propriety for evaluating indicators (before and after being developed). The steps were illustrated as follows:

3.3.1 Hold a meeting to inform the evaluators about indicator details, scoring criteria, and evaluation criteria in an evaluation manual before evaluating.

3.3.2 The evaluators assessed only relevant behavior.

3.3.3 The evaluators assessed the behavior that those evaluated expressed based on the scoring criteria via the comparison with the evaluation criteria of each indicator.

3.3.4 The evaluators might interview those evaluated in the indicators that were expressed through unclear behavior or needed further details.

3.3.5 The evaluators observed the classrooms of those evaluated in order to obtain empirical information about teaching behavior of those evaluated.

3.3.6 When every indicator was evaluated, the evaluators or officers recorded the data via a computer program that was provided by the researcher as the facility.

(4) Evaluation Result Judgement

In terms of judging the abilities in instructional management of the science teachers, the value judgement based on the determined judgement criteria was performed as shown in the following steps.

4.1 Record the scores gained from the evaluation of administrators, those assigned, empowering evaluators, and science teachers in a computer program facilitated by the researcher.

4.2 Fill the evaluation scores given by the administrators or those assigned in the field of administrators' evaluation.

4.3 Fill the evaluation scores given by the empowering evaluators in the field of empowering evaluators' evaluation.

4.4 Fill the evaluation scores given by the science teachers in the field of self-evaluation.

4.5 Score result processing appeared in the field of "each aspect" when the data of each aspect were completely filled.

4.6 Overall score result processing appeared in the field of "total scores" when the scores were filled completely in 29 items.

4.7 The computer program processed the total scores in the field of "total scores of each aspect" and "overall total scores" when every evaluator's score of each aspect and overall scores were filled.

When the processing of the evaluation results was completed, the evaluation results were then compared with the judgement criteria which classified them into four levels as follows:

Average Scores	**Quality Level**
0.00 – 0.49	did not meet the criteria and needed to be improved urgently
0.50 – 1.49	did not meet the criteria and needed to be improved on important issues so that they gained higher quality
1.50 – 2.49	met the evaluation criteria, but still needed to be improved partially in unimportant issues so that they gained higher quality enough to be a model
2.50 – 3.00	higher than the criteria and could be a model for others

(5) Evaluation Result Reports and Utilization in Developing Instructional Management

5.1 The report of the evaluation results illustrated the evaluation results of the components and indicators on science teachers' instructional model enhancing the abilities in reading, critical thinking, and writing of students which resulted from knowledge and abilities expressing from the instructional management in order to be

employed to develop science teachers' instructional management. The operation was shown as follows:

5.1.1 Record in a report form of evaluation results. This was prepared in the reporting form of science teachers on the evaluation results of knowledge and abilities in reading, critical thinking, and writing of basic education students. There were two parts in the report which were the evaluation results of each item (Form 1) and the evaluation results in an overall picture and in each aspect (Form 2).

In terms of the evaluation of each item (each indicator) in each aspect and overall summary, the calculation methods were shown as follows:

$$\text{The average of each item's score (indicator)} = \frac{\text{Scores from Evaluators 1+2+3}}{\text{The number of evaluators}}$$

$$\text{The average scores of each aspect} = \frac{\text{Total of the average scores of each item in each aspect}}{\text{The number of items in each aspect}}$$

5.1.2 The evaluators proposed the evaluation scores to those evaluated individually and allowed them to propose further information gained from different evaluation results.

5.1.3 The evaluators, along with the empowering evaluators, and those evaluated determined goals together in order to develop knowledge and abilities in instructional management of those evaluated based on the indicators that did not meet the evaluation criteria or those that met the criteria but still needed partial improvement in order to be a model later. They participated in planning and determining training curriculum offering knowledge for those failed the evaluation criteria. The empowering evaluators prepared documents on the guidelines on developing the instructional model enhancing the abilities in reading, critical thinking, and writing of basic education students in order to facilitate those evaluated so that they could employ as their operational guidelines.

5.2 The development of instructional management was considered the development of knowledge and abilities in science teachers' instructional management enhancing the abilities in reading, critical thinking, and writing of basic education students. The development methods were shown as follows:

5.2.1 Training offering knowledge from particular experts, based on needs and necessity which was considered from the science teachers' evaluation results that did not meet the evaluation criteria in terms of components and indicators of the instructional management enhancing the abilities in reading, critical thinking, and writing of students, was provided. It consisted of three aspects which were teaching preparation, instructional management, and summary records, reports, storage, and the learning outcome utilization for modifying knowledge foundation.

5.2.2 Consultation via advising and reflecting in a friendly criticism manner after modifying knowledge foundation. This was performed during the instructional management operation in order to improve the problematic instruction gained via operational observation or operational results. Providing documents on guidelines in developing instructional management were facilitated. Science teachers were supposed to be stimulated so that they could change their expressing behavior toward their instructional management which was considered knowledge and abilities within the science teachers.

4.2.2 The Examination Results of the Model Quality

The examination results of the evaluation model for developing science teachers' instructional management which enhanced the abilities in reading, critical thinking, and writing of basic education students in terms of theories, which was performed by 11 experts experiencing in testing and evaluation and instructional management. The experts examined via the examination form of the evaluation model for developing instructional management which covered aspects of propriety, feasibility, clarity, and easiness when utilized. The details were shown as follows:

Table 4.8 Mean and Standard Deviation of the Experts' Opinions toward the Quality of the Evaluation Model

Component Issue	Propriety		Feasibility		Clarity		Easiness	
	$\bar{X}$	S.D	$\bar{X}$	S.D	$\bar{X}$	S.D	$\bar{X}$	S.D
1) Evaluation objectives								
1.1 Information used to improve instructional management	4.91	0.30	5.00	0.00	4.82	0.40	4.91	0.30
2) Objects evaluated								
2.1 Components, indicators, abilities in instructional management	4.73	0.47	4.73	0.47	4.64	0.50	4.73	0.47
3) Evaluation operation								
3.1 Evaluators	4.82	0.40	4.82	0.40	4.91	0.30	4.82	0.40
3.2 Evaluation tools	4.64	0.50	4.73	0.47	4.64	0.50	4.64	0.50
3.3 Evaluation methods	4.91	0.30	4.82	0.40	4.82	0.40	4.73	0.47
4) Evaluation results								
4.1 Evaluation criteria	4.73	0.47	4.64	0.50	4.64	0.50	4.55	0.52
4.2 Judgement criteria	4.82	0.40	4.73	0.47	4.73	0.47	4.73	0.47
5) Reports and application of evaluation results to develop instructional management								
5.1 Evaluation result reports	4.91	0.30	4.91	0.30	4.82	0.40	4.82	0.40
5.2 Instructional management development	4.82	0.40	4.64	0.50	4.73	0.47	4.73	0.47

According to Table 4.8 illustrating the examination results of quality on propriety, feasibility, clarity, and easiness when applied of the evaluation model for developing science teachers' instructional management which enhanced the abilities in reading, critical thinking, and writing of basic education students, it was found that the quality of the instructional model possessed propriety, feasibility, clarity, and easiness when applied at the highest level with an average between 4.55 and 5.00.

4.3 The Utilization Results of the Evaluation Model for Developing Science Teachers' Instructional Management Enhancing the Abilities in Reading, Critical Thinking, and Writing of Basic Education Students

The utilization results of the evaluation model for developing science teachers' instructional management which enhanced the abilities in reading, critical thinking, and writing of basic education students were considered changes in the science teachers' abilities in instructional management. They were obtained by exploring science teachers' attitudes toward instructional management and the evaluation results both before and after utilizing the model. The details were shown as follows:

4.3.1 General information of a sample group of teachers that were authentically employed

4.3.2 The evaluation results of science teachers' abilities in instructional management before their instructional management were developed

4.3.3 The development results of science teachers' instructional management

4.3.4 The evaluation results of science teachers' abilities in instructional management after their instructional management was developed

4.3.5 The comparative results of science teachers' abilities in managing instruction both before and after their instructional management were developed

4.3.6 The results of science teachers' attitudes toward instructional management

4.3.7 The evaluation results of the quality of the evaluation model for developing instructional management which the science teachers employed

4.3.1 General Information of the sample group of teachers

Table 4.9 Number and Percentage of the General Information of Science Teachers

General Information	Number	Percent
Gender:		
Male	8	26.67
Female	22	73.33
Age:		
21-30 years old	5	16.67
31-40 years old	6	20.00
41-50 years old	3	10.00
51-60 years old	16	53.33
Education background:		
Bachelor's degree	22	73.33
Master's degree	8	26.67
Teaching experience:		
1-10 years	5	16.67
11-20 years	10	33.33
21-30 years	2	6.67
More than 31 years	13	43.33
Number of subjects taught:		
1-2 subjects	17	56.67
3-4 subjects	1	3.33
5-6 subjects	-	-
7-8 subjects	12	40.00
Teaching load per week:		
1-10 hours	18	60.00
21-30 hours	12	40.00
Other responsibilities:		
Routine duties assigned	30	100.00
No routine duties assigned	-	-

According to Table 4.9 which illustrated the general information of science teachers in a sample group, it was found that the science teachers participating in the project were mostly female, 22 females (73.33 percent). Their age was between 51 and 60 years old (53.33 percent). Most of them held a Bachelor's Degree, 22 people (73.33 percent). Thirteen people (43.33 percent) had the highest teaching experience of 31 years, followed by 11-20 years of experience found in ten people (33.33 percent). 17 people

taught 1-2 subjects (40.00 percent). The highest teaching load was 11-20 hours per week which was found in 18 people (60.00 percent), followed by 12 people whose teaching load was 21-30 hours per week (40.00 percent). All of them were assigned other responsibilities (100.00 percent).

4.3.2 Evaluation Results of Science Teachers' Abilities in Instructional Management before Being Developed in Instructional Management

The evaluation results of science teachers' abilities in instructional management that enhanced the abilities in reading, critical thinking, and writing of basic education students, which were performed by the science teachers themselves, administrators, and empowering people who were evaluators before being developed as set in the evaluation model, were shown in Table 4.10

Table 4.10 Mean and the Evaluation Results of Science Teachers' Abilities in Instructional Management (Teaching Preparation, Instructional Processes, and Summary Records, Reports, Storage, and Learning Outcome Utilization) Enhancing the Abilities in Reading, Critical Thinking, and Writing of Basic Education Students, Assessed by Teachers Themselves, Administrators, and an Empowering Evaluator as Evaluators before Being Developed as Set in the Evaluation Model

No.	Mean and the Evaluation Results of Science Teachers' Abilities in Instructional Management before Being Developed as Set in the Evaluation Model														Evaluation Results	3-Aspect Average	3-Aspect Evaluation Results
	Teaching Preparation				Evaluation Results	Instructional Processes				Evaluation Results	Records, Reports, Storage, Utilization						
	Self	Administrators	Empowering Evaluator	$\bar{X}$		Self	Administrators	Empowering Evaluator	$\bar{X}$		Self	Administrators	Empowering Evaluator	$\bar{X}$			
1	1.81	1.69	1.75	1.75	Passed	1.78	1.67	1.56	1.67	Passed	1.75	1.50	1.25	1.50	Passed	1.64	Passed
2	1.75	1.56	1.50	1.60	Passed	1.67	1.56	1.44	1.56	Passed	1.75	1.50	1.25	1.50	Passed	1.55	Passed
3	2.00	1.88	1.88	1.92	Passed	2.00	2.33	2.00	2.11	Passed	2.25	2.00	2.75	2.00	Passed	2.01	Passed
4	2.00	1.94	1.88	1.94	Passed	2.00	1.89	1.78	1.89	Passed	1.25	1.00	0.75	1.00	Failed	1.61	Passed
5	1.44	1.44	1.50	1.46	Failed	1.67	1.56	1.44	1.56	Passed	1.50	1.25	1.00	1.25	Failed	1.42	Failed
6	1.81	1.69	1.63	1.71	Passed	1.56	1.44	1.33	1.44	Failed	2.00	1.75	1.50	1.75	Passed	1.63	Passed
7	1.88	1.88	1.81	1.85	Passed	1.44	1.33	1.22	1.33	Failed	2.00	1.75	1.50	1.75	Passed	1.65	Passed
8	1.56	1.63	1.63	1.60	Passed	1.78	1.67	1.56	1.67	Passed	1.50	1.25	1.00	1.25	Failed	1.51	Passed
9	1.13	1.13	1.50	1.29	Failed	0.67	1.00	1.00	0.89	Failed	0.00	1.00	1.00	0.67	Failed	0.95	Failed
10	1.81	1.81	1.75	1.79	Passed	1.44	1.33	1.22	1.33	Failed	2.00	1.75	1.50	1.75	Passed	1.63	Passed
11	1.81	1.75	1.75	1.77	Passed	1.89	1.89	1.78	1.89	Passed	2.25	2.00	1.75	2.00	Passed	1.89	Passed
12	2.06	2.00	1.94	2.00	Passed	2.00	1.89	1.78	1.89	Passed	2.00	1.75	1.50	1.75	Passed	1.88	Passed
13	1.69	1.63	1.63	1.65	Passed	2.00	1.89	1.67	1.89	Passed	2.25	1.50	1.50	1.75	Passed	1.76	Passed
14	1.69	1.69	1.63	1.67	Passed	1.89	1.78	1.78	1.78	Passed	1.75	2.00	1.50	1.75	Passed	1.73	Passed
15	1.56	1.56	1.63	1.58	Passed	2.00	1.89	1.67	1.78	Passed	2.00	2.00	1.25	1.70	Passed	1.70	Passed

Table 4.10 (continued)

No.	Mean and the Evaluation Results of Science Teachers' Abilities in Instructional Management before Being Developed as Set in the Evaluation Model															
	Teaching Preparation				Evaluation Results	Instructional Processes				Evaluation Results	Records, Reports, Storage, Utilization				Evaluation Results	3-Aspect Average	3-Aspect Evaluation Results
	Self	Administrators	Empowering Evaluator	$\bar{X}$		Self	Administrators	Empowering Evaluator	$\bar{X}$		Self	Administrators	Empowering Evaluator	$\bar{X}$			
16	2.00	1.94	1.88	1.94	Passed	2.00	1.78	1.56	1.78	Passed	2.00	1.75	1.50	1.75	Passed	1.82	Passed
17	2.00	1.94	1.88	1.94	Passed	2.00	2.00	1.89	1.96	Passed	2.00	1.98	1.92	1.97	Passed	1.99	Passed
18	1.88	1.88	1.75	1.88	Passed	2.00	2.00	1.44	1.81	Passed	2.25	2.00	1.75	2.00	Passed	1.90	Passed
19	2.00	1.88	1.88	1.90	Passed	1.89	1.89	1.33	1.74	Passed	2.25	2.00	1.75	2.00	Passed	1.88	Passed
20	1.81	1.75	1.81	1.79	Passed	2.00	2.00	1.00	1.67	Passed	2.00	2.25	1.75	2.00	Passed	1.88	Passed
21	1.94	1.88	1.81	1.88	Passed	2.00	2.00	1.67	1.89	Passed	2.25	2.00	1.75	2.00	Passed	1.92	Passed
22	2.00	1.94	1.88	1.94	Passed	2.11	1.89	1.67	1.89	Passed	2.50	1.75	1.75	2.00	Passed	1.94	Passed
23	2.00	1.88	1.75	1.88	Passed	2.00	1.89	1.77	1.89	Passed	2.50	2.00	1.50	2.00	Passed	1.92	Passed
24	1.94	1.87	1.81	1.88	Passed	1.89	2.00	1.77	1.89	Passed	2.25	2.25	1.50	2.00	Passed	1.92	Passed
25	1.43	1.38	1.44	1.42	Failed	1.22	1.22	1.11	1.19	Failed	1.50	1.25	1.00	1.25	Failed	1.28	Failed
26	1.38	1.38	1.69	1.48	Failed	1.56	1.44	1.33	1.44	Failed	1.25	1.50	1.00	1.25	Failed	1.39	Failed
27	1.31	1.31	1.50	1.38	Failed	1.56	1.44	1.11	1.37	Failed	1.75	1.00	1.00	1.25	Failed	1.33	Failed
28	1.31	1.31	1.50	1.38	Failed	1.44	1.44	1.22	1.37	Failed	1.50	1.00	1.25	1.25	Failed	1.33	Failed
29	1.87	1.87	1.81	1.85	Passed	2.00	2.00	1.67	1.89	Passed	2.25	1.75	1.75	1.92	Passed	1.89	Passed
30	1.31	1.39	1.50	1.39	Failed	1.56	1.44	1.11	1.37	Failed	1.50	1.25	1.00	1.25	Failed	1.34	Failed

According to Table 4.10, it was found that those relevant who were teachers themselves, administrators, and an empowering evaluator evaluated the abilities of science teachers in instructional management enhancing the abilities in reading, critical thinking, and writing of students before being developed at a quite similar level. When comparing the average score of science teachers' evaluation results individually with the evaluation criteria, there were 23 science teachers or 76.67 percent that passed three-aspect evaluation criteria. There were seven teachers who failed the evaluation criteria. When comparing each item in teaching preparation, 23 people passed the evaluation criteria (76.67 percent), while seven people failed (23.33 percent). In terms of the summary records, reports, storage, and learning outcome utilization, 21 people passed the evaluation criteria (70.00 percent), while nine people failed both aspects of the evaluation criteria (30.00 percent).

4.3.3 The Development Results of Science Teachers' Instructional Management

After learning the evaluation results of science teachers' instructional management, the researcher as an empowering evaluator took the evaluation results to develop the science teachers via two development methods based on the empowerment evaluation concept which were (1) training to give knowledge and (2) consultation and facilitation. The training to give knowledge aimed at modifying knowledge foundation of the target group consisting of 22 people who failed the evaluation (seven people did not meet the three-aspect evaluation that were teaching preparation, instructional processes, and summary records, reports, storage, and learning outcome utilization; 15 out of 25 people did not meet an item-aspect evaluation; seven people who did not meet an item-aspect evaluation were the same people as those who did not meet the three-aspect evaluation; three people who did not meet the three-aspect evaluation were the same people as those who failed the item-aspect evaluation). As for the consultation and facilitation, it aimed at developing science teachers' behavior in managing instruction so that it was highly qualified. This was operated after the training which gave knowledge during their teaching operation. The target group was a sample group of 30 science teachers classified into a group failing the evaluation who needed to attend the training in order to modify their foundation voluntarily and a group passing the evaluation and needed to

develop themselves to possess higher abilities voluntarily. The details of the development results were shown as follows:

(1) The development results of instructional management via training to give knowledge

(2) The development results of instructional management via consultation and facilitation

(1) The development results of instructional management via training to give knowledge

The empowering evaluator gave the training to provide knowledge for the science teachers failing the judgement criteria in order to adjust their knowledge foundation. The training contents covered three aspects which were teaching preparation consisting of lesson plan preparation and evaluation tools, instructional processes consisting of teaching techniques and evaluation methods, and summary records, reports, storage, and learning outcome utilization consisting of learning outcome report. The training also included theoretical parts and practicum. And, it was found that 22 science teachers finally passed the evaluation performed during the training. Moreover, the science teachers who participated in the training evaluated the training outcomes as shown in Table 4.11.

Table 4.11 Mean and Standard Deviation of Science Teachers' Opinions toward the Training that Gave Knowledge on Instructional Management Enhancing the Abilities in Reading, Critical Thinking, and Writing of Students

Item	$\bar{X}$	S.D	Interpretation
1) Training objectives were appropriate.	4.93	0.25	Very good
2) The venue and atmosphere were appropriate.	4.40	0.49	Good
3) The speaker possessed knowledge and abilities in the training topics.	4.50	0.51	Very good
4) The speaker was able to convey contents.	4.56	0.50	Very good
5) The speaker used modern media during the training.	4.50	0.51	Very good
6) The speaker gave a chance to question.	4.63	0.47	Very good
7) Training handouts were appropriate and enough.	4.50	0.49	Very good
8) Knowledge/experience gained could be utilized.	4.63	0.49	Very good

According to Table 4.11, it was found that a sample group of the science teachers expressed opinions toward the training to give knowledge about instructional management at a very good level in every item, except for "The venue and atmosphere were appropriate" which was at a good level.

(2) The development results of instructional management via consultation and facilitation

The development results were illustrated in Tables 4.12-4.14.

Table 4.12 The Operation Results of Consultation and Facilitation in Teaching Preparation

Problem Issues Identified	Recommendation/Solution
1) As for the composition of situations for students to analyze, the contents covered topics and key features of events, but there were a lack of supporting reasons for each event and summaries.	1) Give recommendations via situational composition guidelines. Key elements were supposed to consist of introduction, content bodies, and summary. The most important part was the contents which described event details of each situation in terms of what included in each event, which outstanding features characterized, why it had to be like that, and what limitation it contained. As for the summary, it mentioned key issues of the event. There were at least two events in each situation which was facilitated by a case study provided.
2) The lesson plans lacked technologies which linked to the lessons.	2) Give recommendations via technology application to link to the lessons, such as the Internet, smart boards, etc. in order to make the lessons interesting.

Table 4.13 The Operation Results of Consultation and Facilitation in Instructional Processes

Problem Issues Identified	Recommendation/Solution
1) The learning objectives were not informed to students before teaching.	1) Give recommendations on informing learning objectives prior to the instructional every time.
2) Leading to the lessons by linking former knowledge to new knowledge, such as questioning prior to reading scientific passages, was not in accordance with the learning objectives in the learning plan.	2) Give recommendations to the teachers by informing them to give guidelines in questioning prior to reading within the learning objective scope.
3) Questioning techniques to stimulate students' thinking were in a format of leading-to-answer questions which were only used to test memory.	3) Give recommendations to the teachers to use questions stimulating students' thinking, such as: Question 1: What were the differences between a food chain and a food web? How did you know? Question 2: How could we believe that these living groups related in a manner of food chains and food webs? Question 3: Why were you interested in this topic?
4) Construction of students' interest in reading, critical thinking, and writing in science from handouts, textbooks, and short notes.	4) Give recommendations to the teachers to construct/provide instructional media in order to build students' interest, such as video tapes, short stories, comics, local learning sources, and colorful and decorated handouts.
5) The teachers questioned to test students' abilities in critical thinking stage in order for them to classify types which were questioned actually to test memory.	5) Point to the teachers so that they realized that questioning for classifying from the contents was used to test memory, while in the analysis stage questioning for classifying from the situations was used instead.

Table 4.14 The Operation Results of Consultation and Facilitation in Summary Records, Reports, Storage, and Learning Outcome Utilization

Problem Issues Identified	Recommendation/Solution
1) Students wrote a mind map instead of a concept mapping which aimed at expressing the abilities in interpreting by analyzing situations in students' daily lives.	1) Point to the teachers that a concept mapping was different from a mind map in that connectives were added to link topics and elements.
2) Students could not give reference based on scientific concepts when assigned to analyze situations and write a causal summary toward what they read as exercises.	2) Give recommendations to the teacher by asking them to practice their students to classify and write a linkage among what they classified by applying what they learned as supporting reasons. This was supposed to be repeatedly performed until the students could write a summary with reference to key scientific concepts based on each student's potential.

4.3.4 Evaluation Results of Science Teachers' Abilities in Instructional Management after Being Developed in Instructional Management

The evaluation results of science teachers' abilities in instructional management enhancing the abilities in reading, critical thinking, and writing of basic education students, assessed by teachers themselves, administrators, and an empowering evaluator as evaluators after being developed as set in the evaluation model were shown in Table 4.15.

Table 4.15 Mean and the Evaluation Results of Science Teachers' Abilities in Instructional Management (Teaching Preparation, Instructional Processes, and Summary Records, Reports, Storage, and Learning Outcome Utilization) Enhancing the Abilities in Reading, Critical Thinking, and Writing of Basic Education Students, Assessed by Teachers Themselves, Administrators, and an Empowering Evaluator as Evaluators after Being Developed as Set in the Evaluation Model

No.	Mean and the Evaluation Results of Science Teachers' Abilities in Instructional Management after Being Developed as Set in the Evaluation Model														3-Aspect Evaluation Results
	Teaching Preparation				Evaluation Results	Instructional Processes				Evaluation Results	Records, Reports, Storage, Utilization					
	Self	Administrators	Empowering Evaluator	$\bar{X}$		Self	Administrators	Empowering Evaluator	$\bar{X}$		Self	Administrators	Empowering Evaluator	$\bar{\bar{X}}$		
1	2.81	2.93	2.81	2.85	Passed	3.00	3.00	2.89	2.96	Passed	2.75	2.25	2.50	2.50	Passed	2.77	Passed
2	2.68	2.69	2.87	2.75	Passed	2.67	2.78	2.67	2.70	Passed	2.75	2.25	2.50	2.50	Passed	2.65	Passed
3	3.00	2.94	2.94	2.96	Passed	3.00	3.00	2.89	2.96	Passed	2.75	3.00	2.50	2.75	Passed	2.89	Passed
4	2.88	2.81	3.00	2.93	Passed	3.00	3.00	2.89	2.96	Passed	2.50	2.75	2.25	2.50	Passed	2.78	Passed
5	2.93	2.87	3.00	2.94	Passed	3.00	3.00	2.89	2.96	Passed	2.50	2.75	2.25	2.50	Passed	2.80	Passed
6	2.93	2.88	2.94	2.92	Passed	3.00	2.89	2.78	2.89	Passed	2.75	3.00	2.75	2.83	Passed	2.87	Passed
7	2.81	2.75	2.75	2.77	Passed	2.78	2.78	2.67	2.74	Passed	2.75	2.25	2.50	2.50	Passed	2.67	Passed
8	2.75	2.69	2.69	2.71	Passed	2.67	2.67	2.56	2.63	Passed	2.75	2.25	2.50	2.50	Passed	2.61	Passed
9	2.56	2.63	2.63	2.60	Passed	2.44	2.44	2.33	2.41	Passed	2.75	2.25	2.50	2.50	Passed	2.50	Passed
10	2.56	2.63	2.63	2.60	Passed	2.33	2.33	2.22	2.29	Passed	2.75	2.25	2.50	2.50	Passed	2.47	Passed
11	2.75	2.69	2.75	2.73	Passed	2.78	2.89	2.78	2.81	Passed	2.75	2.25	2.50	2.50	Passed	2.68	Passed
12	3.00	2.87	2.94	2.94	Passed	3.00	2.89	2.78	2.89	Passed	2.75	3.00	2.50	2.75	Passed	2.86	Passed
13	2.87	2.81	3.00	2.89	Passed	2.89	3.00	2.89	2.93	Passed	2.75	2.25	2.50	2.50	Passed	2.77	Passed
14	3.00	2.88	3.00	2.96	Passed	3.00	3.00	2.89	2.96	Passed	2.75	2.25	2.50	2.50	Passed	2.81	Passed
15	2.75	2.69	2.75	2.73	Passed	2.67	2.78	2.67	2.70	Passed	2.75	3.00	2.50	2.75	Passed	2.73	Passed

Table 4.15 (continued)

No.	Mean and the Evaluation Results of Science Teachers' Abilities in Instructional Management after Being Developed as Set in the Evaluation Model														3-Aspect Average	3-Aspect Evaluation Results
	Teaching Preparation				Evaluation Results	Instructional Processes				Evaluation Results	Records, Reports, Storage, Utilization				Evaluation Results	
	Self	Administrators	Empowering Evaluator	$\bar{X}$		Self	Administrators	Empowering Evaluator	$\bar{X}$		Self	Administrators	Empowering Evaluator	$\bar{X}$		
16	2.81	2.75	2.69	2.75	Passed	2.78	2.89	2.78	2.81	Passed	3.00	2.50	2.75	2.75	Passed	2.77	Passed
17	2.81	2.75	2.69	2.75	Passed	2.78	2.89	2.78	2.81	Passed	2.25	2.75	2.50	2.50	Passed	2.69	Passed
18	2.81	2.75	2.69	2.81	Passed	2.78	2.89	2.78	2.81	Passed	2.78	2.25	2.50	2.50	Passed	2.61	Passed
19	2.75	2.69	2.75	2.73	Passed	2.55	2.67	2.56	2.59	Passed	2.75	2.25	2.50	2.50	Passed	2.61	Passed
20	2.75	2.69	2.69	2.71	Passed	2.56	2.67	2.55	2.59	Passed	2.75	2.25	2.50	2.50	Passed	2.60	Passed
21	2.81	2.75	2.68	2.75	Passed	2.78	2.89	2.78	2.81	Passed	2.75	2.25	2.50	2.50	Passed	2.69	Passed
22	2.81	2.81	2.87	2.83	Passed	3.00	3.00	2.89	2.96	Passed	2.50	3.00	2.75	2.75	Passed	2.85	Passed
23	2.75	2.69	2.75	2.73	Passed	2.56	2.67	2.56	2.59	Passed	2.75	3.00	2.50	2.75	Passed	2.69	Passed
24	2.81	2.75	2.69	2.75	Passed	2.56	2.67	2.56	2.59	Passed	2.75	2.25	2.50	2.50	Passed	2.61	Passed
25	2.75	2.63	2.56	2.65	Passed	2.67	2.78	2.67	2.70	Passed	2.75	2.50	2.25	2.50	Passed	2.62	Passed
26	2.75	2.68	2.62	2.68	Passed	2.56	2.67	2.56	2.59	Passed	2.75	2.25	2.50	2.50	Passed	2.59	Passed
27	2.75	2.63	2.56	2.64	Passed	2.56	2.67	2.56	2.59	Passed	2.75	2.25	2.50	2.50	Passed	2.58	Passed
28	2.75	2.63	2.56	2.64	Passed	2.56	2.67	2.56	2.59	Passed	2.75	2.25	2.50	2.50	Passed	2.58	Passed
29	2.75	2.68	2.56	2.67	Passed	2.44	2.56	2.44	2.48	Passed	2.75	2.50	2.25	2.50	Passed	2.55	Passed
30	2.75	2.75	2.56	2.67	Passed	2.44	2.56	2.44	2.48	Passed	2.75	2.25	2.50	2.50	Passed	2.56	Passed

According to Table 4.15, it was found that teachers themselves, administrators, an empowering evaluator evaluated the abilities of science teachers in instructional management enhancing the abilities in reading, critical thinking, and writing of students after being developed at a quite similar level. When comparing the average score of science teachers' evaluation results individually with the evaluation criteria, there were 30 science teachers or 100.00 percent that passed three-aspect evaluation criteria which were teaching preparation, instructional processes, and summary records, reports, storage, and learning outcome utilization.

4.3.5 The findings gained from comparing the abilities in instructional management of the science teachers (before-after) developed in the instruction management

The findings gained from comparing the abilities in science teachers' instructional management enhancing the abilities in reading, critical thinking, and writing of basic education students before and after being developed. This is performed by themselves, administrators, and an empowering evaluator as evaluators. The findings were illustrated in Table 4.16.

Table 4.16 Mean, Standard Deviation, and Mean Difference of the Abilities in Instructional Management both before and after Development Evaluated by Themselves, Administrators, and an Empowering Evaluator as Evaluators

Abilities in Instructional Management	**Before Development**		**After Development**		**Wilcoxon-Signed Rank Test**
	$\bar{X}$	**S.D**	**$\bar{X}$**	**S.D**	
Teaching preparation	1.72	0.21	2.77	0.11	4.783**
Instructional processes	1.66	2.27	2.73	1.87	4.782**
Summary records, reports, storage, and learning outcome utilization	1.64	0.37	2.56	0.11	4.785**
Total: Three Aspects	**1.67**	**0.26**	**2.68**	**0.11**	**4.802****

**P < 0.01

According to Table 4.16, it was found that the science teachers possessed the abilities in instructional management enhancing the abilities in reading, critical thinking, and writing of basic education students both in an overall picture and in each aspect. The

average after development was higher than that before development based on the evaluation model. The difference was statistically significant at 0.01 level.

4.3.6 The findings on attitudes toward science teachers' instructional management

The evaluation results of the attitudes of the science teachers toward the instructional management that enhanced the abilities in reading, critical thinking, and writing of basic education students were shown in Table 4.17

Table 4.17 Mean and Standard Deviation of Science Teachers' Opinions Gained from Questioning Science Teachers about Their Feelings toward the Instructional Management Enhancing the Abilities in Reading, Critical Thinking, and Writing of Basic Education Students

No.	Question Issue	Level		Interpretation
		$\bar{X}$	S.D	
1	Give information to teachers in diagnosing students in order to group and develop as set at quality levels.	4.77	0.43	Extremely high
2	Enhance teachers to possess teaching goals and students to possess studying goals.	4.67	0.48	Extremely high
3	Enhance teachers to manage instruction covering curriculum indicators.	4.63	0.49	Extremely high
4	Integrate instructional management with learning content areas contributing to no repetition.	4.70	0.47	Extremely high
5	Enhance competency development among students individually.	4.80	0.41	Extremely high
6	Enhance students to learn from authentic practice.	4.83	0.38	Extremely high
7	Enhance students to develop their abilities in reading, critical thinking, and writing logically.	4.70	0.47	Extremely high
8	Be able to reflect real abilities of students.	4.67	0.48	Extremely high
9	Enhance teachers and those relevant to participate in instructional management.	4.67	0.48	Extremely high

Table 4.17 (continued)

No.	Question Issue	Level		Interpretation
		$\bar{X}$	S.D	
10	Enhance teachers to use questions to stimulate students in creating their own knowledge body.	4.83	0.38	Extremely high
11	Enhance teachers to get ready in changing their teaching methods to be in accordance with the Basic Education Curriculum B.E. 2551.	4.70	0.47	Extremely high
12	Possess flexibility in scoring students' work which contributed to fairness among students.	4.83	0.38	Extremely high
13	Help link learning in classrooms with real lives.	4.67	0.48	Extremely high
14	Teachers and those relevant were supposed to give precedence to developing students' quality in accordance with the Basic Education Curriculum B.E. 2551.	4.77	0.43	Extremely high
	Average Total	**4.73**	**0.38**	**Extremely high**

According to Table 4.17, it was found that the science teachers expressed their feelings toward the instructional management enhancing the abilities in reading, critical thinking, and writing of basic education students in both an overall picture and every item at an extremely high level.

4.3.7 The quality evaluation results of the evaluation model for developing instructional management assessed by the science teachers who utilized the model

The quality evaluation results of the evaluation model for developing science teachers' instructional management enhancing the abilities in reading, critical thinking, and writing of basic education students were assessed by the science teachers who utilized the evaluation model. They covered four dimensions which were (1) utility, (2) feasibility, (3) ethical propriety, and (4) accuracy as shown in Tables 4.18-4.21.

Table 4.18 Mean and Standard Deviation of Science Teachers' Opinion Levels toward the Quality of the Evaluation Model in Terms of Utility

No.	Quality Issue	Opinion Level		Interpretation
		$\bar{X}$	S.D	
1	Offer information responding to the needs of science teachers and those relevant.	4.73	0.45	Extremely high
2	Enhance understanding toward evaluation methods and evaluation result utilization in developing instructional management.	4.67	0.48	Extremely high
3	Realize the necessity in applying evaluation and utilizing the evaluation results to develop instructional management.	4.70	0.47	Extremely high
4	Contribute to changes in methods of instructional management enhancing the abilities in reading, critical thinking, and writing.	4.73	0.45	Extremely high
5	Build confidence among teachers in their self-evaluation and application of the evaluation results into developing the instructional management.	4.57	0.50	Extremely high
6	The results gained from instructional management evaluation and development would be feedback information for teachers and those relevant to determine their own direction.	4.73	0.45	Extremely high
	Total	**4.69**	**0.42**	**Extremely high**

According to Table 4.18, it was found that the science teachers thought that the model possessed the utility standard at an extremely high level both in an overall picture and in each item.

Table 4.19 Mean and Standard Deviation of Science Teachers' Opinion Levels toward the Quality of the Evaluation Model in Terms of Feasibility

No.	Quality Issue	Opinion Level		Interpretation
		$\bar{X}$	S.D	
1	Be able to authentically practice in evaluating to apply the evaluation results to develop science teachers' instructional management.	4.70	0.47	Extremely high
2	Contain a clear operational plan.	4.53	0.51	Extremely high
3	Be feasible to gain cooperation from evaluators and those evaluated in order to apply the evaluation results to develop.	4.67	0.48	Extremely high
4	The evaluation model was able to be used to evaluate science teachers practically.	4.83	0.38	Extremely high
5	There was sufficient supporting resource.	4.33	0.48	Extremely high
6	The evaluation results were feasible to gain acceptance from those relevant.	4.83	0.38	Extremely high
7	The yield gained from utilizing the evaluation model for developing was worth.	4.80	0.41	Extremely high
	Total	**4.67**	**0.34**	**Extremely high**

According to Table 4.19, it was found that the science teachers thought that the model was feasible at an extremely high level both in an overall picture and in each item.

Table 4.20 Mean and Standard Deviation of Science Teachers' Opinion Levels toward the Quality of the Evaluation Model in Terms of Ethical Propriety

No.	Quality Issue	Opinion Level		Interpretation
		$\bar{X}$	S.D	
1	Enhance responsibility of science teachers, administrators, and those relevant to cooperate in evaluating and utilizing the evaluation results to develop instructional management.	4.63	0.49	Extremely high
2	Be confident that the evaluation results were accurate and fair.	4.57	0.50	Extremely high
3	Enhance operation in educational institutes.	4.80	0.41	Extremely high
4	Operating in this manner did not build conflict between evaluators and those evaluated.	4.70	0.47	Extremely high
5	Evaluation and development processes of instructional management did not violate individual rights of those evaluated who were pleased to participate in being developed if their evaluation results did not meet the criteria.	4.73	0.45	Extremely high
	Total	**4.69**	**0.31**	**Extremely high**

According to Table 4.20, it was found that the science teachers thought that the model was ethically appropriate at an extremely high level both in an overall picture and in each item.

Table 4.21 Mean and Standard Deviation of Science Teachers' Opinion Levels toward the Quality of the Evaluation Model in Terms of Accuracy

No.	Quality Issue	Opinion Level		Interpretation
		$\bar{X}$	S.D	
1	Contribute to development results of instructional management in reading, critical thinking, and writing in science correctly.	4.80	0.41	Extremely high
2	Be in accordance with the Basic Education Curriculum B.E. 2551 and the National Education Act B.E. 2542	5.00	0.00	Extremely high
3	Be constructed on the basis of accurate and reliable theoretical concepts.	4.63	0.49	Extremely high
4	Evaluation processes and evaluation result utilization for developing instructional management were clear and could collect data and results reliably.	4.60	0.50	Extremely high
5	Evaluation criteria were clear enough to be used to judge the evaluation results correctly.	4.67	0.48	Extremely high
	Total	**4.74**	**0.31**	**Extremely high**

According to Table 4.21, it was found that the science teachers thought that the model was accurate at an extremely high level both in an overall picture and in each item.