# CHAPTER 2

## Literature Review

The study entitled “the Evaluation Model for Developing Instruction Management of Science Teachers in Reading, Critical Thinking, and Writing of Students in Basic Education Institutes” was conducted on the basis of researching on relevant documents and research as shown in the following concepts.

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## 2.1 Instructional Management Based on the Basic Education Core Curriculum B.E. 2551

### 2.1.1 Definition

Instructional management was considered the transfer of knowledge, skills, and various attitudes in a manner that instructors and receivers interacted with one another during the learning process. According to the Basic Education Core Curriculum B.E. 2551, the instructional management held to its principle that learners were the most important ones. The following educators defined the instructional management as follows:

Chaiwat Sutthirat (2007) defined the student-centered instructional management in that it provided learning experience aiming to develop human beings and their lives to possess learning experience in full capacity in line with their proficiency, interest, and needs. Learners were independent in constructing their own knowledge body, learning happily via thinking process and authentic practice, participating physically,

intellectually, emotionally, and socially, and playing a role in learning activities much more than instructors.

Prawet Wasee (2000) defined the student-centered instructional management in that it was considered the learning management emphasizing on learners' real lives as learning denomination. This helped the learners to construct intellectual, understand themselves and the world, possess economic, mental, and social abilities, live together in balance, constantly and happily learn, and possess learning power.

Sumon Amornwiwat (2000) defined the student-centered instructional management in that it was considered the learning which learners were independent to develop their potential of humanity fully, happily learn, and authentically practice in line with their interest. That was the case with the motto "Teach them to do; lead them to think; take action; learn to teach ourselves; consider truth as major and subjects as minor parts.

Tisana Khammani (2002) mentioned that the student-centered instruction was considered a situational management of instruction which allowed learners to play a role and participate physically, intellectually, emotionally, and socially in activities or learning process in that the learners played a role much more than the instructors.

In conclusion, the instructional management in line with the Basic Education Core Curriculum B.E. 2551 aiming at a student-centered approach was considered the instructional management preparing situations so that the learners could authentically practice. The learners could employ thinking process in constructing the knowledge body by themselves based on their skills and interests. This allowed them to possess learning happily as their physical, intellectual, emotional, and social role was much more than that of the instructors.



### 2.1.2 Relevant Concepts and Theories

General instructional management consisted of three parts which were (1) instructional process, (2) instructional contents, and (3) instructional outcomes. This also contained knowledge, understanding, skills, attitudes toward learning strands, and learning process or methods as shown in Figure 2.1.

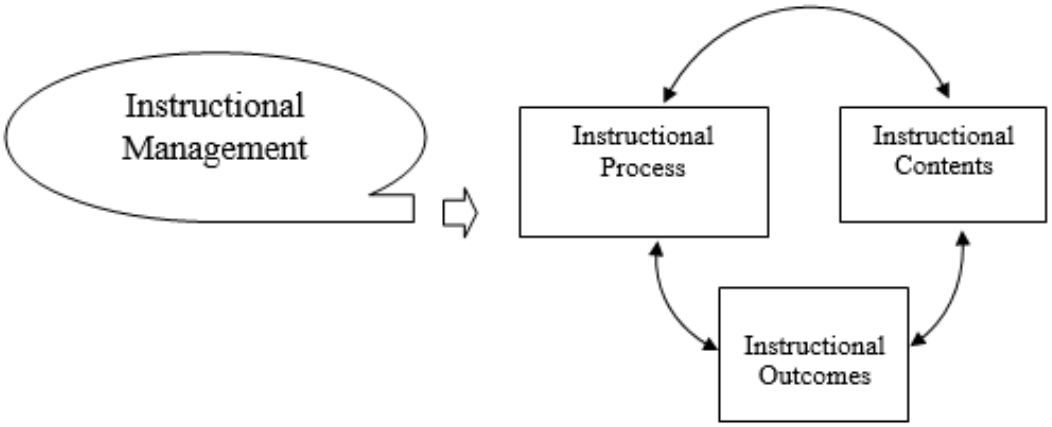


Figure 2.1 Key Components of Instructional Management
(Tisana Khammani et.al: 2001)

According to Figure 2.1, it expressed the key components of the instructional management that the instructors provided various contents for learners so that they could learn. Good and appropriate teaching process or methods in line with the learning strands could cause the learners to learn well in those contents clearly; learning along with the learning process occurred simultaneously. There were certain concepts and theories relevant to learners' learning which could be considered a part of the instructional process as illustrated below.

**(1) Constructivism Theory**

The constructivism theory was based on Piaget's concept illustrating intelligence development of individuals consisting of two major processes which were an assimilation process and an accommodation process. These processes adapted the former schemas so that they were in accordance with the new environment.

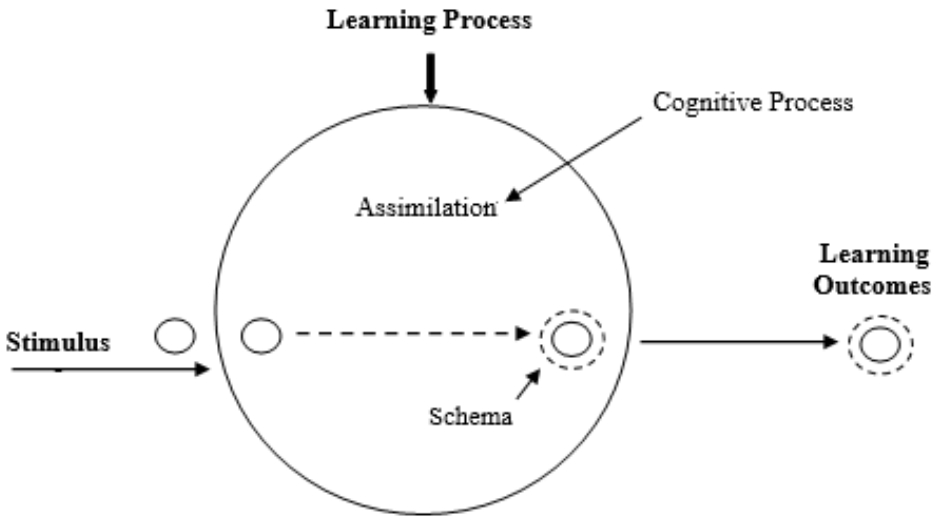


Figure 2.2 Learning Processes via Assimilation (Tisana Khammani et.al: 2001)

According to Figure 2.2, it could be explained that when individuals perceived stimuli (supposing that they were O) into their brains, learning would occur on condition that there was a brain handling in linking those stimuli with their existing schemas that had been collecting since they were born. The processes that the existing schemas assimilated with new stimuli or that new knowledge connected with former knowledge perfectly and meaningfully within those individuals contributed to their equilibrium. This helped them understand the experience or learned messages and be able to explain and express based on their understanding as they thought and constructed the meanings by themselves.

**(2) Bruner's Intelligence Development Theory**

Following Piaget, Bruner (1963) was a psychologist who was interested in the intelligence development. He believed that human beings selected to perceive what they were interested and learning processes emerged from discovery learning which consisted of key concepts as follows:

2.1 The structure of knowledge was arranged to relate and conform to children's intelligence development. This influenced their learning.

2.2 Curricular and instructional management which was appropriate to a learners' readiness level and conformed to their intelligence development could enable their learning effectively.

2.3 Intuition was considered independent logic which could develop creative thinking.

2.4 Internal motivation was considered a key factor contributing to learners' success in learning.

2.5 The theory of intelligence development among human beings was classified into three main stages which listed as follows:

(1) Enactive stage: this learning stage employed senses to perceive various objects. Doing something enabled children to learn well; learning was resulted from doing.

(2) Iconic stage: this dealt with children's internal imagery. They could learn from the images which stood for authentic objects.

(3) Symbolic stage: this dealt with learning objects that were complicated or abstracts.

2.6 Learning could occur from human beings' abilities in constructing concepts or classifying various objects properly.

2.7 The most fruitful learning was the learning allowing learners to discover learning by themselves.

**(3) Klausmeier's Concept of Processing Data**

Klausmeier (1985) mentioned that human beings' learning could be compared with brain operation and computer operation. It consisted of the following operational steps.

3.1 Input via devices or data receivers

3.2 Encoding via instruction sets or software

3.3 Output via devices



Information processing started when human beings perceived stimuli through five senses. Then, the data would be recorded as short-time memory depending on two elements which were recognition and the attention of those perceived those stimuli. Normally, individuals selected to perceive what they had known or what they were interested in. The information processing of brains was controlled and managed via a software when compared with a computer. The control and management of brains toward their information processing was considered metacognition ability. This ability

allowed us to control and select which were to be recorded as long-term memory. In order to assist the memory, there were various techniques that could be used, such as word grouping or repetitive recitation, and facilitated the memory which could be used later. The data needed to be processed and changed by encoding in order to be stored in the long-term memory classified into two types which were semantic memory and affective memory. The individuals could recall and use those data when necessary by decoding from the long-term memory. This could influence response generators which motivated or drove them to mobilize or speak in response to their surroundings. Tisana Khammani (2002) mentioned that the information processing theory was beneficial for learning management as listed below.

(1) Presentation of the stimuli which learners had previously known or possessed information could assist them to pay attention in perceiving those stimuli. This allowed the instructors to connect to new objects relevant to those stimuli.

(2) As for learning management, teachers were supposed to provide the learning stimuli which were in line with learners' interest. This enabled the learners to perceive those stimuli and store them in their short-term memory.

(3) If the teachers needed the learners to perceive the stimuli in their long-term memory, various techniques would step in to help, such as repetitive recitation or grouping what needed to be memorized, in order to memorize easily.

(4) If the teachers needed the learners to memorize any content in a long term, that content needed to be encoded in order to be put into the long-term memory. Encoding methods could be performed differently, such as repetitive recitation, revision, and elaborative operation process which connected new knowledge with former knowledge.

(5) The information stored in short-term or long-term memory could be drawn and used by stimulating verbal or physical behavior. However, certain individuals could not benefit from the information stored due to the fact that they could not draw it to the level of consciousness.

(6) That the learners could control their thinking process could enable them to control their brain functions. Therefore, they could achieve in their learning.

In conclusion, the instructional management that was in line with the Basic Education Core Curriculum B.E. 2551 was considered the instructional management on the basis of constructivism theory, Bruner's (1963) intelligence development theory, and Klausmeier's (1985) information processing theory. These theories of instructional management aimed at student-centered approach which allowed learners to be able to think and construct knowledge by themselves facilitated by teachers.

### 2.1.3 Measurement and Evaluation Concepts

The instructional management in line with the Basic Education Core Curriculum B.E. 2551 determined that learners could learn as determined in learning standards/indicators in all eight learning strands. They were supposed to possess the abilities in reading, critical thinking, and writing. Moreover, they possessed desired attributes and attended student development activities. The measurement and evaluation were settled along with the instructional management in order for the learners to possess quality as stated in the curriculum as shown in Figure 2.3.

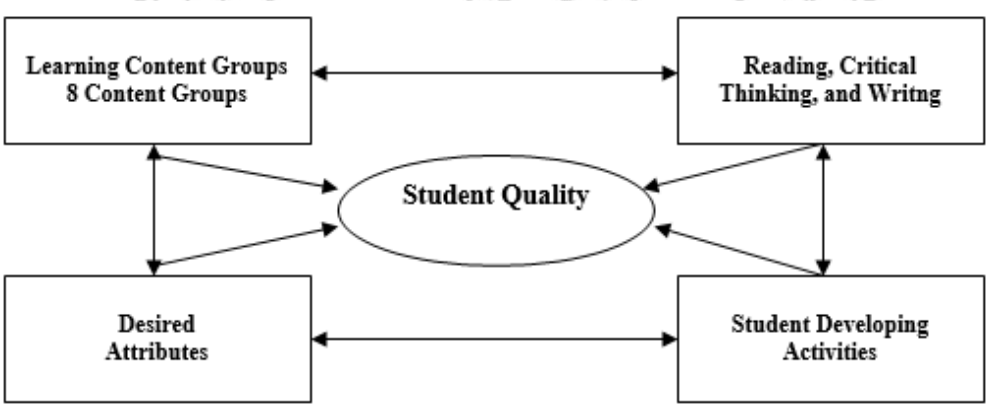


Figure 2.3 Relation of Measurement and Evaluation Elements



According to Figure 2.3, the relation of measurement and evaluation elements in line with the Basic Education Core Curriculum B.E. 2551 was presented in each aspect as follows:

(1) Learning Outcome Measurement and Evaluation of Each Learning Content Group

Instructors measured and evaluate learners on a basis of each subject in line with the indicators of fundamental subjects and learning results of additional subjects as determined in learning units. The instructors employed various methods from various data sources in order to object evaluation results that reflected learners' authentic knowledge and abilities. This could be achieved by constantly measuring and evaluating simultaneously with the instructional management. They had to observe the learners' development, behavior, learning behavior, and activity attendance and focus on authentic evaluation, such as operational evaluation, project evaluation, portfolio evaluation, various tests, which could be held alongside in balance. They had to give more precedence to the evaluation during a study rather than year-end/semester-end evaluation. This could be used in order to evaluate class upgrading and graduation at various levels.

(2) Reading, Critical Thinking, and Writing Evaluation

The reading, critical thinking, and writing evaluation were considered competency evaluation of the learners in reading books, documentations, and various media in order to seek knowledge as well as increase experience and pleasure. The content read was then applied and analyzed leading to expressing opinions, synthesizing, creating various solutions, and transferring the thoughts via writing with accurate language usage. This could be supported with reasonable and hierarchical presentation which could generate understandings among readers clearly in line with the abilities of each class level. On condition that the learners possessed visual impairment or others relevant affecting reading ability, educational institutes could modify evaluation methods so that they were appropriate to their target groups. The educational institutes had to operate the reading, critical thinking, and writing evaluation constantly and summarize per year or per semester in order to diagnose and employ the data gained to develop learners and upgrade their classes and graduation.

(3) Desired Attribute Evaluation

The desired attribute evaluation was considered the evaluation, which was needed to appear among the learners. Societies desired to see these characteristics in terms of virtue, morality, values, good sense, and being to live together with others happily as Thai citizens and global citizens. The Basic Education Core Curriculum B.E. 2551 determined eight desired characteristics. Therefore, the evaluation of each characteristic had to perform. The evaluation results were then collected from all parties of evaluators and several data sources in order to obtain the data which were used to summarize per year or per semester and to develop the learners and upgrade their classes and graduation.

(4) Student Development Activity Evaluation

The student development activity evaluation was considered the evaluation of activity performance, student performance, and time the students attended as determined by the criteria of each activity. The data obtained would be used to upgrade their classes and graduation.

As for this research, it emphasized on developing the abilities in reading, critical thinking, and writing to develop learners' competency so that it could reach the goals of the Basic Education Core Curriculum B.E. 2551.

**2.2 Instructional Management Enhancing the Abilities in Reading, Critical Thinking, and Writing in Accordance with the Basic Education Core Curriculum B.E. 2551**



The instructional management of the Basic Education Core Curriculum B.E. 2551 was determined to possess the reading, critical thinking, and writing measurement and evaluation in line with the learners' competency based on the curriculum regarding critical thinking and thinking communication through reading via reasonable writing. Therefore, the development of students' abilities in reading, critical thinking, and writing had to be in line with the measurement and evaluation as detailed as the concepts of reading, critical thinking, and writing which were related among one another. The details of each aspect were shown as follows:

### 2.2.1 Reading Concepts

Banlue Phreksawan (1991), Yuppadee Songthong (2002), Prathern Mahakhan (1987), Sanit Tangtawee (1995), Mingkwantham Chamcheunmuang (2001), the Bureau of Academic Affairs and Educational Standards (2003), and the Institute for Promoting of Teaching Science and Technology (2014) briefly mentioned that reading was a brain process in interpreting symbols and defining their definitions which contributed knowledge, understanding, and rational thinking. Therefore, the reading was considered the communication between writers and readers. In order to understand the authors' thoughts, the skills and processes in word analysis, definition, interpretation, and expansion were employed through effective thinking and reading process. The readers needed to understand authors' goals and thoughts, be able to identify main ideas from the passages, be able to express opinions toward the passages, and be able to apply knowledge and ideas gained from the reading to employ in their daily lives in order to evaluate the passage values. The Department of Curriculum and Instruction Development (2003) classified reading into seven methods as listed below.

(1) Tentative reading: it was used to explore whether that particular book was to be read in details onward or not, and whether it was borrowed, bought, copied, or duplicated only at the needed parts. Tentative reading would focus on titles, authors, contents, introduction, and certain chapters or lessons in order to consider messages, contents, and indexes to identify topics needed whether they could be found or not.

(2) Reading for gathering concepts: it was used to read in order to prepare brief records for later revision or summarize key contents. This could be achieved via practicing and identifying key words, sentences, and main ideas in order to be able to summarize the concepts of each paragraph of the passage.

(3) Patrolling reading: it was a combination of the first and the second methods merged with partial reading only at important sections. This was like a scientist using a microscope to see a particular particle in order to identify its elements.

(4) Reading for searching: this reading relied much on the third method, but it did not focus only on certain points as searching needed to cover every chapter and section thoroughly. If any points were ignored, it could lead to some mistakes. For

example, in reading short stories, passages sent to a contest, or autobiography, it was needed to read from the beginning to the end carefully and informatively.

(5) Analytical or interpreting reading: this analytical reading could be used to analyze elements of words, phrases, word selection in a sentence, idioms, author's purposes, or implication. The fourth method could be used along with this method in that careful reading was applied first in order to gain complete information. Then, it was time to differentiate the definition and importance whether it related to other elements or not.

(6) Reading for information: this was used when reading several books or documentations in order to identify information about the same topic from many sources, compare, select, and take only needed parts for further usage. This reading type was mostly used in preparing reports, theses, or research.

(7) Critical reading: when using this method, the readers had to possess the aforementioned reading methods as this reading type had to apply all of those methods together efficiently before acquiring wisdom. It was considered using a hypothesis to identify reasons in logic, definition, and reality. Those who used this reading method needed to read a lot and be brave enough to tell whether that particular message was right or wrong in which aspect.

It could be seen that there were several methods of reading depending on reading objectives and reading material characteristics. The documentations aimed at giving knowledge consisting of textbooks, books, and references; the documentations aimed at entertaining, consisting of novels and short stories; the documentations aimed at giving both knowledge and entertainment consisting of documentary; the documentations aimed at presenting information and events consisting of news; the documentations aimed at communicating knowledge or entertainment with individuals consisting of signs, leaflets, and pamphlets. Readers could select appropriate methods to apply to what they read. The aforementioned reading method types of the Department of Curriculum and Instruction Development were in line with those of Bloom's learning behavior (1971) as shown in Table 2.1.

Table 2.1 Reading Methods in Line with Bloom's Learning Behavior

| Reading Methods | Bloom's Learning Behavior |
|---|---|
| Tentative reading | Knowledge/Memory |
| Reading for gathering concepts | Understanding |
| Patrolling reading | |
| Reading for searching | |
| Analytical or interpreting reading | Analysis |
| Reading for information | |
| Critical Reading | Value evaluation |

According to Table 2.1, various reading methods were emerged from individual's learning at a basic stage, such as memory and understand. As for a higher stage, an analysis and value evaluation were applied. For example, in critical reading, brains would use relevant thinking processes. Therefore, reading and critical thinking had to cooperate.

### 2.2.2 Critical Thinking Concepts

According to the document synthesis of Tisana Khammani (2001), Kringsak Chareonwongsak (2003), Watchara Laoriendee (2004), Lakhana Sariwat (2006), Praphansiri Susaorat (2008), Chawan Paerattanakul (2009), Supaporn Jandokmai (2010), Phatcharawalai Meesap (2011), Bloom (1956), and Good (1973), the researcher could conclude that critical thinking referred to the abilities in searching for factual and interpreting information by means of grouping in order to classify, group similar objects in the same group, and compare information about each group. After that, key information was selected and identified the relationship of information selected on how it was connected and which concepts were used to connect it together. This could be performed by referring to evidence on the basis of knowledge and understanding in the concepts of what was being analyzed. Then, reasonable summary was obtained as explained in the following parts of behavior and elements of critical thinking.

#### (1) Behavior Identifying Critical Thinking Abilities

Watchara Laoriendee (2004) mentioned that critical thinking behavior was an individuals' expression indicating the abilities in examining, classifying, managing data

studied, searching for reasons and evidence to be used in summarizing the data, possessing careful problem-solving, and connecting existing knowledge systematically.

**(2) Critical Thinking Components**

The educators both domestic and international summarized the critical thinking components as follows. Tisana Khammani (2001) saw that critical thinking steps consisting of (1) data collection for classification, (2) criteria determination of classification, (3) similar data grouping, (4) data comparison in each group, and (5) relationship identification among factual and important data. Marzano (2001) expressed that identifying relationship had to be supported with references of concepts. Bloom (1956) and Kringsak Chareonwongsak (2003) regarded that individuals who possessed critical thinking skills had to possess knowledge and understanding in the topic which would be analyzed preliminarily as detailed in Table 2.2.

Table 2.2 Critical Thinking Components

| Educators | Critical Thinking Components |
|---|---|
| Kringsak Chareonwongsak (2003) | 1) Knowledge and understanding in a topic analyzed<br>2) Interpretation a topic which was being analyzed<br>3) Questioning which led to the search for truth<br>4) Identification of reasonable relationship |
| Tisana Khammani (2001) | 1) Overall data collection for systematic organization<br>2) The determination of dimensions or aspects analyzed<br>3) Determination of groups, dimensions, or aspects analyzed<br>4) Data distribution in each group<br>5) Ranking of distributed data in each group<br>6) Data comparison in each group |
| Bloom (1956) | 1) Basic knowledge on a topic analyzed<br>2) Basic understanding on a topic analyzed<br>3) Basic knowledge application in daily lives<br>4) Analysis of importance, relationship, and concepts |
| Marzano (2001) | 1) Classification<br>2) Grouping<br>3) Connection<br>4) Summary<br>5) Application |

According to Table 2.2, it could be concluded that critical thinking consisted of six aspects as follows:

(1) Basic knowledge on a topic analyzed could be measured from recalling passages learned or searched from subject contents which were key concepts and learners' former experience, such as identifying definition, identifying operational steps, and classifying, etc.

(2) Understanding a topic analyzed could be measured via identifying main ideas of the passages, such as interpreting from former contents to new ones. Interpreting from former contents could be done in a form of brief summaries in their own language while expansion from fact could be measured from anticipating events or passages which were event trends.

(3) Basic knowledge application in daily lives could be measured from the abilities in applying knowledge and understanding gained from the study to use in real situations or similar simulated situations.

(4) Component analysis of daily situations from factual data could be measured from grouping, distributing, and comparing groups.

(5) Relation analysis of factual data from daily situations could be measured from connecting the data of each group of passages analyzed.

(6) Critical thinking of concepts referring to data relationship which was considered fact from daily situations could be measured via referring to the key concepts or principles of the passages in order to guarantee the data relationship.

According to the aforementioned parts, it could be summarized as shown in Figure 2.4.

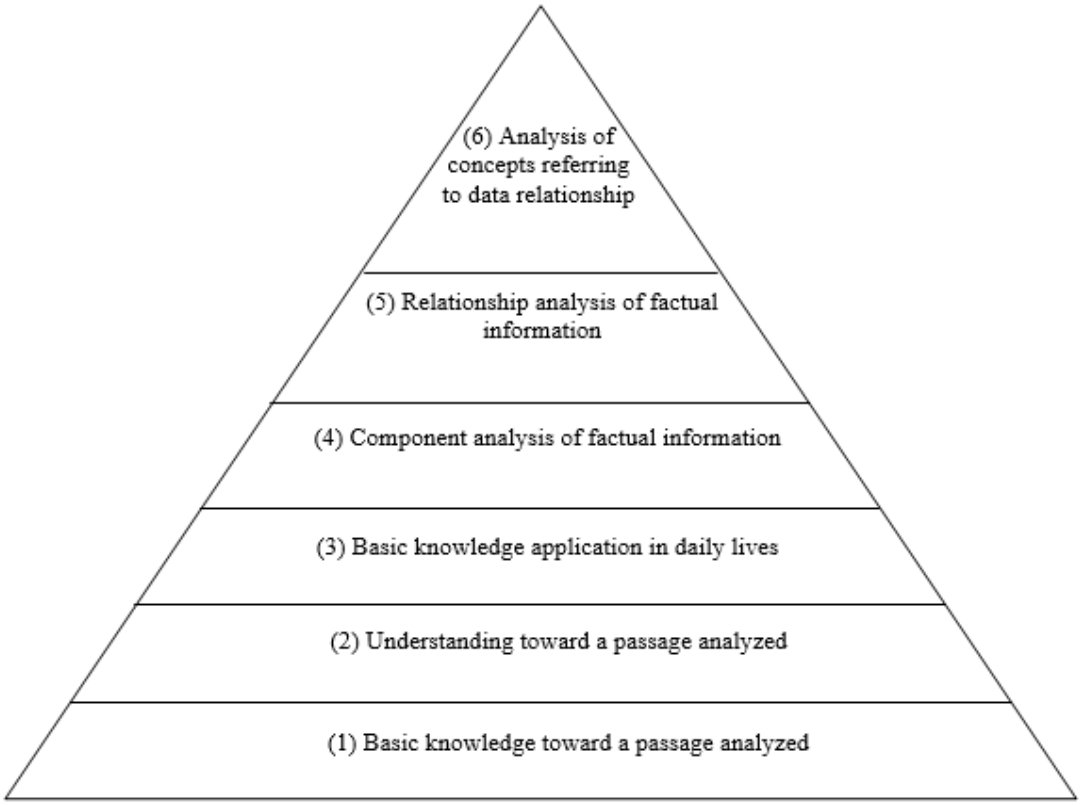


Figure 2.4 Summary of Critical Thinking Components

### 2.2.3 Sensibly Critical Thinking Concepts

According to documentation synthesis of Suphannee Suwanjarut (2000), Sunisa Lawanwong (2000), Somsak Sinthurawet (2002), the Royal Institute (2003), Chawewan Kaewsaiha et.al. (2003), Winai Kumsuwan (2005), Suwit Moonkham et.al. (2004), Lakkhana Siriwat (2004), Praphansiri Susaorat (2008), Chawan Paerattankul (2009), Supaporn Jandokmai (2010), Phatcharawalai Meesap (2011), Beyer (1985), Ennis (1985), Norris (1989), and Yager (1993), the researcher summarized that sensibly critical thinking was brain abilities in considering reasonably with academic evidence and experience in order to consider whether it was right, convincing, or performed or not. This would lead to practice, solve problems, or generate new knowledge.

Moreover, the educators both domestic and international, such as Ennis (1985), Dressel and Mayhew (1957), Praphansiri Susaorat (2005), and Watson and Glaser (1964), synthesized the components of sensibly critical thinking. When the researcher considered minor components, it was found that it was a thinking skill followed the

critical thinking process, especially data selection, data value judgement, and summary, which led to practice. The details were shown in Table 2.3.

Table 2.3 Components of Sensibly Critical Thinking

| Educators | Components of Sensibly Critical Thinking |
|---|---|
| Ennis (1985) | 1) Be able to determine or indicate a question or problem issues.<br>2) Be able to analyze conflicts or argument and compare data.<br>3) Be able to question challengingly which stimulated curiosity and answer clearly.<br>4) Be able to consider the reliability of data whether it was from experts or other sources.<br>5) Be able to observe and make a decision on data by themselves.<br>6) Be able to break down major concepts into minor ones.<br>7) Be able to summarize based on situations.<br>8) Be able to evaluate and consider data in order to judge on their values.<br>9) Be able to define words and judge their meaning.<br>10) Be able to indicate hypothesis.<br>11) Be able to interact with others.<br>12) Be able to make a decision leading to practice. |
| Dressel and Mayhew (1957) | 1) Abilities in selecting problems<br>2) Abilities in selecting information<br>3) Abilities in indicating initial agreement<br>4) Abilities in determining and establishing hypothesis<br>5) Abilities in summarizing reasonably |
| Praphansiri Susaorat (2005) | 1) Definition/Clarification of problems<br>2) Data collection/analysis<br>3) Synthesis<br>4) Evaluation and data judgement consideration |
| Watson and Glaser (1964) | 1) Abilities in reference or summary<br>2) Abilities in accepting the initial agreement<br>3) Abilities in safety<br>4) Abilities in evaluating conflicts |

According to Table 2.3, it could be summarized that sensibly critical thinking components consisted of (1) problem definition, (3) data collection, (3) data analysis and selection, (4) summary referring to conditions and agreement, and (5) evaluation and consideration of judgement data.

According to the summary of sensibly critical thinking components of the aforementioned educators, it could be seen that critical thinking was a component of sensibly critical thinking in that the sensibly critical thinking needed to rely on the data gained from the analysis in making decision.

### 2.2.4 Writing Concepts

According to the documentation synthesis of Reung-urai Intaraprasert and Anek Ukkarabandit (1988), Tinprapa Jeraphan and Ong-art Olom (1997), Nitima Phromkasetrin (1997), Phatcharee Manawanitchareon (1999), Kanlaya Sahachaikosee (), Kaneungnit Jan-O (2002), Chamna Buchasook (2003), Supawan Mongphet (2004), and Plernta Mosakul (2004), the researcher could summarize that writing transferred knowledge and thoughts through characters, symbols, and language methodology in order for the receivers to comprehend what the senders needed. The details were shown as follows:

(1) Writing Concepts

According to writing concepts of Saenee Wilawan (2001), it could be summarized that the writing concepts needed to be paid serious attention in order to gain knowledge and skills and avoid mistakes. Therefore, it was necessary to possess six writing concepts as follows:

1.1 Possess data accuracy and accurate, appropriate, and timely language.

1.2 Possess clarity in using a word with apparent meaning, including clear sentences and idioms, in order for the readers to comprehend in line with the objectives.

1.3 Possess conciseness and simplicity via the selection of easy-to-understand and precise words in order to gain clarity and conciseness without making the readers bored.

1.4 Construct impression via word usage that stimulated images, emotions, impression, profound meaning, and persuasion of reading.

1.5 Possess language beauty via polite and careful language both idioms and contents without being embarrassed.

1.6 Possess responsibility via expressing opinions reasonably and generating knowledge and attitudes that benefited readers.

(2) Writing Importance

Writing was important for human beings, especially in the current world of prosperity which gave more importance to writing. The importance of writing could be summarized as follows:

2.1 Writing was a type of communication.

2.2 Writing expressed human beings' wisdom.

2.3 Writing was a tool used to transfer intellectual heritage.

2.4 Writing was a tool used to construct harmony and prosperity. On the contrary, it could be used as a tool for destruction.

### 2.2.5 Relation of Reading, Critical Thinking, and Writing

Writing was a process needed to perform constantly following reading and critical thinking. Moreover, critical thinking about what read based on the aforementioned educators' concepts was considered sensibly critical thinking which was in line with the reading concept as stated in PISA frames consisting of reading messages, publishing media, and electronic media from educational situations or contexts. This could be performed via identifying key words of the passages, interpreting, identifying main ideas from what read, and evaluating the value of what read based on their opinions as shown in Figure 2.5.

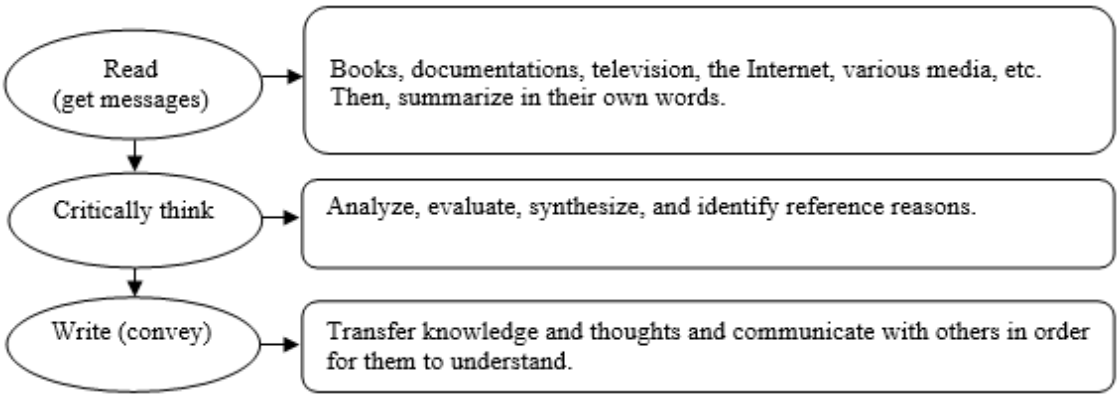


Figure 2.5 Relationship of Reading, Critical Thinking, and Writing
(Source: the Bureau of Academic Affairs and Educational Standards: 2009)

According to Figure 2.5, it could be seen that reading, critical thinking, and writing was a perception of stories, knowledge, and experience of reading books, documentations, television, various media, etc. Then, thinking skills from reading were employed. Teachers could practice thinking skills, such as interpreting, comprehending, questioning, briefly summarizing, and concluding. Writing was considered a skill expressing knowledge, opinions, and experience via organizing thoughts from what read, knowledge, and experience gained from interpreting, comprehending, questioning, briefly summarizing, and concluding. Teachers had to practice the skill of organizing thoughts for students before writing. The thinking skills of writing consisted of description, explanation, clarification, expansion, and knowledge application.

### 2.2.6 Concepts of Reading, Critical Thinking, and Writing in Science

In general, the reading, critical thinking, and writing were considered a process that needed to be operated continuously. Meanwhile, the scientific reading, critical thinking, and writing were also a constant process in science. According to the synthesis of concepts, relevant research, and scientific learning evaluation frames of PISA, it was found that the science and technology learning from situations and context in the daily lives could be achieved by identifying scientific issues, explaining scientific phenomena and reference based on scientific sense with knowledge, understanding, and experience learned.

According to the literature review relevant, the researcher presented the definition, the components of reading, critical thinking, and writing in science, learning behavior, strands and learning standards, and the evaluation of scientific learning outcomes for basic education students as shown below.

(1) Definition

Reading, critical thinking, and writing in science for basic education students referred to the reading, critical thinking, and writing in science which was in line with the Basic Education Core Curriculum, such as living things and life processes, life and the environment, substances and properties of substances, forces and motion, energy, change processes of the earth, astronomy and space, and nature of science and technology. These strands did not rely on exploration or experimental testing. On the contrary, they relied much on reading key concepts from various media, such as textbooks, handouts, and the Internet. After that, students collected their knowledge from reading, interpreting, understanding, and identifying main ideas from the passages in order to express their comprehension toward scientific passages. Moreover, they were able to apply knowledge gained from scientific passages to analyze events and daily situations from various media, such as short stories, cartoons, and articles, for their components, their differences, their relation, causes, results, and reference.

(2) Components of Reading, Critical Thinking, and Writing in Science

According to the aforementioned literature review relevant to reading, critical thinking, and writing of educators both domestic and international, the researcher synthesized the components and indicators of reading, critical thinking, and writing in science for basic education students. There were three components: (1) be able to read and write, (2) know how to read and write, and (3) analyze and write a reasonable summary, as detailed below.

Being able to read and write aimed to read for information from various media and transfer it via writing. The learning behavior which was considered competency indicators consisted of the followings.

2.1 Being able to read and write was considered the reading to obtain information from various media and transfer it via writing of learning behavior records which were the competency indicators. They consisted of the followings.

2.1.1 Identify definition and key words found in key scientific concepts.

2.1.2 Identify ranks and key words found in key scientific concepts.

2.1.3 Classify key words found in key scientific concepts.

2.1.4 Record definition, ranks, and classification of key concepts.

2.2 Knowing how to read and write was considered the reading for identifying main ideas from the reading passages and transferring through the writing of main ideas from the passages. The learning behavior which was the competency indicators consisted of the followings.

2.2.1 Interpret definition and key words found in key scientific concepts.

2.2.2 Comprehend and write briefly summaries of key scientific concepts.

2.2.3 Anticipate events/possibilities in the future based on key scientific concepts found, experience, or existing knowledge.

2.3 Analyzing and writing a reasonable summary was considered the reading for grouping, classifying, differentiating, and comparing information. Value data were selected and written in order to connect the data and express opinions rationally with reference as evidence. The learning behavior which was the competency indicators consisted of the followings.

2.3.1 Group key words/messages/situations which were factual opinions in science.

2.3.2 Classify similar words/messages/situations in science into the same group.

2.3.3 Compare scientific words/messages/situations of each group.

2.3.4 Select valuable information from scientific passages/situations.

2.3.5 Write a summary connecting the selected data both before and after the summary, and write to express opinions based on key scientific concepts found, knowledge, or former experience.

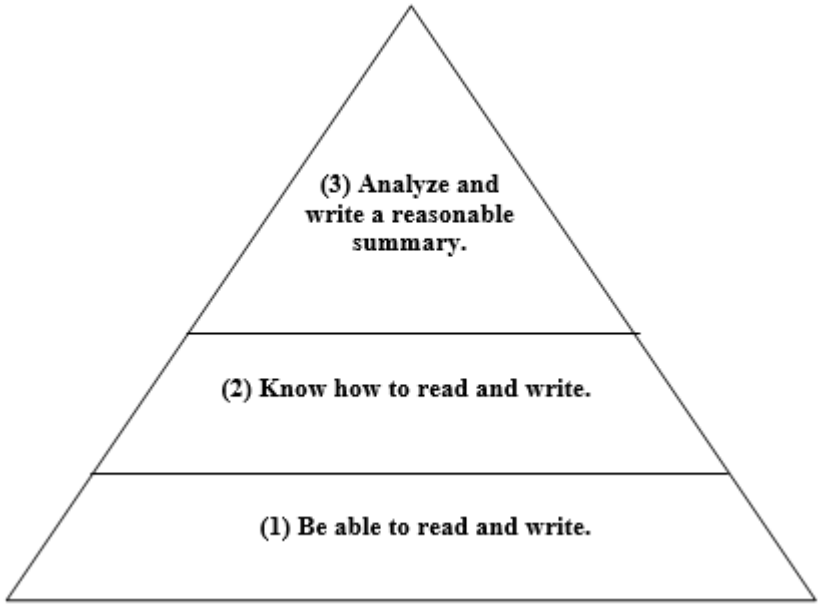


Figure 2.6 Components of Reading, Critical Thinking, and Writing in Science
(Source: Applied from Bloom's et.al: 1971)

(3) Learning Behavior Gained from Analyzing the Standards in Scientific Learning Content Areas

According to the analysis of the standards in scientific learning content areas in line with the Basic Education Core Curriculum B.E. 2551, the learning behavior which was in line with the indicators of reading, critical thinking, and writing classified by class levels was illustrated as shown in Table 2.4 (Sukhothai Thammathirat Open University: 2011).



Table 2.4 Learning Behavior Gained from Analyzing the Standards in Scientific Learning Content Areas

| **Class Levels** | **Learning Behavior for Testing the Abilities in Reading, Critical Thinking, and Writing in Science** |
|---|---|
| Grades 1-3 | Tell, explore, explain, discuss, classify, compare, search, select, analyze data, present data, express opinions, record, and write |
| Grades 4-6 | Tell, explore, explain, discuss, classify, compare, search, analyze data, present data, express opinions, record, write, and summarize |
| Grades 7-9 | Tell, explore, explain, discuss, classify, compare, search, analyze data, present data, express opinions, record, write, make comments, and summarize |

(4) Strands and Standards in Scientific Learning

The strands and standards in scientific learning in the basic education that could be employed in the instructional management in order to enhance the abilities in reading, critical thinking, and writing in science were detailed as follows (the Bureau of Academic Affairs and Educational Standards: 1999).

Strand 1: Living Things and Life Processes

Standard SC1.1: Understanding of the basic units of living things; the relationship between structures and functions of various systems of living things which are interlinked; having an investigative process for seeking knowledge; ability to transfer and put the knowledge into practice and care for living things

Standard SC1.2: Understanding of the process and the importance of genetic transmission; the evolution of living things; the biodiversity; the application of biotechnology affecting humans and the environment; having an investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Strand 2: Life and the Environment

Standard SC2.1: Understanding of the local environment; the relationship between the environment and living things; the relationship between living things in the eco-system; having an investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Standard SC2.2: Appreciating the importance of natural resources; the utilization of natural resources at local, national and global levels; and the application of knowledge for management of natural resources and local environment on a sustainable basis

Strand 3: Substances and Properties of Substances

Standard SC3.1: Understanding of the properties of substances; the relationship between the properties of substances and the structures and binding forces between particles; having an investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Standard SC3.2: Understanding of the principles and the nature of change in the state of substances; the solution formation; the chemical reaction; having an investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Strand 4: Forces and Motion

Standard SC4.1: Understanding of the nature of electromagnetic, the gravitational and nuclear forces; having an investigative process for seeking knowledge; transferring and putting the knowledge into practice

Standard SC4.2: Understanding of the characteristics and various types of motion of natural objects; having an investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Strand 5: Energy

Standard SC5.1: Understanding of the relationship between energy and living; the energy transformation; the interrelationship between substances and energy; the effects of energy utilization on life and the environment; having an investigative process for seeking knowledge; transferring and putting the knowledge into practice



Strand 6: Change Processes of the Earth

Standard SC6.1: Understanding of various processes on the earth's surface and the interior; the relationship between various processes causing changes in climate, topography and form of the Earth; having an investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Strand 7: Astronomy and Space

Standard SC7.1: Understanding of the evolution of the solar system, galaxies and the universe; the interrelationships within the solar system and their effects on living things on the earth; having an investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Standard SC7.2: Understanding of the importance of space technology utilized for space exploration and natural resources for agriculture and communication; having an investigative process for seeking knowledge and scientific reasoning; transferring and putting the knowledge into practice

Strand 8: Nature of Science and Technology

Standard SC8.1: Application of the scientific process and scientific reasoning in investigation for seeking knowledge and problem-solving; knowing that most natural phenomena assume definite patterns which are explainable and verifiable within limitations of the data and instruments available during particular periods of time; and understanding that science, technology, society and the environment are interrelated

(5) Student Evaluation

The student evaluation via measuring the abilities in reading, critical thinking, and writing in science was applied from the student assessment criteria of PISA, especially those regarding scientific reading and learning. The criteria on reading, critical thinking, and writing were separated as follows:

**Scientific Reading Ability Criteria**

| Score | Quality Level Explanation |
|---|---|
| 1 | Be able to define, rank, and classify key scientific concepts of the reading passage. |
| 2 | Be able to interpret key scientific concepts of the reading passages. |
| 3 | Be able to comprehend key scientific concepts of the reading passages. |
| 4 | Be able to anticipate events after reading key scientific concepts. |

**Scientific Analysis Ability Criteria**

| Score | Quality Level Explanation |
|---|---|
| 1 | Be able to group after reading situations or events. |
| 2 | Be able to classify similar objects and group them together after reading situations or events. |
| 3 | Be able to contrast among groups of situations or events. |
| 4 | Be able to select valuable information after reading situations or events. |

**Scientific Writing Ability Criteria**

| Score | Quality Level Explanation |
|---|---|
| 1 | Be able to write in order to define, rank, and classify key scientific concepts of the reading passage. |
| 2 | Be able to write a brief summary about key scientific concepts of the reading passages. |
| 3 | Be able to write a summary connecting scientific situation or phenomena with scientific evidence or reference. |
| 4 | Be able to write a summary connecting scientific situations or phenomena and express disagreement or agreement with scientific evidence or reference. |

### 2.2.7 Components and Indicators of the Instructional Management That Enhanced the Abilities in Reading, Critical Thinking, and Writing in Accordance with the Basic Education Students

#### (1) Instructional Management Components

It could be seen that ability development in the instructional management that enhanced the abilities in reading, critical thinking, and writing in accordance with the Basic Education Core Curriculum B.E. 2551 was considered the situational arrangement so that learners could practice authentically. They could apply thinking process in constructing knowledge by themselves based on their skills and interest. This enabled them to happily learn in terms of physical, intellectual, emotional, and social aspects. Chairat Sutthirat (2007), Boonchom Srisa-ard (2003), Tisana Khammani (2002), and Sirichai Kanjanawasee (2009) determined teachers' roles in managing instruction in line with the Basic Education Core Curriculum B.E. 2551 which consisted of teaching preparation, instructional processes, and summary records, reports, storage, and learning outcome application.

##### 1.1 Teaching Preparation

Teaching preparation was a preparation prior to teaching which consisted of (1) determining learning goals needed to possess among learners based on the curriculum, (2) writing of lesson plans in a manner of student-centered approach determining teachers and students' roles during instruction, and (3) designing teaching in a manner of student-centered approach to be in line with learning objectives and desired goals needed to possess among learners. The teaching methods invented by foreign educators included metacognition teaching method (Beyer: 1985), inquiry method, graphic organizer instructional model (Clarke: 1993). The teaching methods invented by Thai educators included inquiry cycles (5Es) (the Institute for the Promotion of Teaching Science and Technology: 2008), and teaching via instructional package (Boonchom Srisa-ard (2003). Once teaching was designed, instructional media were determined and included both in a publishing form – articles, pamphlets, and newspapers – and a visual form – pictures, charts, compact discs, and authentic media, etc. (Boonchom Srisa-ard: 2003). After the teaching design, teachers had to plan how to examine

students' performance during teaching, i.e. students' learning outcome evaluation. This evaluation had to be matched with learning objectives or goals that students needed to learn. There were two aspects of evaluation which were formative evaluation which aimed at adjusting and correcting and summative evaluation. The popular measuring and evaluating tools used to evaluate students' learning in classes were objective tests, essay tests, authentic assessment, portfolios, and observation (Sirichai Kanchanawasee: 2003).

In conclusion, teaching preparation consisted of goal determination, learning needs to possess among learners based on the curriculum, and lesson plan preparation which consisted of determination of learning objective, contents, methods, and measurement and evaluation. This could be performed per week or per unit determined in advance before the instructional management. As for this research, lesson plan preparation which was planned before teaching was identified. Wattanaporn Ra-ngabthook (2000), Akkarin Seemahasarn (2002), the Department of Curriculum and Instruction Development (2003), Aporn Jaithieng (2003), and Suwit Moonkham (2006) mentioned that lesson plans referred to instructional management plans provided by the teachers from teacher manual, learning units, course description, and indicators needed to exist among students. This allowed the teachers to know which contents were applied to instructional processes, what learning media used, how to evaluate, and how to present the instructional outcomes. The details were illustrated as follows:

1.1.1 Importance of an Instructional Management Plan

Akkarin Seemahasarn (2002) mentioned about the importance of an instructional management plan in that the instructional management plan enabled the instructors to learn what they were supposed to teach weekly or hourly, what learning contents were supposed to be covered, and what problems and conditions surveyed contributed to their confidence in managing learning and evaluating learners enabling them to be able to develop themselves in various aspects in line with the goals.

1.1.2 Characteristics of an Instructional Management Plan

The characteristics of a good instructional management plan had to be able to answer the following questions.

(1) What desired attributes did students possess?

(2) What student development activities would be held in order for the students to meet the objectives?

(3) What roles the teachers played in holding the activities either teacher-centered or student-centered?

(4) What media/devices enabled the students to meet the objectives?

(5) How did the teachers learn that the students yielded the expected characteristics?

1.1.3 Components of an Instructional Management Plan

The instructional management plan consisted of the following key topics.

(1) Introduction: a subject/a class level, a learning unit topic or a learning management plan topic, and a teaching period

(2) Learning objectives/Expected learning outcomes

(3) Learning strands

(4) Learning management processes

(5) Learning outcome measurement and evaluation

(6) Learning sources

(7) Learning management outcome records



1.1.4 Patterns of an Instructional Management Plan

The patterns of the instructional management plan were not fixed, depending on each department or educational institute's determination. However, most characteristics of the learning activity management plan were similar. They could be concluded in three patterns as follows:

(1) A topic-ordering pattern: this pattern ranked the topics in chronological order without drawing a table. This was quite convenient in that there was no table, but it was quite difficult to see the relationship of each topic as shown in the following example.

Example: A Topic-Ordering Teaching Pattern

Learning activity management plan: Unit No. ……...
Sub-unit No. …….. Class ……
Topic …….. Class Time …….. Period ……..

(1) Key contents ……..
(2) Objectives:
    2.1 End-point objectives ……
    2.2 Leading objectives ……...
(3) Contents …….
(4) Instructional activities ……...
(5) Measurement and evaluation …….
(6) Additional activities suggested or appendixes ……..

(2) A semi-table pattern: this pattern was written in columns in line with determined topics. Even though it took time in drawing tables, it was convenient for reading. This made the relationship of each topic obvious as shown in the following example (Aporn Jaithieng: 2003).

Example: A Semi-Table Teaching Pattern

Learning activity management plan: Subject group …….. Class ……..
Unit No. ……. Topic …….. Time …… Period …….
Date …….
Key contents ……...
End-point objectives: (1) ……...
(2) ……

| **Behavioral Objectives** | **Contents** | **Instructional Activities** | **Instructional Media** | **Measurement and Evaluation** | **Remark** |
|---|---|---|---|---|---|
| | | (1) Introduction ……...<br>(2) Teaching ……...<br>(3) Summary ……...<br>(4) After-teaching record ……... | | | |

Figure 2.7 Example of a Semi-Table Teaching Pattern
Source: Teaching Principles (Aporn Jaithieng: 2003)

(3) A table pattern: like a semi-table teaching pattern, this pattern was written in columns with topics and key contents as shown in Figure 2.8 (Aporn Jaithieng: 2003)

Example: Teaching Plan: Group …….. Class …… Time …….. Unit Period ……...

| **Key Contents** | **Objectives** | **Contents** | **Instructional Activities** | **Instructional Media** | **Measurement and Evaluation** |
|---|---|---|---|---|---|
| | | | (1) Introduction<br>……<br>(2) Teaching<br>……<br>(3) Summary<br>…… | | |

Figure 2.8 Example of a Table Teaching Pattern

Source: Teaching Principles (Aporn Jaithieng: 2003)

### 1.2 Instructional Processes

The instructional process of this research was that in line with the Basic Education Core Curriculum B.E 2551 which focused on learners' thinking skill development with various methods. According to the review literature on teaching models for developing thinking skills, they were classified into six models. The first one was the instructional model focusing on the fact that the learners constructed knowledge body by themselves while being facilitated by teachers, i.e. the instruction based on the constructivism theory (Wanthipa Rodrangkha: 2003), the triarchic theory of human intelligence (Sternberg: 2002), the story line teaching method (Walai Phanit: 1999), 5E science teaching method (the Institute for the Promotion of Teaching Science and Technology: 2007), 4MAT teaching pattern (McCarthy: 1990), and inquiry teaching method (Suwat Niyomkha: 1988). The second dealt with teaching to read in order to develop thinking, namely the whole language approach (Aree Sanhachawee: 1992), metacognition development (Schmitt: 1986), and the panorama reading strategy (Edwards: 1973). The third model covered the instruction for developing thinking that learners and instructors

planned together, namely self-directed learning method (Surang Khongtrakul: 1990). The fourth one dealt with the instructional technique that allowed learners to learn from abstract to pictures, namely the concept mapping construction technique (Brunet: 1978), the mind mapping technique (Tisana Khammani: 1945), and the graphic organizer instructional model (Tisana Khammani: 2002). The fifth dealt with the instructional management for developing thinking focusing on collaborating among students, namely the cooperative learning method (Chairat Sutthirat: 2007). The sixth one was the instructional management for developing students' thinking focusing on individual differences via media-based methods, namely the instructional package (Chaiyong Promwong: 1980, Boonchom Srisa-ard: 2003), computer multimedia lessons (Booppachard Taphikorn: 1995), etc. These six aforementioned teaching methods could be used by the instructors while managing learning activities. They would stimulate/reinforce via different methods in order for the students to express behavior that developed learners' thinking skills, such as questioning, allowing students to evaluate themselves before and after learning, employing instructional media, constructing interaction between teachers and students and between students and students, and building atmosphere while learning. The researcher would like to present the teaching method that was appropriate to develop the abilities in reading, critical thinking, and writing via developing metacognitive by applying the concept of Schmitt and Bauman (1986) in reading, critical thinking, and writing of basic education students. This connected new knowledge with existing knowledge. Their thinking was controlled via examining thinking perception both before and after reading. The steps were listed as follows:



1.2.1 Pre-reading activities dealt with identifying what known or unknown in what they read, author's purposes presented, and topics from preliminary information observed, and making questions prior to reading.

1.2.2 While-reading activities consisted of the followings:

(1) Search for answers from pre-reading questions.

(2) Examine answers by reading.

(3) Identify additional known information from reading.

(4) Make additional questions.

1.2.3 Post-reading activities consisted of the followings:

(1) Take the while-reading answers to compose as a short idea in chronological order.

(2) Discuss what expected together.

(3) Examine whether the reading served the objectives or not and how.

(4) The teachers additionally questioned students to cover what the students read.

When the instructional management was performed completely, the teachers had to examine students' learning toward the lessons via measuring and evaluating students. The measuring and evaluating methods were in line with learning goals and objectives in evaluating reading, critical thinking, and writing efficiently. The teachers were supposed to answer the following key four questions (the Bureau of Academic Affairs and Educational Standards: 2003).

Question 1: What was evaluated? This questioned what was going to evaluate in students' reading, critical thinking, and writing. In other words, it referred to the abilities in reading, comprehending, and being able to think, classify, differentiate, consider, express reasons, and transfer via writing.

Question 2: What were the goals of reading, critical thinking, and writing? This questioned on the goals in evaluating reading, critical thinking, and writing which was in line with the Basic Education Core Curriculum B.E. 2551 in that the evaluation results were taken to adjust and judge the students' performance.



Question 3: What skills were evaluated? This questioned on the skills evaluated, namely reading, critical thinking, and writing skills via assessing a similar work – writing. Writing represented writing abilities in order to communicate knowledge, ideas, and attitudes. It was also an evidence expressing the critical thinking ability. According to the Basic Education Core Curriculum B.E. 2551, the critical thinking was the sensibly critical thinking which resulted from sensibly reading. Therefore, the learners' writing gained from reading was considered a document used to evaluate reading, critical thinking, and writing skills.

Question 4: How the reading, critical thinking, and writing were evaluated?

The evaluation methods of reading, critical thinking, and writing evaluation based on the Basic Education Core Curriculum B.E. 2551 were listed as follows:

Type 1: This evaluated via integrating the indicators of reading, critical thinking, and writing with the instructional management in line with learning content groups. It examined whether the ability indicators of reading, critical thinking, and writing possessed with what learning unit of what subjects. If there was none or few, they could be integrated into that particular learning unit or learning plan of that subject when taking the learning unit to hold learning activities. This was considered the evaluation results of the abilities in reading, critical thinking, and writing. If there was a plan determining learning units of each subject in each year (the primary education level) or each semester (the secondary education level), the indicators were distributed into every subject in a sufficient ratio with apparent works. This could be regarded as a representative of the abilities in evaluating reading, critical thinking, and writing in line with the evaluation criteria that were determined by educational institutes. Then, the evaluation results of eight learning content groups were totally summarized as the evaluation results of the abilities in reading, critical thinking, and writing per year/semester based on appropriate statistics, namely mode or mean. This type was appropriate for schools with moderate readiness, enough number of teachers in all classes, and some part-time teachers.

Type 2: This type determined projects/activities enhancing the abilities in reading, critical thinking, and writing for the students to specifically practice via exploring the indicators, ranges, criteria, and rubrics of the evaluation toward the abilities in reading, critical thinking, and writing. Then, the projects/activities were held for the students to perform in groups, individuals, or self-study for further search. The reports on reading, critical thinking, and writing were written, collected, and presented in a format of portfolios in order to evaluate the learners' potential in reading books, documentations, and various media correctly and fluently. After that, they were concluded as knowledge and understanding. The learners were able to think critically toward the contents read which led to synthesize, create, express opinions on various aspects, and transfer those opinions by writing to convey messages reflecting wisdom, knowledge, understanding,

and abilities in thinking critically, synthesizing, solving problems, and creating imagination properly and valuably. This included, for example, the project of "Love Reading and Writing." This type was appropriate for big-sized or extra big-sized schools possessing high readiness.

Type 3: There was the integration of indicators evaluating the abilities in reading, critical thinking, and writing together with evaluating student development activities via exploring indicators, ranges, criteria, and rubrics of the evaluation toward the abilities in reading, critical thinking, and writing. This was integrated into the student development activity plan in order to take the activity plan into practice and evaluate activity performance based on workload learned. The work regarding the evaluation toward the abilities in reading, critical thinking, and writing in line with the activities was considered the evaluation that took the information to judge the evaluation results of reading, critical thinking, and writing via comparing with criteria, rubrics determined by the educational institutes. This type was appropriate for the schools possessing moderate readiness, enough number of teachers in all classes, and some part-time teachers. One teacher might be responsible for teaching and extra jobs.

It could be seen that the evaluation toward the abilities in reading, critical thinking, and writing of students in line with the Basic Education Core Curriculum B.E. 2551 focused on authentic performance assessment of students' work. Therefore, the determination of work evaluation criteria was in a format of rubric scores.

Rubric scores or scoring rubric was a tool assigning points in details as evaluation criteria toward a piece of work and quality (Somsak Phuvipadawat: 2001). The scoring rubric consisted of many components as follows:

(1) There was at least one aspect or dimension acting as a basis in judging learners.

(2) Defining had to be clear in each aspect.

(3) Scoring measure had to be outstanding at each level and clear. The width of point levels was no more than six to seven levels. The determination of the width in scoring had to be appropriate and clear in defining from poor to excellent. There were two types of the scoring rubric as follows:

3.1 Holistic rubrics: these rubrics scored works or processes that considered the characteristics of them in an overall picture without separating parts or scoring elements. This tool would describe the overall quality of that piece of work in order based on the determined score levels. The holistic rubrics were easy to use and employed a few times with one student. It was an overall evaluation in every characteristic of the operation as shown in Table 2.5

Table 2.5 Example of the Total Scores Criteria

| **Score Level** | **Learning Outcome** |
|---|---|
| 4<br>(Excellent) | Write a complete concept mapping which summarized natural resource consumption based on situations covering usage methods, benefits, and abuses together with expressing opinions via key concepts identified, knowledge, and existing experience. |
| 3<br>(Good) | Write a complete concept mapping which summarized natural resource consumption based on situations covering usage methods, benefits, and abuses. |
| 2<br>(Fair) | Write a complete concept mapping which summarized natural resource consumption based on situations covering usage methods, benefits, and abuses but still not perfect. |
| 1<br>(Need Improvement) | Write a concept mapping which summarized natural resource consumption based on situations covering usage methods, benefits, and abuses only on one situation. |

3.2 Analytic rubrics: these rubrics separately scored parts, work characteristic components, or processes. After that, each part, component, or work characteristic component was combined as a total score. The analytic rubric was often used by evaluating each part separately. It would be beneficial when teachers were interested in diagnosing or helping students, whether they possessed knowledge, understanding of each part, or each characteristic of that particular operation or not. This would enable the teachers to enhance or develop learning in each characteristic of the learners much better as shown in the example of scoring criteria for separate components in Table 2.6.

Table 2.6 Example of Scoring Criteria for Separate Components

| Evaluation List | Score Level | | | |
|---|---|---|---|---|
| | 4 | 3 | 2 | 1 |
| Reading | Be able to anticipate events after reading key scientific concepts. | Be able to comprehend key scientific concepts of the reading passages. | Be able to interpret key scientific concepts of the reading passages. | Be able to define, rank, and classify key scientific concepts of the reading passage. |
| Critical Thinking | Be able to select valuable information after reading situations or events. | Be able to contrast, among groups of situations or events. | Be able to classify similar objects and group them together after reading situations or events. | Be able to group after reading situations or events. |
| Writing | Be able to write a summary connecting scientific situations or phenomena and express disagreement or agreement with scientific evidence or reference. | Be able to write a summary connecting scientific situation or phenomena with scientific evidence or reference. | Be able to write a brief summary about key scientific concepts of the reading passages. | Be able to write in order to define, rank, and classify key scientific concepts of the reading passage. |



**1.3 Summary Records, Reports, Storage, and Learning Outcome Application**

As for the instructional processes based on the Basic Education Core Curriculum B.E. 2551, teachers had to manage instructional activities in line with the standards or indicators stated in the curriculum of each subject. Learners' learning was examined via measuring and evaluating. Then, the summary records, reports, storage, and the learning outcome application had to be used to develop learners' quality as follows:

Performance reports while studying were in two aspects which were individual reports and classroom reports in order to inform evaluation results to those relevant, namely classroom teachers, guardians, and students via fundamental statistics. The students' quality was ranked in low-potential, moderate-potential, and high-potential groups (Supak Phiboon: 2012). Those who were in low-potential group were supposed to be enhanced potency until they could pass the determined level prior to being evaluated at the end of a semester.

Performance reports at the end of a semester/year were in two aspects which were individual reports in order to judge the performance per person, group, and year. Then, the evaluation results were informed of those relevant, namely classroom teachers, guardians, and students. Those who failed the evaluation were supposed to be developed or supplemented via appropriate methods. Moreover, there was supposed to be a repeated evaluation as well.

Learning outcome storage was supposed to be stored at a classroom level and a school level via a school database in order to cooperate in planning for development. This could be performed in a website database that those relevant could examine.

The evaluation result application in developing learners' potential was performed as shown in the following guidelines (Supak Phiboon: 2012).

1.3.1 Analyze the target groups relevant or pay attention to the evaluation results. Educational institutes had to analyze and classify those relevant, such as the evaluation results while studying in order to supplement those failing the evaluation, which would be beneficial for teachers and students who could use the evaluation results efficiently.

1.3.2 Provide the database of the evaluation results in the same searching source that was easy and convenient for those relevant to access into. The information reports via website were convenient for those relevant in examining the evaluation result information, such as school administrators, teachers, and guardians. There might be the determination of accessing in the information by member registration.

1.3.3 Construct qualified culture that enhanced an organization to be a learning organization that employed the evaluation results to support decision making all the time in order to share the learning in a monthly agenda.

1.3.4 Provide a calendar of an organization's information needs with the following guidelines.

(1) Analyze the information needs with a decision making within a year cycle.

(2) Provide a seminar calendar.

(3) Provide an informative calendar.

Therefore, those relevant provided the evaluation result information in line with the calendar for the sake of mutual acknowledgement among those measuring and evaluating and those requiring the information to make a decision in planning, improving, or modifying the work.

According to the details of the components for managing the instruction that enhanced the abilities in reading, critical thinking, and writing, the summary could be shown in the following figure.

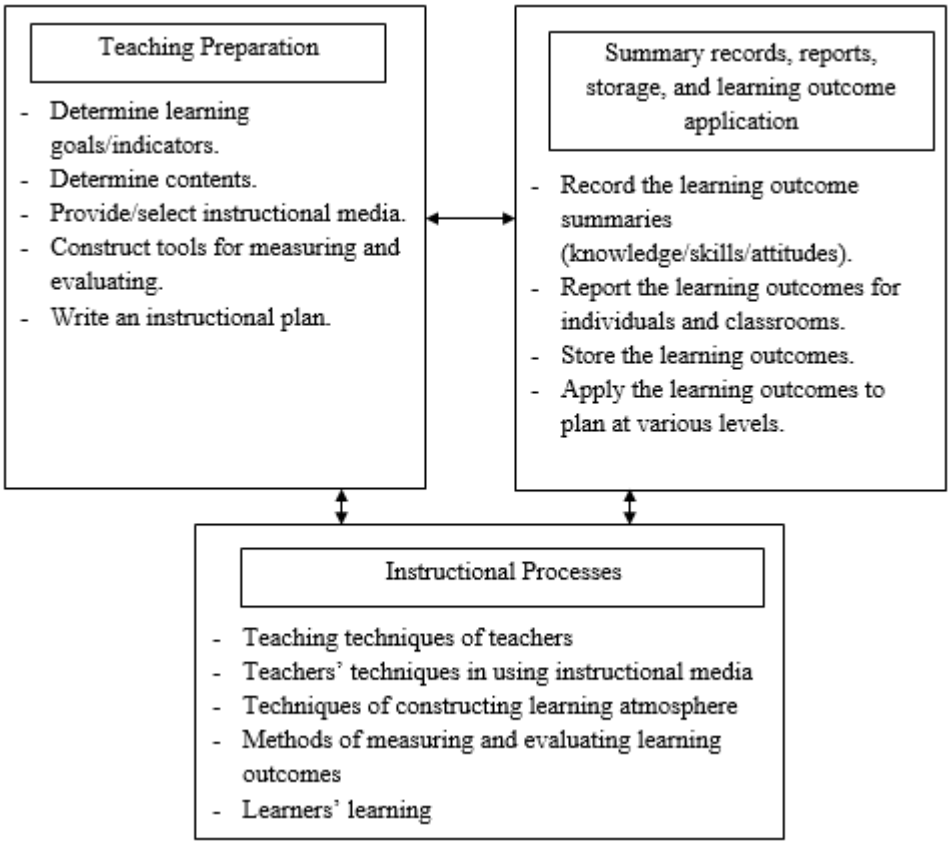


Figure 2.9 Instructional Components

**(2) Indicators of Science Teachers' Instructional Management Enhancing the Abilities in Reading, Critical Thinking, and Writing of Basic Education Students**

The indicators were considered the variables reflecting the characteristics of those aimed to measure (Sirichai Kanjanawasee: 2009 and Rattana Buason: 2005). The researcher explored the instructional management indicators determined in the National Education Act B.E. 2542 from the organizations delivering basic education and the educators as listed below.

The indicators of student-centered instructional management that was determined in the National Education Act B.E. 2542 were illustrated as follows:

(1) Provide substance and arrange activities in line with the learners' interests and aptitudes, bearing in mind individual differences.

(2) Provide training in thinking process, management, how to face various situations and application of knowledge for obviate and solving problems.

(3) Organize activities for learners to draw from authentic experience; drill in practical work for complete mastery; enable learners to think critically and acquire the reading habit and continuous thirst for knowledge.

(4) Achieve, in all subjects, a balanced integration of subject matter, integrity, values, and desirable attributes.

(5) Enable instructors to create the ambiance, environment, instructional media, and facilities for learners to learn and be all-round persons, able to benefit from research as part of the learning process. In so doing, both learners and teachers might learn together from different types of teaching-learning media and other sources of knowledge.

(6) Enable individuals to learn at all times and in all places. Cooperation with parents, guardians, and all parties concerned in the community was supposed to be sought to develop jointly the learners in accord with their potentiality.

Indicators of Student-Centered Instructional Management Developed by the Office of the Basic Education Commission (2000) consisted of the followings:

(1) Hold various instructional activities which were appropriate to learners' nature.

(2) Hold instructional activities allowing learners to practice searching, observing, collecting data, analyzing data, thinking variously and creatively, and generating knowledge by themselves.

(3) Hold instructional activities stimulating learners to identify knowledge and seek for answers by themselves.

(4) Apply appropriate local wisdoms, technology, and media into the instructional management.

Indicators of Student-Centered Instructional Management Developed by Wattanaporn Ra-ngabthook (2000) consisted of the followings.

(1) Teachers prepared their teaching in both content and methods.

(2) Teachers arranged environment and atmosphere that motivated, stimulated, and reinforce learners to possess learning.

(3) Teachers paid attention to the learners individually and had merit toward them thoroughly.

(4) Teachers held activities and situations in order for the learners to express and think creatively.

(5) Teachers enhanced the learners to practice thinking, doing, and adjusting themselves.

(6) Teachers enhanced learning and sharing activities in groups and observe both strengths and weaknesses of the learners.

(7) Teachers employed teaching media to practice thinking, problem-solving, and discovering knowledge.

(8) Teachers employed various learning sources and connected experience with real lives.

(9) Teachers practiced manner and disciplines which were in line with Thai cultures and styles.

(10) Teachers observed and evaluated learners' development constantly.

The aforementioned indicators of the student-centered instructional management could be employed to be the guidelines in developing the indicators the instructional management, enhancing reading, critical thinking, and writing which was in line with the instructional management of the Basic Education Core Curriculum B.E. 2551. There were 29 indicators as listed as follows:

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

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

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

(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.

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

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

(7) Various media used in reading, critical thinking, and writing were identified.

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

(9) Activities leading to lessons linking former knowledge and new knowledge were identified.

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

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

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

(13) Activities enhancing students to summarize lessons by themselves were identified.

(14) Technologies linking with lessons were identified.

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

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

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

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

(19) Techniques of questioning and stimulating students to think from reading in science were employed.

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

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

(22) Instructional media that were in accordance with lessons were employed.

(23) Environment and media facilitating reading, critical thinking, and writing in science were provided.

(24) Learning outcomes which were in accordance with learning objectives were evaluated.

(25) Attitudes toward learning were evaluated.

(26) Learning outcome summaries of an individual and a class were recorded.

(27) Learning outcomes of an individual and a class were reported.

(28) Learning outcomes of an individual and a class were stored.

(29) Learning outcomes were used to planning on improving the students' quality continuously.

### 2.2.8 Instructional management evaluation

Kritsana Kitdee (2004) mentioned that instructional management evaluation referred to an instructional management diagnosis of teachers in inputs, processes, and outcomes for development (Nevo: 1983, Sirichai Kanjanawasee: 2013, Yaowadee Rangchaikul: 2005). The general components of educational evaluation consisted of objectives, objects evaluated, evaluation methods, value judgement on evaluation results, and learning outcome utilization. After reviewing the literature, it was found that there was certain research conducted on the evaluation model of teachers' instructional management in basic education and higher education levels as follows:

Chailikit Soipetkasem (2004) conducted a study on "The Development of an Evaluation Model on Learning Process Management of Teachers for the Schools under the Office of the Basic Education Commission" aiming at developing the model of learning

process management of teachers for the schools under the Office of the Basic Education Commission. It was found that the construction of learning process management model was in relation to four constituents which were evaluation goals, objects evaluated, evaluation methods, and value judgement methods. The sample group of this research consisted of 29 teachers affiliated with the Office of the Basic Education Commission, Phitsanulok. The evaluation tools for learning process were a questionnaire on learning management concepts and a rating-scale form used in learning process observation. The model evaluation tool was an evaluation form which was in line with the evaluation model in learning process management of teachers in the schools under the Office of the Basic Education Commission. The evaluators were administrators, teachers evaluated, and assistants to school administrators. The research findings revealed that the evaluation model in the learning process management of teachers for the schools under the Office of the Basic Education Commission was qualified and acceptable on the basis of the evaluation criteria for performance quality in three aspects which were evaluation questions, evaluation methods, and evaluation results.

Krissana Kiddee (2004) conducted a study on "A Development of the Evaluation Model of the Student-Centered Learning Management." The purposes of this research were (1) to develop the indicators of student-centered learning management, (2) to develop the evaluation model of student-centered learning management, and (3) to evaluate the effectiveness of using the evaluation model of student-centered learning management. The research samples were 1,271 persons that consisted of 31 teachers, 310 parents of the students, and 930 students in the school under the Pichit Educational Service Area Offices 1. The data were collected through the evaluation forms, attitude measurement forms toward instructional management, and interview forms on performance and budget. The quantitative data were analyzed through descriptive statistics, t-test and ANOVA. The reliability was calculated by the method of Hoyt's analysis of variance. The qualitative data were analyzed by content analysis. The research findings revealed that the evaluation model of student-centered learning management consisted of four factors which were (1) the goal of evaluation, (2) the objects of evaluation, (3) the methods of evaluation, and (4) the methods of judgement. The sources of the evaluation were: self-evaluation, evaluation performed by the head of the department, the director's assistants, peer, students and the parents of the students. The judgement

method was the comparison between the information about the evaluation and the absolute criteria developed by the experts. It was found that the teachers had the positive attitude towards the evaluation of student-centered learning management. Moreover, the stakeholder accepted the possibility of both practical and budget management; the evaluation results were accurate.

Sathida Sakulrattanakoolchai (2010) conducted a study on "Development of Evaluation Models for Architecture Studio Instruction Using Empowerment Evaluation." The purposes of this research were (1) to analyze the characteristics of architecture studio instruction and instructors' evaluation approaches, (2) to develop the evaluation capacity of the instructors by using empowerment evaluation, and (3) to synthesize and evaluate the effectiveness of the architecture studio instruction evaluation models from the results of instructors' evaluation practice. Research and development methodology was employed in this study. Participants were instructors of the faculty of architecture from five universities. Moreover, capacity building project of studio instruction evaluation using empowerment evaluation was employed for instructors of the faculty of architecture. The results indicated that architecture studio instruction evaluation consisted of two parts, which were formative evaluation and summative evaluation. The characteristics of architecture studio instruction and instructors' evaluation approaches generally were not much different. When applying empowerment evaluation for developing instructors' evaluation capacity through the creation of studio instruction evaluation models. It was found that the created evaluation models were practical. They also provided the instructors' participation in the evaluation. The created architecture studio instruction evaluation models consisted of three formative evaluation models (i.e., systematic-based evaluation model, naturalistic-based evaluation model, and student participation-based evaluation model), and three summative evaluation models (i.e., all instructors' jury model, partial instructors' jury model and independent group jury model). All developed models could be used as the guidelines for the application and further development of evaluation in architecture studio instruction. According to the aforementioned literature review, it could be summarized as shown in Table 2.7.

Table 2.7 Summary of the Literature Review on the Evaluation Model of Instructional Management

| | **Chailikit Soipetkasem (2004)** | **Krissana Kiddee (2004)** | **Sathida Sakulrattanakoolchai (2010)** |
|---|---|---|---|
| **Objectives:** | To develop the model on teachers' learning process management for the schools under the Office of the Basic Education Commission | (1) To develop the indicators of student-centered learning management<br>(2) To develop the evaluation model of student-centered learning management<br>(3) To evaluate the effectiveness of using the evaluation model of student-centered learning management | (1) To analyze the characteristics of architecture studio instruction and instructors' evaluation approaches<br>(2) To develop the evaluation capacity of the instructors by using empowerment evaluation<br>(3) To synthesize and evaluate the effectiveness of the architecture studio instruction evaluation models from the results of instructors' evaluation practice |
| **Concepts/ Models:** | (1) Educational evaluation (Sirichai Kanjanawasee: 2013)<br>(2) A model consisting of evaluation objectives, objects evaluated, evaluation methods, and judgement methods | (1) 360-degree evaluation from various sources<br>(2) A model consisting of evaluation objectives, objects evaluated, evaluation methods, and judgement methods | (1) Empowerment evaluation<br>(2) The architecture studio instruction evaluation model consisting of the systematic-based evaluation model, the naturalistic-based evaluation model, and the student participation-based evaluation model |
| **Variables Evaluated:** | Learning process management | Student-centered instructional management | (1) Architect studio instructional management<br>(2) Model quality |
| **Evaluators:** | Administrators, teachers evaluated, administrator assistants | Teachers themselves, peers, students, departmental heads, director assistants | Instructors |

Table 2.7 (continued)

| | **Chailikit Soipetkasem (2004)** | **Krissana Kiddee (2004)** | **Sathida Sakulrattanakoolchai (2010)** |
|---|---|---|---|
| **Evaluation Tools:** | (1) A questionnaire on learning management concepts<br>(2) A rating-scale form used in learning process observation | (1) Evaluation forms<br>(2) Attitude scales<br>(3) Interview forms on performance and budget | (1) Teacher competency evaluation forms<br>(2) Self-evaluation forms of instructors |

According to Table 2.7, the instructional evaluation model could be classified into three patterns which were (1) an evaluation model utilizing evaluation results in making decision. The evaluators consisted of those relevant at every level, namely teachers themselves, teacher peers, students, departmental heads, and director assistants. (2) An evaluation model utilizing evaluation results in making decision like the first one came the second, but its evaluators were different from those of the first one. (3) An evaluation model enhancing the evaluators could utilize techniques and self-evaluation findings to determine their own directions and to develop themselves came the third which was quite different from the first two. This was an outstanding characteristic of the empowerment evaluation which enabled teachers to possess power in evaluating themselves. However, there were certain limitations in that (1) the teachers who participated in training were supposed to join voluntarily, (2) a short time period of training, (3) a short time period of practicing based on the empowerment evaluation, and (4) differences in terms of subject contents resulting in different views toward problems of each teacher.



According to the aforementioned strengths and limitations, the researcher synthesized the components of science teachers' instructional management enhancing the abilities in reading, critical thinking, and writing of basic education students. There were five components which were (1) evaluation objectives, (2) objects evaluated, (3) evaluation operation, (4) evaluation result judgment, and (5) evaluation result reports and utilization in developing the instructional management. As for the part of instructional

management development, the researcher applied the empowerment evaluation concept which was detailed as follows:

## 2.3 Empowerment Evaluation Concepts

The empowerment evaluation concept was originated at the point when David Fetterman (1993) wrote a book entitled "Speaking the Language of Power: Communication, Collaboration, and Advocacy." He summarized that the various evaluation enabled administrators, evaluators, and those relevant to gain full comprehension toward their work. This could lead to solutions and problem-solving through participatory operation. The definition, steps, concepts, characteristics, and benefits of the empowerment evaluation were mentioned as follows:

### 2.3.1 Definition

Fetterman (1996) mentioned that the empowerment evaluation was considered the application of evaluation concepts, techniques, methods, and findings both qualitative and quantitative into decision making and adjustment at individual and organizational levels, including within an organization and among an organizational network. This evaluation relied much on participatory operation concepts without any reinforcement to anybody. Instead, everyone had to reinforce themselves. Participatory operation was in accordance with participatory evaluation – a constructivist approach. As for the constructivist approach, the evaluators played a role in controlling the evaluation and operating until an acceptance toward the evaluation and its results was shared. However, as for the empowerment evaluation, the evaluators did not play a role as those controlling the evaluation. Instead, they were advisors and supporters who empowered the evaluation of those relevant.



Cousin (1996) compared the constructivist approach and the empowerment evaluation as shown in Table 2.8.

Table 2.8 Comparison of Constructivist Approach and Empowerment Evaluation

| Issues | Similarity | Difference |
|---|---|---|
| (1) Participation | The stakeholders participated in the evaluation to increase evaluation result benefits. | --- |
| (2) Evaluator role | The evaluators were facilitators, not judges of evaluation. | The evaluators were able to adjust to the surroundings or changes happening. |
| (3) Objectives | To enable personnel/organizations to clarify themselves. | --- |
| (4) Knowledge given during the evaluation | Evaluation knowledge was given to those relevant in the evaluation. | The stakeholders could make a decision by themselves independently. |
| (5) Decision making levels | | As for the empowerment evaluation, the stakeholders controlled the evaluation while as for the constructivist approach the stakeholders and the evaluators controlled the evaluation together. |

Therefore, the evaluators were considered the developers. This was in line with the concept of Rattana Buason (2005) who summarized the future evaluation in that the evaluators was seen as the developers as the program evaluation in the future aimed to evaluate program theory aspects and evaluation result utilization for developing programs. If the evaluators were not considered a part of the development team, it was quite difficult to apply program theories into evaluation. As a result, the evaluators had to be supporters for developing programs eventually.



### 2.3.2 Steps of Empowerment Evaluation

Fetterman (1996) proposed the steps of empowerment evaluation consisting of four steps which were (1) taking stock, (2) setting goals, (3) developing strategies, and (4) documenting progress. Later, Fetterman (2001) modified those steps and came up with three main steps which were (1) defining the mission or duties of a program and an organization, (2) taking stock within an organization or a program, and (3) planning for

the future. The key contents of the modified steps were still the same as illustrated and compared in the following table.

Table 2.9 Comparison of Fetterman's Empowerment Evaluation Steps

| **Empowerment Evaluation Steps in 1996 (4 Steps)** | **Empowerment Evaluation Steps in 2001 (3 Steps)** |
|---|---|
| Step 1: Taking stock | Step 1: Defining mission |
| Step 2: Setting goals | Step 2: Taking stock |
| Step 3: Developing strategies | Step 3: Planning for future |
| Step 4: Documenting progress | 3.1 Setting goals |
| | 3.2 Developing strategies |
| | 3.3 Documenting progress |

According to Table 2.9, it was seen that Fetterman's empowerment evaluation steps in 1996 and 2001 contained the similar key contents in each step. However, the step modified in 2001, namely Step 1: Defining mission, led to community practice consisting of participation in sharing a program and a concrete construction role expressing in a form of documentations or messages. Therefore, defining mission was greatly necessary for facilitating mechanism in order to allow individuals to learn by themselves.

As a result, the researcher integrated the empowerment evaluation concept and classified into four steps as follows:

(1) Taking Stock: this step involved prioritizing and evaluating activities and operation of an organization in order to answer at which point it positioned in the area of its determined mission and vision. It was the step of exploring what existed in a project or an organization in order to identify weaknesses and strengths of any current duty. There were two minor steps as follows:

1.1 The participants in a project or an organization helped generate a list of current key activities that were functioning based on their mission. Then, they had to prioritize each activity and select ten key activities. An empowering evaluator needed to facilitate score voting with symbols or notes on selected activities. This voting pattern helped generate good attitudes among members in working together.

1.2 After voting, it was time to determine the activities that needed to be improved. Everyone had to participate in evaluating the priority of various activities selected. The empowering evaluator had to facilitate in evaluating activity priority. Scoring ten activities, for example, on a basis of ten points, could be applied. Any activity which was scored the highest meant it possessed high priority. Then, the scores from the first and the second steps were accumulated and identified mean of each activity and each individual. This method was beneficial for the personnel and those relevant in that they could review themselves whether they had similar or different opinions or negative or positive opinions when compared with other members. This could construct understandings among those relevant.

(2) Setting Goals: setting goals could be achieved via brainstorming from those relevant with a project or an organization. The data from the taking stock list of activities could be used as the basis for setting specific goals relating to the activities needed to be improved. The evaluators were considered the facilitators and friends who gave concepts, analyzed, criticized, and questioned those relevant so that they could clarify their opinion. When setting the goals, educational administrators and those relevant were supposed to join so that it was performed authentically.

(3) Developing Strategies: in this step, the process of brainstorming, critical review, and consensual agreement was used to establish a set of strategies. These strategies were routinely reviewed to determine their effectiveness and appropriateness. Determining appropriate strategies, in consultation with sponsors and clients, was an essential part of the empowering process. Program participants were typically the most knowledgeable about their own jobs.



(4) Documenting Progress: as for this step, program participants were supposed to consider what type of documentation or evidence required to monitor progress toward their goals. The documentation and evidence had to be credible and rigorous.

According to the aforementioned steps, external evaluators and those relevant (internal evaluators) in the programs would cooperate. The external evaluators played a role as the consultants rather than the evaluators. However, the role of the external evaluators

might deal with collecting data, analyzing data, and giving feedback information which supported a decision making of those relevant in the programs. As a result of cooperating in the empowerment evaluation process, Fetterman insisted that those relevant would gain knowledge, practice, experience, and understandings toward specific techniques in operating the evaluation. Meanwhile, they also improved in collecting data meaningfully which benefited the utilization.

### 2.3.3 Concepts of Empowerment Evaluation

The concepts of empowerment evaluation, which were considered guidelines for utilizing practically consisted of ten concepts (Fetterman and Wandersman: 2005) as follows:

(1) Improvement: this identified that evaluators could help and support those relevant to perform self-evaluation through empowerment techniques by recommending measuring and monitoring tools, including constructing internal evaluation logic. This enabled those relevant to utilize evaluation to improve projects, organizations, communities, and successful performance.

(2) Community Ownership: the empowerment evaluation valued that individuals would believe, utilize what they found, and follow if they took part in establishing responsibility. Therefore, the decision making on evaluation depended on those evaluating. The evaluators did not have any right in judging the decision making.

(3) Inclusion: this was the combination of those relevant in a program from many parties and levels. Those relevant were supposed to be enhanced to agree mutually in planning and making decisions.

(4) Democratic Participation: this focused on expressing opinions toward the evaluation openly among those relevant.

(5) Social Justice: this expressed the awareness of social inequalities and the effort in improving those situations by treating toward individuals with respect in possessing human rights. It also included evaluation methodology selection, tools, data collection which was appropriate.

(6) Community Knowledge: this dealt with the belief that those in communities were knowledgeable. They constructed the knowledge body which was considered a bottom-up approach resulting in sharing and developing.

(7) Evidence-Based Strategies: these helped design intervention process contributing to propriety in line with community needs. The evaluators would help those relevant connect the knowledge body emphasizing on evidence and community knowledge body in planning and intervening to practice.

(8) Capacity Building: this generated knowledge body for those relevant by the evaluators who trained and supported the evaluation in planning, operating, and monitoring operational outcomes. It also constructed evaluation skills via self-evaluation making the evaluation as a part of planning and management.

(9) Organizational Learning: this process contributed to the improvement which only occurred when there was a process encouraging learning (organizational learning) and an organizational structure encouraging learning (a learning organization).

(10) Accountability: this supported those relevant in evaluating a program to perform their responsibilities together toward their commitment the evaluation constructed.

According to Fetterman's empowerment evaluation concept (2005) based on the theoretical model proposed in the article entitled "Empowerment Evaluation Yesterday, Today, and Tomorrow," the key concepts were to improve self-evaluation in order to apply the evaluation results to develop as necessary until the goals were achieved. The competency development concept was considered the development via training, giving knowledge, and consulting while operating. The reference evidence provision concept aimed at providing self-evaluation evidence leading to the development and improvement. This evidence expressed the operation progress with the motivation from empowerment evaluators. The summary was shown in Figure 2.10.

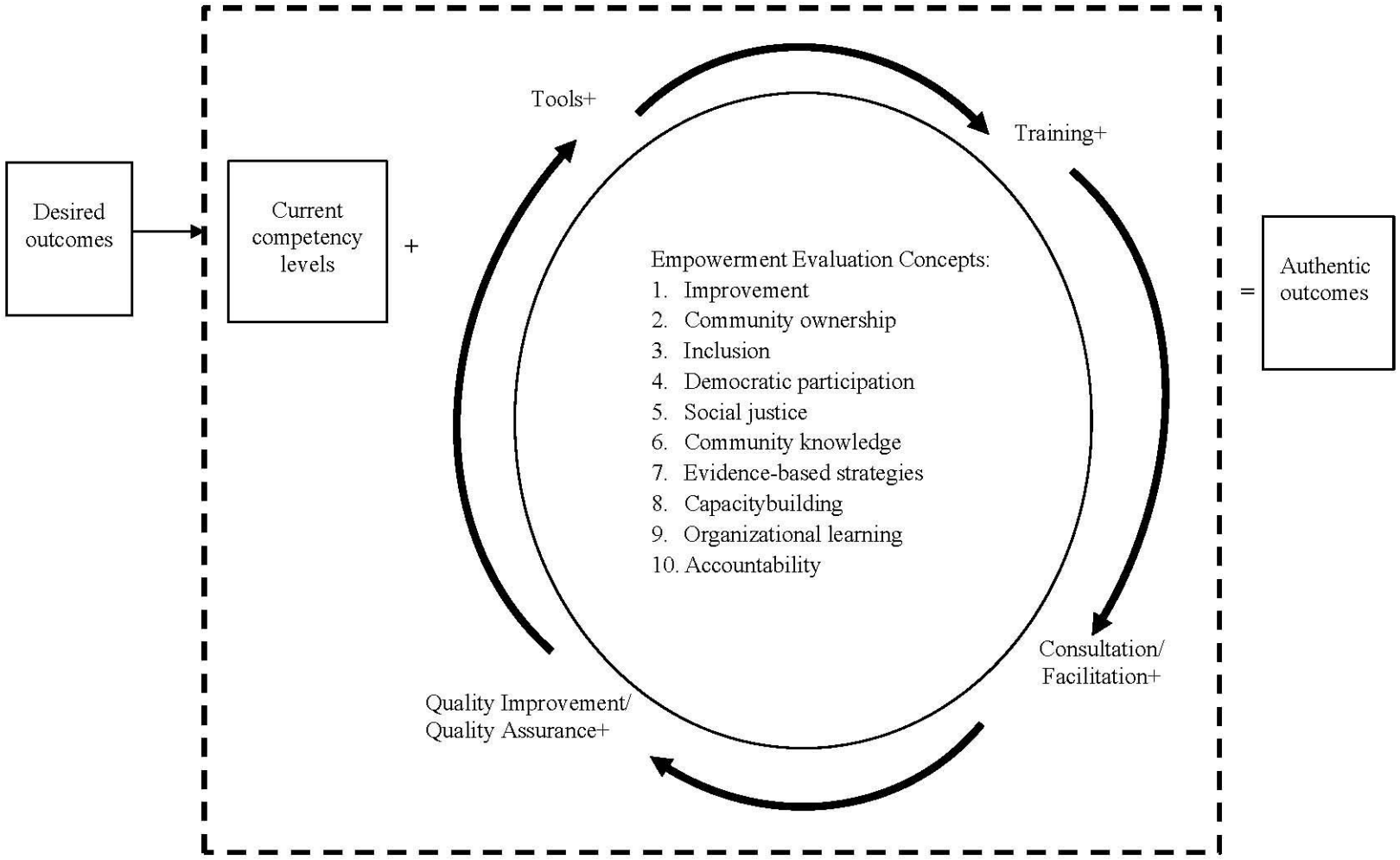


Figure 2.10 A Theoretical Model of Empowerment Evaluation (Fetterman and Wandersman: 2005)

### 2.3.4 Characteristics of Empowerment Evaluation

Due to the fact that the empowerment evaluation focus was a program development and lifelong learning, the external evaluators played a role in the empowerment evaluation facets in terms of empowerment evaluation contexts as illustrated below. (Fetterman: 1996, Suwimol Wongwanit: 2000)

(1) Training was an internal individual development process so that the internal individuals could perform self-assessment by means of giving knowledge about evaluation methods. As a result, the internal individuals possessed learning in every operational step. It aimed at constructing the individuals to comprehend the methods rather than giving various knowledge. This supported what Fetterman (2005) mentioned that "give someone a fish and you feed her one day; teach her to fish and she will feed herself for the rest of her life."

(2) Consultation and facilitation was considered giving guidelines on offering suggestions in self-evaluating for the internal individuals. This was performed by the evaluators in order to reinforce the personnel to perform their self-evaluation and determine their development directions by themselves. This helped formed a learning community.

(3) Advocacy was the utilization of their self-evaluation by proposing hem to those relevant, especially the administrators, in order to ask for resource support in operation until the required needs were achieved.

### 2.3.5 Benefits of Empowerment Evaluation



Fetterman (2005) mentioned the advantages of empowerment evaluation as listed below.

(1) Help construct evaluation techniques, methods, and knowledge as the empowerment evaluation was designed in order to support stakeholders to make a decision by themselves.

(2) Increase the integration of qualitative and quantitative methods.

(3) Due to the cooperation and summoning up among the stakeholders in evaluation process, they possessed the sense of belonging toward the evaluation process.

(4) Self-judgement in the evaluation would increase the awareness in values, needs, and necessity of the evaluation.

(5) Help support goal development and research methodology which could well construct understandings within communities in terms of evaluation design and operation.

## 2.4 Model Development Process

### 2.4.1 Definition of a Model

Nadler (1980) mentioned that a model was an application of guidelines, theories and conceptual framework in development so that it was easy to interpret various phenomena.

Robbins (1986, 1993) mentioned that a model was an abstract object which enabled us to understand phenomena or fact easier. In general, the model consisted of at least three key issues which were objectives, variables, elements, contents, and variable relationship.

Tosi and Carroll (1982) specified that a model was credible dynamic or situational reenactment from easy to extremely confused examples. It was either a physical model – library demonstrate, plane model, etc. or a subjective model used to clarify circumstances or phenomenon by means of languages or symbols.



Stoner and Wankel (1986) gave a definition of a model in that it was a conceptual construction of a set of phenomena based on concrete concepts aiming to clarify definition, relationship, and messages relevant.

Yaowadee Rangchaikul Wiboonsri (2003) defined a model in that it was a method individuals transferred their thoughts, understanding, and imagination toward phenomena or any other story so that they existed to be used in communication of various aspects, such as paintings, portraits, figures, continuous maps, or mathematic

formula. This enabled us to understand easily and present stories in various issues concisely with systematic concepts.

Phitsanu Fongsri (2007) defined that a model was an object generated or developed from concepts, theories, experience, and imagination in order to transfer it. This enabled the presentation to be understood easily, concisely, and accurately. It could be applied as guidelines for practice, and it consisted of three aspects which were objectives, variables, contents, and a systematic relationship of variables.

Sirichai Kanchanawasee (2009) mentioned that a model was considered an authentic simulation of theories or their connection to concrete practice.

In conclusion, a model referred to authentic simulation in that the individuals could transfer opinions, understanding, and imagination toward phenomena via the presentation which was easy-to-understand, concise, and accurate on the basis of systematic theories and concepts. The model consisted of three key components which were objectives, variables, components, contents, and relationship among variables.

### 2.4.2 Model Development Process

The educators both domestic and foreign mentioned about the model development process as follows:

Boonchom Srisa-ard (2003) mentioned that the model development might be performed in two steps as follows:

(1) Model construction or development involved when the researcher constructed a model based on a hypothesis on a basis of exploring and searching on theories and model concepts developed earlier in the same topic. According to the research findings or relevant research, analyzing conditions or various situations would contribute to the determination of components or various variables within the model, including various related aspects among components or particular variables or the order of each component in the model. When developing the model, the principles of reasons were considered a foundation for developing the model. The researcher might figure out the model structure prior to its modification based on the information collected from

exploring theories, model concepts, relevant research, and minor components or each variable. Then, the minor components or key variables were selected to form a model structure. The key part of this step relied on selecting appropriate components which were supposed to be clearly determined as concepts in developing a model.

(2) Model validity examination followed the model development. Since the developed model lay on a basis of theories, concepts, models of others, previous research findings, or even the experts' consideration, it was a model based on a hypothesis which was needed to collect information from authentic situations or try out in authentic situations in order to test its propriety, i.e. the model efficiency testing.

Far West Laboratory for Research and Development (Borg and Gall: 1981) summarized the cycle of research and model development which was classified into ten steps detailed as follows:

**Step 1: Research and Information Collecting**

This step consisted of a literature review, authentic observation, preparation of documentations and reports, and research in order to explore contexts and needs in developing innovation or models so that the information could be used in making decision in developing models and determining key aspects of the models. The key aspects of the models developed were supposed to cover the following three issues which were (1) overall explanation of goals in constructing the models, (2) guidelines for model utilization, and (3) messages identifying specific objectives of the models.



In general, the model details would be changeable all the time throughout development processes. However, there was supposed to be planning for constructing the models on a basis of appropriate concepts and principles from the very first step of construction the models. The criteria used to select products/models for further development were supposed to consider the following components.

(1) Would the model goals be the key educational needs or not?

(2) Were there any situations or supporting factors that were updated or advanced enough to develop that particular model in order to make it possible or not?

(3) Were there any personnel who possessed the skills, knowledge, and essential experience of developing that particular model or not?

(4) Were the model able to be developed within a proper time period or not?

**Step 2: Planning**

The plan consisted of defining skills needed to be developed, determining objectives, planning teaching, determining key content ranks, and testing the possibility in small groups. Therefore, the planning of products/models would be able to operate when the researcher explored the literature and collect preliminary information completely. This began from clearly determining specific objectives or providing criteria in judging the model efficiency. The objectives were supposed to identify to the efficient level which could develop the instruction and be in line with the time in utilizing the model. Designing was supposed to consist of contents, models, educational philosophy used, and guidelines gained from teachers and students' acceptance. Therefore, if the model goals were determined unclearly, the measured results from the users were not clear and correct as well, resulting in not being able to confirm the efficiency of the model developed. Apart from determining the objectives, the key components in the planning phase consisted of planning for various resource consumption and operating time periods in developing the models in each step. The careful planning would contribute to utilize the resources valuably covering costs. Moreover, the planning on seeking for external sponsors prior to developing the model and coordinating with the areas where the model would be tried out was supposed to be in line with the time period and model utilization processes.



**Step 3: Develop Preliminary Form of Product**

This was the preparation of instructional methods, resources employed, handbooks, and evaluation methods as determined in the details of planning periods.

**Step 4: Preliminary Field Testing**

This could be performed by conducting preliminary field tests in one to three schools, using six to twelve samples. The data were collected by means of interview, observation, questionnaire response, and data analysis.

**Step 5: Main Product Revision**

This was a model revision based on the recommendations gained from the preliminary field testing. It dealt with trying out the model on a basis of the objectives of the preliminary field testing, i.e. model/product quality evaluation. When performing the preliminary field testing with a small sample group, the evaluation aimed at content propriety and model methods rather than at model production. Consequently, the testing area selection had to be similar and in line with authentic areas that the model would be used later. When the differences of the evaluation results were found in various areas, the product/model had to be additionally tried out in order to figure out apparent summary. The caution in collecting the data via reflecting the model utilization results was the Hawthorne effect which was regarded as the evaluation results that were higher than those in real situations. This could lead to wrong model modification. Therefore, the caution had to be aware when offering highly inappropriate incentives to the sample group participating the project. If the evaluation results were higher than those in reality, the researcher would perceive the model efficiency that did not match with the reality leading to employing the evaluation results incorrectly.

**Step 6: Main Field Testing**

The main field testing dealt with employing the model in 5-15 schools with a sample group of 30-100 people. The quantitative data were collected in order to compare the results acquired before and after the utilization. The outcomes were evaluated in line with the model objectives. The comparison with a controlled group might be used.



**Step 7: Operational Product Revision**

This was the revision based on the recommendations gained from the main field testing.

As for Steps 6-7, the objectives of the main field testing were to make a decision on selecting the product/educational model in line with the development results that were found efficient. As for this step, the experimental research design was used in order to examine the product efficiency of the main field testing model. In other words, it was to examine the model success as determined in the objectives and to collect data for

developing the model so that it was more complete at the following levels. The data collection in this step had to gather via a questionnaire and an interview which covered all relevant parties used in the main field testing. When the data found from the main field testing indicated that the model was still not complete, it was essential that the model be needed to be tested in terms of the main field testing in other additional areas until it was complete. This cycle was tested and modified continuously until the defects of the model were found at the minimum level when evaluated in line with the model objectives determined.

**Step 8: Operational Field Testing**

The operational field testing could be conducted by employing the model in 10-20 schools with a sample group of 40-200 people. The data were collected via interview, observation, and questionnaires. Then, the data were analyzed.

**Step 9: Final Product Revision**

This was the revision based on the recommendations gained from the operational field testing. Steps 8 and 9 were the testing in authentic areas aiming to judge whether the educational model developed was fully ready to be employed in reality. In other words, this referred to the authentic model utilization with the determined population group. As for this step, the overall model had to be perfect and tested thoroughly until it gained well acceptance. After testing in the authentic areas completed, the data regarding the model utilization outcomes and satisfaction were supposed to be collected leading to the final model revision in an overall picture.



**Step 10: Dissemination and Implementation**

This was considered the final step of the research. It consisted of research report operation, research finding report to those relevant, publication in journals, and application in collaborating with others in order to expand the research findings and develop quality. During the model application, the data collection was supposed to be monitored in order to take the data to develop the model constantly. This final step was important and necessary in controlling the quality of the model utilization processes leading to reference and model utilization in many areas in the future.

### 2.4.3 Model Evaluation Standards

The model evaluation standards developed and employed as the guidelines in determining the quality of the models relevant to education were developed by the Joint Committee on Guidelines and Standards for Educational Evaluation and accredited by the American National Standards Institute (the Joint Committee on Guidelines and Standards for Education: 1994). The standards were classified into four aspects as follows:

(1) Utility Standards

The utility standards were proposed to ensure that an assessment would serve the information needs of arranged users. The utility standards for program assessment contained the followings.

1.1 Stakeholder Identification: the people incorporated into the evaluation and the individuals who might be impacted by the assessment had to be recognized.

1.2 Evaluator Credibility: the people driving the assessment had to be solid and skilled to perform the assessment in order for the assessment's disclosures to achieve most outrageous acceptability and affirmation.

1.3 Information Scope and Selection: the accumulated data had to be broadly chosen with the goal that it tended to relevant inquiries concerning the program and could be receptive to the requirements and interests of customers and other demonstrated stakeholders.

1.4 Values Identification: the perspectives, procedures and premise utilized to interpret the findings of the assessment were supposed to be precisely depicted so that the bases for esteem judgments were clear.

1.5 Report Clarity: an assessment report had to absolutely depict the program being assessed, including its connection, purposes, procedures and findings so that the basic information was given and clear.

1.6 Report Timelines and Dissemination: assessment reports and any colossal between time findings were supposed to be scattered to arranged users so that they might be utilized in a convenient manner.

1.7 Evaluation Impact: the way an assessment was masterminded, directed and reported was supposed to energize complete by stakeholders in order to build the likelihood that the assessment would be utilized.

(2) Feasibility Standards

The feasibility standards were proposed to guarantee that an evaluation would be practical, reasonable, political, and economical. The feasibility standards for program evaluation contained the followings.

2.1 Practical Procedures: assessment procedures were supposed to be sensible with a specific end goal in order to keep interference to a base while critical and required data was obtained.

2.2 Political Viability: while masterminding and coordinating the assessment, one had to predict the various places of particular intrigue groups so that their cooperation might be gained. This would similarly permit one to divert or kill any possible attempts by these groups to discourage assessment operations or to inclination or curve the assessment's outcomes.

2.3 Cost Effectiveness: an extraordinary assessment was supposed to be capable and deliver information of adequate esteem to legitimize the utilization of open assets.

(3) Propriety Standards

The propriety standards were relied upon to ensure that an assessment would be led legally, morally, and with due regard for the welfare of those incorporated in the assessment, as well as those affected by its outcomes. These standards were communicated as follows:

3.1 Service Orientation: assessments were supposed to be proposed to assist associations to address and sufficiently serve the requirements of the full scope of centered members.

3.2 Formal Agreements: duties of the formal parties to an assessment (what was to be done, how, by whom, when) were to be assented to in making, so that

these parties were resolved to hold fast to all states of the understanding or formally to renegotiate it.

3.3 Rights of Human Subjects: assessments were supposed to be illustrated and directed to regard and secure the rights and welfare of human subjects.

3.4 Human Interactions: assessors were supposed to respect human nobility and worth in their participation with distinctive persons connected with an assessment, so that participants were not incapacitated or hurt.

3.5 Complete and Fair Assessment: the assessment was supposed to be finished and sensible in its examination and recording of strengths and weaknesses of the program being evaluated, so that strengths could be based upon and issue areas tended to.

3.6 Disclosure of Findings: the formal parties to an assessment were supposed to ensure that the full arrangement of assessment findings along with associated confinements were made available to the people affected by the assessment, and any others with imparting legal rights to get the results.

3.7 Conflict of Interest: irreconcilable circumstance was supposed to be overseen transparently and truly, so that it did not exchange off the assessment processes and results.

3.8 Fiscal Responsibility: the evaluator's portion and use of resources were supposed to reflect sound accountability strategies and generally be sensible and ethically careful, so that expenditures were represented and appropriate.

(4) Accuracy Standards

The accuracy standards were planned to ensure that an assessment would reveal and pass on technically adequate data about the elements that decided worth or value of the program being assessed. The standards were listed as follows:

4.1 Program Documentation: the program being assessed was supposed to be depicted and filed clearly and unequivocally, so that the program was unmistakably recognized.

4.2 Context Analysis: the setting in which the program existed was supposed to be analyzed in enough detail, so that its feasible influences on the program could be recognized.

4.3 Described Purposes and Procedures: the purposes and methodology of the assessment were supposed to be observed and depicted in enough detail, so that they could be recognized and overviewed.

4.4 Defensible Information Sources: the sources of data used in a program assessment were supposed to be depicted in enough detail, so that the adequacy of the information could be studied.

4.5 Valid Information: the data gathering procedures were supposed to be chosen or created and after that realized so that they would ensure that the clarification landed at was true blue for the arranged utilization.

4.6 Reliable Information: the data gathering procedures were supposed to be chosen or developed and after that actualized so that they would ensure that the data obtained was adequately strong for the proposed utilization.

4.7 Systematic Information: the data gathered, handled, and reported in an assessment were supposed to be efficiently checked on and any blunders observed were supposed to be balanced.

4.8 Analysis of Quantitative and Qualitative Information: quantitative and qualitative data in an assessment were supposed to be properly and efficiently examined so that assessment inquiries were effectively replied and productive.

4.9 Justified Conclusions: the conclusions came to in an assessment were supposed to be unequivocally upheld, so that stakeholders could assess them.

4.10 All: Impartial Reporting: reporting methods were supposed to prepare for reshaping brought on by individual feelings and slants of any party to the assessment, so that assessment reports really reflected the evaluation findings.

4.11 Meta-evaluation: the assessment itself was supposed to be formatively and contentiously assessed against these and other related standards, so that its direct was fittingly guided and, on completing, stakeholders could eagerly analyze its strengths and weaknesses.

## 2.5 Relevant Research

### 2.5.1 Domestic Research

**(1) Research on Measuring and Evaluating Learning Outcomes in Empowerment Manner**

**Krittiya Wongkom (2004)** conducted the research which aimed at developing and evaluating the teacher development model in learning assessment based on the empowerment evaluation in accordance with the National Education Act B.E. 2542. The research sample consisted of 34 volunteers who were primary school teachers affiliated with the Division of Education of the Nakornpathom City Municipality and Nakornpathom Educational Service Area Office 1. The research tools consisted of questionnaires, interview forms, document analysis, and participatory observation. Research findings were as follows:

(1) The teacher development model in learning assessment based on the empowerment evaluation in accordance with the National Education Act B.E. 2542, consisted of three components which were teacher development planning, teacher development performance, and teacher development evaluation. All of the components contained relating elements.

(2) As for the evaluation results of the teacher development model in learning assessment based on the empowerment evaluation in accordance with the National Education Act B.E. 2542 performed by the experts, it was found that the structure of the teacher development model and the strategy in developing teachers in a manner of the empowerment evaluation in accordance with the National Education Act B.E. 2542 were suitable at the highest level. Also, they were efficient in terms of propriety, feasibility, clarity, and easiness when employed at the high to the highest levels.

(3) As for the evaluation results of the teacher development model in learning assessment based on the empowerment evaluation in accordance with the National Education Act B.E. 2542 performed by the teachers, it was found that the teacher development model possessed utility, feasibility, accuracy, and propriety. The teachers were satisfied with the teacher development model and the researcher's role in the

development process, facilitating process, support, and clarity construction with reinforcing power within learning evaluation.

In conclusion, the research in testing and evaluating in a manner of empowerment was employed to develop teachers, administrators, and participants in the planning, development practice, and development result evaluation. The researcher played a role in facilitating in teacher development processes, clarity construction in reinforcing the power within the learning evaluation, and learning systems based on teamwork.

**(2) Research on Teacher Development**

Chusri Wongrattana et.al. (2010) conducted a study on "Guidelines for Development of Teaching and Learning Performance of Teachers in Private Secondary Schools and Vocational Education and Training Sector." It aimed to study the guidelines for development of teaching performance of teachers from domestic and foreign institutions, to study on problems and requirement for development of teaching and learning performance, and to establish patterns for the development of teaching and learning performance of teachers in private secondary schools and vocational education and training sectors. The sample groups were divided into two groups which were (1) a sample group of institute executives and directors, educational supervisors and regional education executives, teachers, and students in private secondary schools totaling 378 schools obtained by using multi-stage random sampling method and (2) a sample group for an experiment on implementation of patterns for development of teaching and learning performance of teachers in private secondary schools and vocational education and training sector obtained by using purposive sampling method from private secondary schools and vocational education and training sectors totaling six schools. Data collection tools were six questionnaires and assessment forms. The research findings were shown as follows:

(1) The top three activities which were most implemented for development of teachers' performance were training, meeting/seminar, and self-practice/learning, respectively.

(2) Teachers had problems and needs for development of teaching and learning performance at a medium level in an overall picture. When considering the

specific performance, it is found that the problems and needs for development of teaching and learning performance in educational research possessed the highest mean value, followed by performance in curriculum development and performance on learning management, respectively.

(3) The development of the patterns of training under the supervision of teachers' network staff was comprised of four steps which were (1) a study on teachers' needs, (2) teacher training, (3) implementation of knowledge gained from training to actual practice, together with follow-ups, supervisions, and feedbacks, and (4) the summary of teachers' performance and feedbacks from teaching peers.

**(3) Research on Evaluation of Reading, Critical Thinking, and Writing**

**Rumpoo Putrawan (2005)** conducted a study on "Development of Instruments to Measure the Abilities of Reading, Analytical Thinking, and Communicative Writing of the Students of the Third Stage of Classes under the Basic-Education Commission in Songkhla Province." The aim of this study was to develop instruments to measure the abilities of reading, analytical thinking, and communicative writing of students of the third stage of classes. The quality of the instruments was ascertained, and norms and manuals constructed. The instruments were three tests for writing answers – Test 1 measuring reading ability, Test 2 measuring analytical thinking, and Test 3 measuring communicative writing ability. The sample selected by means of multi-stage sampling consisted of 1,214 students of the third stage of classes in schools affiliated with the Office of the Basic-Education Commission in Songkhla Province in Academic Year 2004. It was found that the reliability of the three tests by means of the alpha coefficient formula ranged in the value from 0.76 to 0.94.



**Ananda Santhitiwanit (2008)** conducted the research on "Development of Item Specifications of a Test Integrating Indicators of Reading, Analytical Thinking, and Writing Abilities with Indicators of Content Subject: An Application of Multidimensional Item Response Theory." The objectives of this research were (1) to develop, verify the quality, and try out the item specifications of a test integrating the indicators of reading, critical thinking, and writing abilities with the indicators of content subjects for Grade 9 students and (2) to develop and verify the quality of the tests developed from test item specifications by an application of multidimensional item

response theory. The sample groups consisted of 697 Grade 10 students in science strand and 673 Grade 10 students in mathematics strand, gained from a multi-stage random sampling. The research tools were interviewing forms, questionnaires, evaluation forms, test item specifications, and ability tests that were in a mixed format and were multidimensional within-item tests. The research findings expressed that the indicators for abilities in reading, critical thinking, and writing within science learning contents in Grade 9 consisted of eight indicators, namely two indicators in reading ability (reading for main ideas and application of knowledge gained from reading), three indicators in analysis ability (analysis from the passages, numerical analysis, and logical thinking), and three indicators in writing ability (descriptive writing, expanding from the passages, solution-approach writing, and experimental design writing).

In conclusion, the research in reading, critical thinking, and reading was considered teachers' testing form development influencing the abilities in (1) reading for main ideas of the passages, thinking critically in order to identify relation of the data via evidence reference and (2) writing in order to express opinion toward the passages leading to solutions and experimental design of basic education students.

**(4) Research on Thinking**

**Pinda Varasunun (2011)** conducted a study on "Evaluation Capacity Building in Test Construction for Elementary School Teachers Using Critical Friends." The purposes of the research were (1) to assess the teachers' need in test construction, (2) to build evaluation capacity in test construction of teachers, and (3) to study learning community and sustainability of evaluation capacity building in test construction of teachers using critical friend's network concept. Participants were 18 elementary school science teachers. Participants used websites as a channel to create a learning community. Data were analyzed by content analysis and descriptive statistics. The research results were as follows:

(1) Most of the constructed items measured knowledge, while O-NET test mostly measured comprehension and analysis.

(2) After the project, teachers had more knowledge and skills in test construction as well as more positive attitudes towards test construction.

(3) Teachers had constructed the tests and applied the critical friend concept via websites, shared knowledge regarding the test construction and the critical friend concept. In addition, teachers used the critical friend concept to develop themselves in the test construction, teaching, and create learning community.

According to the aforementioned research, it was concluded that developing teachers in order for them to be able to develop tests by themselves based on the critical friend concept with teacher peers within the same schools was considered a means of developing test quality. Teachers could apply the critical friend concept to reflect themselves resulting in developing more qualified tests, employing in their instruction, and developing learning communities.

**(5) Research on Authentic Assessment**

Supaporn Thummawichaipun (2007) conducted a study on "Causal Factors Influencing Authentic Assessing Ability of Science Teachers at Primary Level." It aimed to study the causal factors influencing the authentic assessment ability of science teachers in primary level. The sample consisted of 500 primary school teachers in the central area using primary schools under the Office of the Educational Area, selected by using a three-stage random sampling technique. The research instruments used for collecting data were a questionnaire concerning social support, attitudes towards science teaching and authentic assessment, self-efficacy towards science teaching and authentic assessment, working motivation and authentic assessment behavior of science teachers, Statistics used for analyzing the data were a basic statistics and path analysis.



The study revealed that the causal relationship model which was significantly consistent with the empirical data at .05 levels were as follows:

(1) Authentic assessment behavior of the science teachers was directly affected by self-efficacy toward science teaching and authentic assessment, and working motivation.

(2) Authentic assessment behavior of the science teachers was indirectly affected by social support, attitudes toward science teaching and authentic assessment,

and self-efficacy toward science teaching and authentic assessment, pass through working motivation.

### (6) Research on Evaluation Model Development

**Kanyarat Phuengbanhan (2010)** performed a study on "Development Evaluation Capacity Building Model for Health Care Staff" which aimed to develop evaluation capacity building model for health care staff. This research consisted of four steps which were (1) studying the documents and contexts of Uttaradit Hospital, (2) creating the evaluation capacity building model, (3) trying out the evaluation capacity building model, and (4) evaluating the evaluation capacity building model. The subject involved in this study was identified through textbooks, articles, research, administrators, and health care staff at Uttaradit Hospital. The research instruments were the recorded documents, observation records, semi-structured interview, and the questionnaire. The statistics used for data analysis were mean, percentage, standard deviation, and t-test.

The results of this study showed that the evaluation capacity building model consisted of three components which were (1) identified organizational contexts, (2) evaluation capacity building process, and (3) sustainable evaluation practice. According to the results gained from trying out the evaluation capacity building model, it was found that there were five projects that were evaluated successfully. These projects allowed the staff to have a chance in sharing knowledge regarding evaluating the projects together. The health care staff who was equipped with the evaluation capacity possessed the evaluation capacity and evaluation attitudes higher than those before participating in the evaluation capacity building projects at a statistically significant level ($p < .001$). The evaluation results of the evaluation capacity building model revealed that the evaluation capacity building model played an important role in building evaluation capacity at an individual level, a team level, and an organizational level. This enhanced personnel to use the evaluation results in developing projects and organizations much better.

### 2.5.2 Foreign Research

**Research Reports on Reading, Critical Thinking, and Writing**

Billy Mcclune and Ruth Jarman (2010) conducted a study on developing knowledge, skills, and attitudes toward sensible reading from scientific news. The research findings revealed that the foundation of developing reading sensibly consisted of five aspects which were scientific knowledge, writing and language knowledge, knowledge regarding news, newspapers, and journals, sensible reading, thinking, and writing skills, and attitudes toward science subject.

According to the study of relevant research, it could be summarized that Group 1 research was conducted for evaluating and developing teachers via applying the empowerment evaluation concept. The researcher played a role of a teacher developer, facilitator, and supporter of those mentioned so that they possessed their own power and were able to determine development directions by themselves. Group 2 research dealt with the evaluation and development in reading, critical thinking, and writing. There was a testing form construction in order to evaluate reading, critical thinking, and writing via notes and the research regarding developing teachers to possess the abilities in constructing thinking tests. Group 3 research dealt with teacher development research models, namely the perception of their own abilities and operational motivation. Group 4 research dealt with the research that developed the abilities in thinking sensibly in science of students. Necessary factors consisted of reading and writing skills and knowledge in what studied, including positive attitudes toward science subject. This could lead to achievement in developing the abilities in reading sensible.



## 2.6 Research Framework

According to the study of concepts, theories, and relevant research, the researcher presented the research framework of the evaluation model in developing science teachers' instructional management that enhanced the abilities in reading, critical thinking, and writing of basic education students. This framework proposed the model picture which consisted of (1) the guidelines of general instructional management,

reading, critical thinking, and writing of the Bureau of Academic Affairs and Educational Standards (2008), (2) the concepts of educational evaluation (Nevo: 1983, Sirichai Kanchanawasee: 2013, and Yaowadee Rangchaikul: 2005) consisting of goal determination, objects evaluated, evaluation methods, value judgement on evaluation results, and application of evaluation results, (3) the empowerment evaluation model of Fetterman (2005) consisting of instructional evaluation, evaluation result application via training to give knowledge, consultation and facilitation, monitoring on evaluating instructional operational conditions, knowledge, understanding toward the instructional management, needs and necessity in developing the instructional management enhancing the abilities in reading, critical thinking, and writing of basic education students, components and indicators in managing instruction of science teachers that enhanced the abilities in reading, critical thinking, and writing, (4) the concepts of model evaluation standards of the Joint Committee on Standards for Education consisting of utility, feasibility, ethical propriety, and accuracy, and (5) the research regarding instructional management evaluation model of Chailikit Soikasem (2004), Kritsana Kitdee (2006), and Sathida Sakulrattanasakulchai (2010), including the research on competency development of Chusri Wongrattana (2010). These were applied to determine the research framework as shown in Figure 2.11.

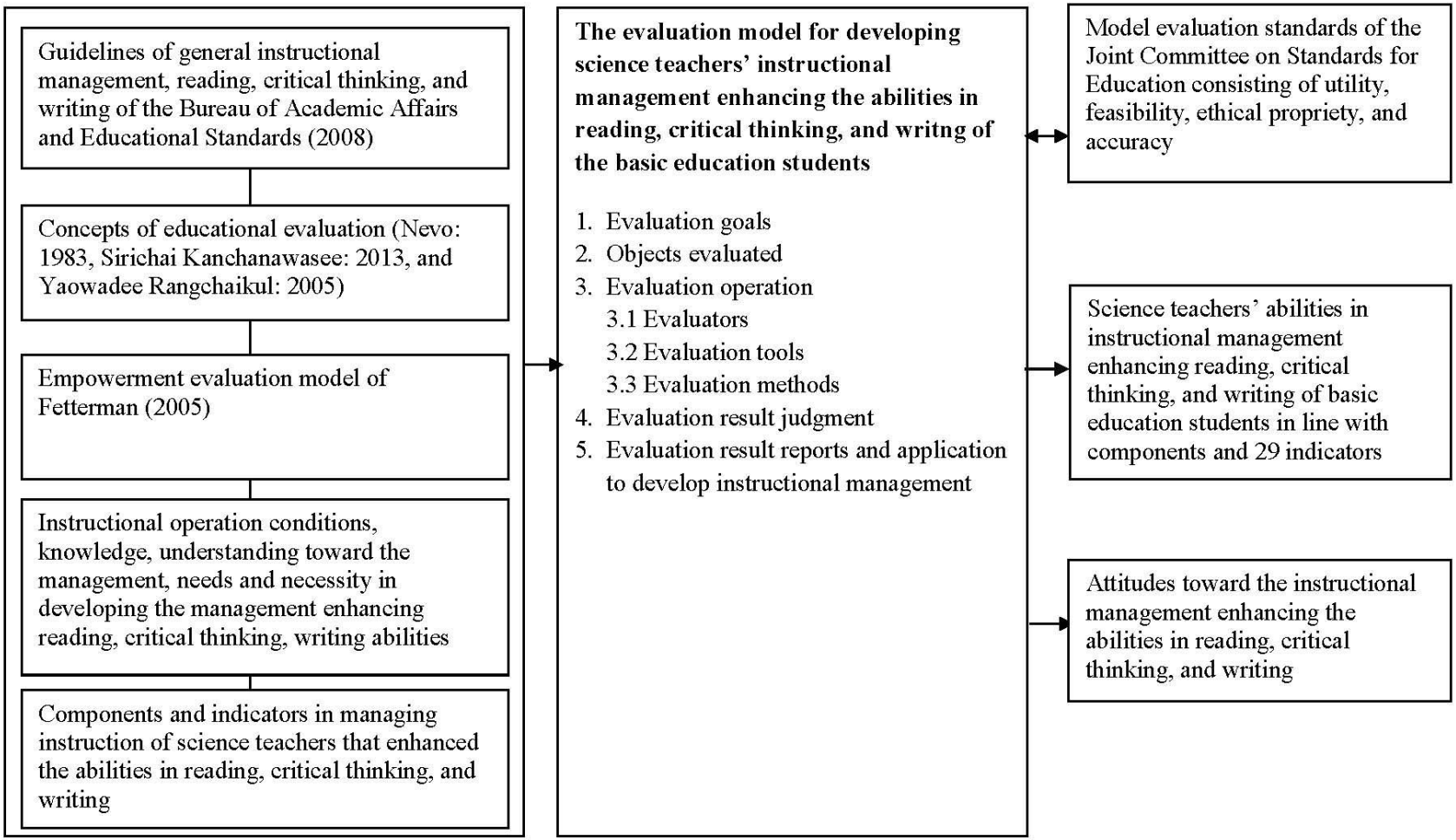




Figure 2.11 Research Framework