CHAPTER 2

Literature Review

This research entitled ‘Strategy Development to Enhance Critical Thinking for Nursing Students’ has been studied, explored, and reviewed a range of information sources that included textbooks, literature, and research articles. The topics covered in this review were:

1. Strategies and Related Concepts
2. Critical Thinking
3. Concepts and Learning Theory of Promoting Critical Thinking
4. Strategies to promote Critical Thinking for Nursing Students
5. Related Research on Strategies to promote Critical Thinking
6. Research framework

1. Strategies and Related Concepts

Strategies are essential factors in education. According to the Thai Qualifications Framework for Higher Education, which is found in the curriculum development section of the curriculum category, curriculum developers need to address strategies (Office of the Higher Education Commission, 2009). Doing so leads to an understanding of an action plan that will in turn lead to the achievement of planned objectives. Organizations, and in particular education-related organizations, face constant challenges, threats, or opportunities as circumstances change. Organizations, therefore, need clear strategies and plans if they are to maintain focus and direction. However, when formulating educational strategies, educators tend to embrace the same principles as those held by business managers.

1.1 Definition of Strategies

Educators and marketers describe the meaning of 'strategies' as used in the fields of business, marketing, and education, as follows.

The Coordinating Center for Budget Systems, Department of General Education (2009), indicates that the term 'strategies' has its roots in the Greek terms '*stratos*,' translated as battalion, and '*agein*,' translated as leading. The meaning of the term together is then 'generalship', or 'stewardship'. The Royal Institute Dictionary, B.E. 2542(http://www.royin.go.th/th/ knowledge/detail), states that this term is used in a military sense to describe methods and tactics employed to win battles. Currently, it is used in a general sense to denote procedures and processes used to succeed in important missions.

Heuser (2010) stated that 'strategies' are ways of securing political results, and include the use of threats and force. Strategies are employed to win conflicts between at least two sides that interact with each other. Woraporn Siripokakij (2007) stated that 'strategies' are procedures or guidelines that an organization uses to present values to customers in order to lead the organization to success. Moreover, Sanoa Thiyou (2007) defined the meaning of 'strategies' as an entire plan of operation that determined directions for resource management in order to achieve the long term goals of the organization.

Somchok Pakapaswiwat (2010) indicated that 'strategy' refers to an analysis of the external environment of a business in order to explore opportunities and risks, and an analysis of the internal environment of a company in order to identify weakness and strengths. Rogers (1992) said that effective strategies should explain practices leading to achievement, value building, and positive image of stakeholders. Hence, strategies are an important and necessary part of all planning processes that can lead a company from 'Where you are' to 'Where you want to be.' In addition, Mintzberg and Quinn (1996) stated that strategies are patterns and maps representing a unity of aims, policies, and activities within organizations, and are means by which the organization can be seen, and can function, as one.

From the above definitions of strategies by scholars and business managers, we

can conclude that strategies are plans or guidelines that are based on critical thinking processes and on both internal and external environmental analysis, which can determine the success of a business or educational institution. The implementation should lead to results consistent with the mission aims and to a high level of performance in accord with the planned goals.

1.2 Types of Strategies

Scholars have produced various categorizations of strategies, and some of them are discussed over the following paragraphs.

Sirot Ponpuntin (2007) defined four categories of strategies:

1. Active strategies are characteristic of organizations in a situation with high opportunities and strengths. These organizations have the ability to expand the business and the opportunity to develop the organization.
2. Adaptive strategies are characteristic of organizations that have weaknesses, but also have potential and resources to adapt and strengthen themselves.
3. Declining strategies are often characteristic of organizations that have many strong points but face unfavorable circumstances. Such organizations cannot expand their business and therefore slow down.
4. Reducing strategies are characteristic of organizations that have weaknesses and face hostile external environments. Such organizations cannot develop and require major changes such as downsizing in order to survive.

Somchai Pakapaswiwot (2010) categorized strategies into 4 types as follows:

1. Stability strategies: which are about maintaining the management and production aspects of the business.
2. Growth strategies: aim at expanding or transforming an old business into a new one, and typically involve new forms of marketing and increased production.

3. Retrenchment strategies: concerned with winding down and ending a business.

4. Mixed strategies: concerned with managing a business using a combination of three strategies reviewed above.

The categories mentioned above closely correspond to those categories defined by Vichan Vitayaudom (2010), who outlined four types of strategies:

1. Growth strategies: strategies that organizations adopt when they attempt to accelerate and grow their product ranges. Such strategies typically involve analysis of product sales, product expansion, and an increase in the number of employees. Many people who have faith in the philosophy that an organization needs to be developed in order to survive value and adopt growth strategies.

2. Retrenchment Strategies: strategies associated with downsizing and exiting. The concept behind this type of strategy is that a reduction of excess and unprofitable parts is necessary, and actions like replacing higher paid employees with new lower paid ones, halting the production of products with low sales volumes, and allowing management by other organizations may be taken. Just how long organizations adopt such strategies depends on economic conditions.

3. Stability Strategies: strategies that an organization adopts when it is pleased with its current overall performance. Stability strategies are adopted in order to maintain the current situation.

4. Mixed Strategies: are commonly applied in business. Organizations often implement mixed strategies.

Sakda Wongvaraniran (2012) characterized strategies into multiple levels. Each level is composed of different types of strategies.

1. Corporate Strategies are strategies that consider the overall picture of the organization. They determine the directions of an organization with regard to factors like productivity, product modification, organization

expansion, contraction, and retrenchment. A corporate strategy contains the following sub-strategies:

1.1 Stability Strategies: strategies that are used when the external environment does not support expansion according to missions or targets. However, the environment is appropriate for the current business activity. Therefore, the organization needs to be slowed or stabilized at current conditions, temporarily. If opportunities arise, the organization can apply a growth strategy and move into an expansion phase. Stability strategies can be concerned with:

1.1.1 Maintenance of status quo

1.1.2 Fixed rate of return

1.1.3 Sustainable growth

1.2 Growth Strategies: strategies applied when an organization has favorable external opportunities and a positive internal environment. Consequently, the organization can manage strategies that strengthen and expand it. There are three sub-strategies as followed:

1.2.1 Concentration: aim at raising the level of distinctness of the existing products/services.

1.2.2 Diversification: aimed at building on existing products/services and moving into new products/services.

1.2.3 Joint Ventures: joining forces with other organizations in order to take advantage of the prominent points of each organization and generate benefits.

1.3 Retrenchment Strategies: are strategies used when the organization faces a crisis, and internal and external environments are not conducive to the continuance of smooth operation. There are four kinds of retrenchment strategies:

1.3.1 Turn Around Strategies: focused on size and cost reduction of the unnecessary parts of a business, and on

the development of the rest.

1.3.2 Divestment Strategies

1.3.3 Captive Company Strategies

1.3.4 Liquidation Strategies

2. Business Strategies are strategies established by an organization for purposes of industrial competition. Productivity and division into production groups depend on the complexity of jobs in that organization. These are strategies that
promote competitive advantage. Four areas of activity can be identified:

   2.1 Differentiation in products, after sale service, images, innovation, technology, reputation, production consistency, production status, and trademarks.

   2.2 Cost Leadership

   2.3 Quick Response

   2.4 Market Focus

3. Functional Strategies are strategies that impact at the operation level, in areas like finance, academia, human resource management, research and development, manufacturing, and marketing.

In conclusion, strategy determination depends on internal and external environments, managers, and stakeholders involving in strategic planning. Strategies determine the directions of an organization. Researchers classify strategies into different types. However, all the strategies reviewed above are in fact applied in business. In order to take the ideas of business strategies and apply them in educational missions, strategies should be modified into organizational, unit, and sub-strategies

1.3 Strategic Planning

Strategic planning is a systematic process that has been used in the military for a long time. It eventually found its way into business management and the

education system, and became an important part of organization development. Wonchai Meechat (2552) proposed that planning strategies or strategic planning is a perspective of the organization as one unit. Strategic planning covers an entire organization. There needs to be a consistency of planning which stretches from the organizational plans to the operational plans. Strategic planning consists of the following processes:

1.3.1 Mission Determination

The mission determination is an essential item that an organization needs in order to proceed. It represents an attempt and a commitment to convey the outcome of the mission. The mission determination is based on the environment of the organization and is under the authority of the organization. In business, the mission determination is stated in accord with the objectives of the organization in a memorandum (Vonchai Meechat, 2552).

1.3.2 Environment Analysis

It is through analysis of the environment of an organization that changes to the organization's internal and external operating conditions are detected and measured. Environmental analysis provides a sound basis on which continuous adaptation can occur. Environmental analysis is a very important part of strategic planning because it is offers a foundation for the strategy determination of the organization, and directions by which guidelines can be met. Analysts can be employees in the organization, or specialists from outside. As mentioned, environmental analysis examines the parameters of strength, weakness, opportunity, and threat, which are collectively known as SWOT (S = Strength, W = Weakness, O = Opportunity, T = Threat). Environmental analysis can be divided into two parts:

1) External Environment Analysis

In external environment analysis, analysts generally have to consider two features:

1.1) The general environment, which is the environment that does not directly impact on systems or implementation, and includes the PEST factors (P = Politics, E = Economic, S = Social and Cultural, T = Technological). The analysis of the overall external environmental picture focuses on those environmental elements that are indirectly related to organization.

1.2) The task environment is the environment that directly affects the performance and success of the organization. The elements of this environment are particularly important to the operation, and some of these key elements are the customers, suppliers, rivals and potential entrants. Customers are the main factors in the success or otherwise of an operation because they hold the trading power. Suppliers are individuals or organizations that make available the resources for manufacturing or provision of services. Rivals are other organizations that run similar operations. Official and non-official combination with rivals can reduce the risk of business failure. Finally, potential entrants are other organizations that threaten to offer products or services to the same groups of customers.

External environment analysis for strategic planning informs the organization about opportunities and threats from the environment that can, or can potentially, impact on the operation of the organization. The analysis requires knowledge, ability, skills, and experienced analysts in order to accurately understand and predict changes to the environment.

2) Internal Environment Analysis

Internal environment analysis is analysis of conditions within an organization. The organization, for purposes of the analysis, is usually divided up into parts or subsystems. This division into

subsystems helps analysts to better understand the internal workings of the organization, and thus to more effectively analyze its weaknesses and strengths. Factors typically analyzed include financial status, personal capacity, research and development capability, and human resource management.

1.3.3 SWOT Analysis and Strategic Management

Internal and external environment analysis examines an organization's weaknesses and strengths and opportunities and threats. Managers use this essential information in determining and managing their next strategies. To manage strategies, analysts generally put the analyzed information into tables; this technique is called TOWS Matrix analysis (Wheelen & Hunger, 2006). The analytical steps are as follows:

1) Entering data for analysis

Internal environment analysis is primarily concerned with the weaknesses and strengths parameters, whilst external environment analysis is primarily concerned with the opportunities and threats parameters. After conducting detailed research of all aspects of the environment, the data is then entered into the table for analysis and identification of next strategies. Therefore, effectiveness of strategic determination is based on analytical ability. If the analysis is not sufficiently detailed, strategic planning will be incomprehensive and inappropriate.

2) Relationship Analysis

Relationship analysis between strengths and opportunities, weaknesses and opportunities, and weaknesses and threats leads to strategy determination. There are 4 types of analyses:

2.1) SO Strategies are determined on the basis of the analysis of strengths and opportunities.

2.2) ST Strategies are determined on the basis of the evaluation of strengths and threats. Although the organization may have

external constraints that it cannot control, the organization is able to use its strengths to protect itself from threats.

2.3) WO Strategies are determined on the basis of weaknesses and opportunities analyses. Organization can try to develop and use new ideas to counter weaknesses.

2.4) WT Strategies are determined on the basis of analyses weaknesses, threats, or uncontrolled constraints.Strategy determinations are then made based on a TOWS Matrix analysis. This information is summarized on Table 2.1

Table 2.1 Environment analysis of the organization according to TOWS Matrix

	Opportunity		
Strength	SO Strategy	WO Strategy	**Weakness**
	ST Strategy	WT Strategy	
	Threat		

Source: Wheelen & Hunger, 2006

1.3.4 Determination of an Organization's Objectives

The objectives adopted by an organization that are part of the implementation of strategy should be aligned to organization's mission. Common characteristics of effective objectives are shown in the following list:

1) Specific
2) Measurable
3) Agreeable
4) Realistic
5) Time Frame
6) Challenging
7) Documentation

It is important that an organization sets objectives that are neither too difficult nor too easy. If the objectives set are too difficult, practitioners may feel that they cannot achieve them, and will thus not implement them. If the

objectives set are too easy, practitioners may not try with their full potential to implement them, as they feel that objectives can be achieved effortlessly. Moreover, objective determination should be explicit. Objectives must be clear and well-defined. Practitioners cannot understand and implement objectives that are vague and too broad. Organization objective depends on level of types of setting, which is occurred by situation analyzing. Each level of strategy has to relate, harmonize and get same direction and should connect goal to practice. It makes practice effectively. Organization objective sets are three levels as follow.

1.3.5 Strategy Determination of the Organization

This is the process of diagnosing situations. Each level of strategic plan should be related, and moving in the same direction; in other words, there must be a connection between goals and methodology. This helps the organization operate effectively and achieve planned organizational goals. Strategy determination is divided into 3 levels:

1) Corporate Level Strategies

Corporate Level Strategies are strategies that take into account the overall picture. They are generated from the analysis on environment, component, and from the organization's mission. There are two ways by which corporate level strategies are determined:

1.1) Strategy Determination by Grand Strategies

This method involves the use of SWOT analysis. The internal and external environments of the organization are researched, and data is entered into a blank matrix with two axes. The horizontal axis displays the weaknesses and strengths of the organization. This data came from the internal environment analysis. The vertical axis displays opportunity for development and threats that may occur during operation. This data came from external environment analysis.

1.2) Strategy Determination by Portfolio Strategies

This method involves analysis of sub-units within the organization. Each sub-unit encounters different circumstances. The organization then formulates overall strategies that include the missions and analytical results from all sub-units. This method is regularly applied in business. For example, a main company has many affiliated companies. Each affiliated company has different missions. Therefore, the overall strategy determination needs to include input from each affiliated company.

Corporate level strategies, which include both grand strategies and portfolio strategies, are strategy determinations that view the big picture of the organization. Even though an organization may have many missions and subunits, these strategies lead to identifying the directions of the entire organization.

2) Business Level Strategies

Business Level Strategies are strategy determinations that sub-units conduct in accordance with the relevant corporate level strategies. In other words, they are strategies that are primarily to do with accomplishing business objectives. Business level strategies cannot be successful on their own. They have to operate in close correspondence with corporate level strategies.

3) Strategy Determination at the Functional and Operational Level

These are strategies that are to do with methodology, operations, staff, and resources. They are the nuts and bolts of achieving the planned goals of the organization. In practice, great care is needed in the application of functional level strategies. If they are implemented incorrectly or sloppily, the goals of the organization cannot be achieved and the business may sustain considerable damage.

1.3.6 Putting Strategies into Practice

Putting strategies into practice is a process that significantly influences the success of an organization. It is at this point that we see the procedures of the organization, which are associated with organization management, in various dimensions.

According to Somchai Pakapaswiwat's opinion (2010), strategic planning utilizes analytical processes that have 5 features:

1. Analysis of changes in the external environment: this analysis explores factors such as economics, politics, industry and business, which are factors in the external environment that affect business in the present and in future. This analysis of changes helps an organization adapt to change quickly. Positive impacts on the organization are called opportunities, and negative impacts are called dangers, obstacles or threats.

2. Internal environment analysis of an organization involves looking at human resources, the financial situation, data information systems, technology, organizational structure, value, and communications. Effective analysis of an organization requires the acquisition and analysis of similar data from competitors. This comparison with competitors can assist in the process of identifying the weaknesses and strengths of the organization. If the organization is superior to competitors in key aspects, these are counted as strengths. On the other hand, if the corporation is inferior to the competitors in certain key aspects, then such minus points are said to be weaknesses. If the analysis lacks information about the state of competitors' situations, the analysis of weaknesses and strengths is based solely on predictions.

3. Strategic planning consists of three stages - long term, medium term, and short term. Long-term plans determine directions, which are called strategies directions. They are abstract. Medium term and short-term plans are more concrete and describe explicit concepts and actions. They are put into practice according to time and performance guidelines.

Medium term plans are shown as performance indicators. Short term plans contained detailed operational actions, operation time, and persons in charge.

4. Strategic planning involves finite steps and fixed and well-defined systems. All activities are correlated to each other and tied into the structure and time frame to achieve the stated goals.

5. All strategies must be realistic and practical.

1.4 Strategic Management

Organizations do not operate in a vacuum. They are neither isolated nor individual entities, and exist in the context of an evolving environment. An organization has to have a clearly identifiable operating position. Therefore, strategic management provides the means for the management of organizations in changing environments. The conceptual and strategic management tools it brings enable high performance management of organizations (Thosaporn Sirisumphan, 2005). The emphasis is on strategic decision making, which is different from other decision making; strategic decision making is crucial to the long-term future of the whole organization.

Sanoa Thiyou (2007) explained that strategic management is decision making and implementation in order to achieve specified organizational outcomes that involve strategy determination, implementation, and evaluation. Nattapan Kajonranan (2009) mentioned that strategic management is a process that consists of environmental analysis, information for decision making, planning, and implementation guidelines, and strategic control of organization operation. The aim is to ensure that performance capability is in sync with changing operational environments. Ultimately, an organization is developed to compete effectively in an industry. Supanee Saritvanit (2010) argued that strategic management is organization management in general, and its aims are to generate competitive strategies, and to take advantage of the weaknesses of other organizations. Strategic management requires analysis of the external and internal environment in order to create a strategic plan appropriate to the organization's strengths, weaknesses, opportunities and obstacles. Furthermore, organizations can

implement their strategic plan to achieve their intended objectives.

Strategic management is holistic organization management that focuses on generating strategies, and seeks to minimize uncertain decision making, but it requires experience, a clear vision of problems, and coordination with other units in the organization if organizational goals are to be achieved. Strategic management requires a commitment from all sectors of an organization. Moreover, the efficient use of an organization's resources depends on the explicit directions of strategies, and a clear understanding of corporate members. In addition, it must take into account the importance of stakeholders in organizations. Strategic management is extremely beneficial to an organization. Nattapan Kajonranan (2009) summarized that:

1. Set directions help executives understand the changes of the internal and external environments that influence an organization, acquire visions for the future, and define the purpose and direction of operations in the organization.

2. Harmony is necessary for unified strategic management. Strategic management generally focuses on strategy determination, and resource monitoring and control. Therefore it is necessary if the key components of an enterprise are to be managed in a balanced fashion.

3. Providing readiness make members in the organization ready to deal with changes and take on challenges. The analysis of the internal and external environments that influence an organization and its strategies allow members of the organization at all levels, from executives to employees, to understand and recognize the potential of the organization.

4. Improving the competiveness of an organization is a strategic challenge that helps improve the capacity of the management executives, builds their knowledge and degree of readiness, and develops their abilities to implement strategic plans.

Faculty of Education, Chulalongkorn University, Office of the Public Sector Development Commission, and the Office of the Basic Education Commission

(2010) compare education management to strategic management. They compare education management by government to a large ship; strategy is the rudder that determines the direction and is an engine that powers the ship to reach the desired destination. Therefore, strategy is what institutions do to contribute to their success, and strategies vary from institution to institution. Strategic management requires an answer to these four questions:

1. Where do we want to be?
2. Where are we now?
3. How do we get there?
4. What do we have to do or change in order to get there?

1.5 Elements of Strategic Management

1.5.1 Direction Setting

Direction Setting is an indication of the direction in which the institution is heading. It includes visions, missions and strategies of the institution. The visions or missions of the institution are converted into specific strategies and operational goals.

1.5.2. Strategic Analysis

Strategic Analysis is the analysis of a) various factors related to the institution from both external and internal factors; b) changes in order to understand the status of the institution; and c) resources and capabilities of the institution that are strengths and weaknesses of the institution that lead to opportunities and constraints of the institution. Strategic analysis brings about competitive advantage as well.

1.5.3 Strategic Formulation

Strategic Formulation is an application of data and knowledge from direction setting and strategic analysis. Strategies at multiple levels are formulated, and the most appropriate strategies for institutions are selected. Strategic formulation includes the formulation of the best guidelines, methodology, and the activities of the institution that can help the institution achieve its mission and defined objectives against a background of shifting external and

internal factors. Strategic formulation must be aligned with strategic planning. Sometimes strategic planning is strategic formulation; however, strategic formulation does not always become strategic planning (Sirot Ponpuntin, 2550).

1.5.4 Strategic Implementation

Strategic Implementation is a final and very important step in strategic management. It is the process of implementing strategic plans, based on defined steps. It involves the management of human resource structures and systems collaboration in order to achieve the proposed objectives.

According to strategic management from the self-learning tool (Faculty of Education, Chulalongkorn University, Office of the Public Sector Development Commission, and Office of the Basic Education Commission, 2553), this is connected to the elements of management. Strategies that the members in the organization should set the questions to find answers are in the Figure 2.1

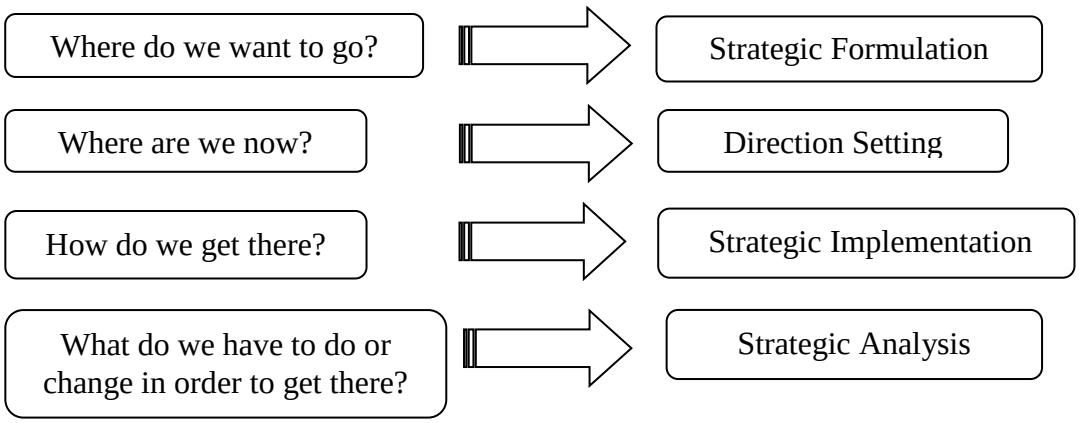

Figure 2.1 The relationship between strategic questions and elements of strategic management

Source: Faculty of Education, Chulalongkorn University, (2553)

1.6 Processes in Strategic Management

The processes in strategic management are classified into 3 steps as follows (Sirot Ponpuntin, 2549)

1.6.1 Strategic Planning

Strategic planning consists of the determination of vision, mission, strategic

issues, goal, indicators, and strategies.

1) Visions

Visions are the final destinations that one desires to reach. The actualization of a company vision usually requires a long-term plan of at least 5-3years in duration. The principles of creating a vision are as follows:

1.1) Creating a vision based on the conclusion, or end-point. Strategies include the main strategies, and extended strategies for the implementation.

1.2) A vision initiates and stimulates ideas in the minds of participants who collaborate and strive for the best outcomes. Managers should define positive visions.

2) Missions

Missions indicate the scope of actions or performance of a company. They are considered as the philosophies of company operation, and are integral to a company attaining its vision. The principles of writing missions are as following:

2.1) Missions can be written as causal description or listed items.

2.2) Missions should be used to define strategies that cover environmental analysis and must be achievable.

3) Strategic Issues

Strategic Issues are important points that a company should focus on, and they should be related to the mission.

4) Goals

Institutions need to achieve goals, or desired outcomes. Furthermore, goals need to be clearly specified, and are important parts of: running a business; serving customers; managing resources; and building

capacity. Goals include indicators of performance and are based on a mission.

5) Key Performance Indicators (KPI)

KPI are indicators used to evaluate success. They are based on the mission.

6) Targets

Targets are the level of success that a company wants to achieve. They enable comparison with other organizations to be made (Bench Marking).

7) Strategies

Strategies are guidelines, procedures, or measures that contribute to the achievement of the desired goal, indicators, and defined targets.

8) Strategy maps

Strategy maps are diagrams that show the organization's relationships. They can help the organization's members better understand the paths involved in the implementation of the strategic plan. Strategy maps are beneficial for evaluating the level of success of an organization. Moreover, they are used as a framework for evaluating the performance of the organization.

1.6.2 Strategic Implementation

Strategic implementation refers to transforming a strategy map into an action plan. It is the process that puts plans and strategies into action to reach goals. A written implementation plan should include information on activities, timings and budgets. Furthermore, the duration of each activity should be included. Implementation requires the input and cooperation of all parts in the company.

1.6.3 Strategic Control

Strategic control is the process of monitoring, evaluating, and reviewing the

strategic plan by making an agreement, and having the tools for tracking progress and achievement. Such tools include self-assessment reports (SAR) and terms of reference (TOR).

In conclusion, a strategy is a plan or an approach based on analytical thinking and consideration of both internal and external environments that contributes to the achievement of outcomes consistent with the mission, and to performance that meets the goals.

1.7 Strategic Planning in Education

Strategic planning has been used in Thailand's national education system for some time. There has been a determination of the policy, directions, and budget allocation, so that educational institutions can implement the policies of the national plan. Educational institutions must meet the needs of the community and stakeholders. Strategic planning requires an investigation of problems and opportunities for success. It can depend on the ability of staff within the institution. When doing strategic planning, the administrators of the institution should recognize the following issues (the Faculty of Education at Chulalongkorn University, the Office of the Public Sector Development Commission, and the Office of the Basic Education Commission, 2010)

1. The National education act, laws, legislation, rules, policies, educational measures, and educational goals.
2. Objectives of the curriculum
3. Available resources and planning for human resources, budgets, and equipment.
4. Cultures, values, economic status, and the society surrounded the educational institutions
5. Conditions within the country – economical, societal and political stability and health.

The procedure of strategic planning in education consists of six stages (Chirawot Nitnate, 1999):

1. Vision Setting of the Educational Institution

This refers to a determination of values and expectations of the educational institution. It is done by creating a future picture of how the institution will be, and is done under a consideration of philosophy and values. Normally, it is a description of the expected goals of the institution. Visions must be clear and state the commitment of the institution.

2. Determining the Mission

Mission determinations must be based in the regulations and authority of the institution. A mission illustrates the objectives of implementation based on responsibility. In general, it encompasses beliefs and educational principles.

3. Analysis of the Internal Environment of the Institution

This analysis is an exploration of the environment within the institution. It indicates weaknesses and strengths within the institution in terms of fundamental factors such as human resources management and working processes. The SWOT method is often applied here, in a similar way to its application in business.

4. Strategic Determination

This involves development from vision to strategic planning in operation. Effective strategies should be doable, moderately flexible, and consistent with missions and goals. Determinations should contain various methods that will benefit the institution.

5. Plan Implementation

This refers to the implementation based on every step of the plan. A certain agent is responsible for ensuring that the mission is captured in the strategic plan. Indicators are used to monitor the success of the plan implementation.

6. Evaluation

Tools and criteria are created or adapted to measure or compare performance. For example, there are measures of teachers' readiness and ability to facilitate student-centered learning. Such indicators assess teacher

knowledge, attitude, and factors related to learning of the students. Every step must be ready in order to achieve this strategy.

After creating a strategic plan, a very essential step is to transform strategies into action, and strategic plans are used as guidelines in the operation of different departments within the institution. Moreover, this must be done in accord with directions and timing. Planning can take various forms such as the use of the Gantt Chart. The fundamental components of a strategic plan are as follows.

1. Plan names, which refer to strategies
2. Objectives and goals, which are measures for tracking progress
3. Project or activity names
4. Objectives and goals, which are indicators of project success.
5. Duration of operation.
6. Project managers.
7. Budgets and inputs.

In summary, an effective strategy is one that everyone in the organization must be involved in. These strategies may be beneficial for implementation, but some cannot be implemented. Consequently, the effectiveness of strategies needs to be evaluated. Criteria for doing so include:

1. Achievability. The strategy can be implemented under the constraints of existing resources, and opportunities for success.
2. Focus. It should not be too wide and unclear.
3. Appropriateness and consistency with the institution. The strategy should be compatible with the internal environment of the institution, in terms of both strengths and weaknesses, and with the external environment of the institution, including opportunities and constraints.
4. Positive. It should promote the higher performance of the institution. After its implementation, a good strategy will lead the institution to achieve its targets with minimal resource use and at a minimum cost.
5. Inclusivity. It should have a mechanism by which all staff collaborate in working for an effective outcome.

6. Acceptability. A good strategy must be accepted by all staff within the institution. Although it is the job of administrators to manage a project, strategy implementation can be difficult without the collaboration of all involved.

2. Critical Thinking

2.1 Definition of 'Critical Thinking'

Researchers defined the concept of critical thinking in many ways. Some researchers stated only definitions, but others described the characteristics of critical thinking.

Watson& Glaser (1964) noted that critical thinking consists in attitudes, knowledge, and skills. Attitude refers to thinking about the pursuit of knowledge and accepting claims that are based on evidence and deductive reasoning, making conclusions about main ideas, and decision making based on rationality and logic. Critical thinking also includes applying attitudes and knowledge when evaluating and judging the validity of statements. Ennis (1985) found that critical thinking involves reflection and reason-based consideration. It is a vital part of the decision making we do when we come to believe in something, or do something, and it helps us make decisions correctly. Moreover, Snyder (1993) stated that critical thinking is the ability to solve problems by understanding the information through experience-based thinking processes that are creative, logical, and analytical.

With regard to the nursing profession, Facione & Facione (1996) observed that critical thinking is 'reasoning' based on information related to nursing (background, rules, experience) and present moment factors like time constraints, risk, and emerging problems. An ideal critical thinker should have the following characteristics: he or she should be "habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit". Scheffer and Rubenfeld (2000) confirmed that the habits of mind

commonly found in nurses correspond to the characteristics of critical thinking as defined by Facione (2000), and the researchers added that thinking should be creative, flexible, insightful, firm, and discreet.

Moreover, the Secretary's Commission on Achieving Necessary Skills (2011) concluded that the attributes of critical thinking are knowing how to study, giving reasons, thinking creatively, creating ideas, and evaluating ideas. Critical thinking consists in viewing things thoughtfully, and making decisions about problems.

In Thailand, educators defined critical thinking in many ways. For example, Orapun Leebunthawatchai (2000) observed that critical thinking is a thinking process that involves knowledge, attitudes, rational thinking, pondering, and review of facts, issues, and problems in order to create appropriate hypotheses and conclusions and implement them. Vijitporn Loasuwonkul (2001) explained that a part of critical thinking is thinking that is purposeful and self-determined. It is the result of interpreting, analyzing, evaluating arguments, and making conclusions based on credible evidence in order to reasonably prove something. It includes explaining evidence, concepts, methods, criteria, and situations in a deliberate and thoughtful manner, and wisely making decisions about what to believe and what to do.

Suwit Moonkum (2004) noted that critical thinking is the rational thinking process of carefully considering scientific evidence in order to effectively come to a conclusion and make a decision on what is right, what to believe, what should be selected, and what should be done. Furthermore, Chanathip Pornkul (2011) proposed that critical thinking is a kind of confidence building strategy, in that thinkers can feel or know that their thinking is broad and deep, and involves multiple steps of thinking processes, including effective scrutinizing, and assessment. On other words, they can appreciate that critical thinking is a worthwhile practice that has quality benefits.

Sukont Sinthapanon, Worarat Wonletlak, and Pornnee Sinthipanon (2012) concluded that critical thinking denotes scientific thinking processes that are to do with the investigation of facts, and evidence, and information-based decision making. Critical analysis, then, should be the basis of decisions about what to

believe.

After considering all of the above, the researcher in this study defines critical thinking as an intellectual process that requires knowledge, logical thinking skills, intuition, creative thinking, consideration, and revision of the facts and problems, in order to make an appropriate hypothesis and conclusions, and to ultimately decide how to solve the problem. Critical thinking is also an important component of 'active' processes that can prevent problems.

2.2 Ideas about Critical Thinking

Watson & Glaser (1964: 10) proposed the idea that there are three elements inherent in critical thinking: attitudes, knowledge and skills.

1. Attitude refers to interest in the pursuit of knowledge, ability to analyze problems, and the habit of identifying evidence to support claims.
2. Knowledge refers the analysis of evidence, logical enquiry, reasoning, including skills like concluding main ideas and making comparisons.
3. Skill refers to ability in analyzing problems, situations, statements, and conclusions by applying attitude and knowledge.

Moreover, Watson & Glaser concluded that the following abilities were crucial to the critical thinking:

1. Inference, which refers to the ability to make explanations based on the data, or to make a summary from data.
2. Recognition of assumptions, which refers to the ability to recognize the assumptions inherent in any arguments.
3. Deduction, which refers to the ability to decide whether the observed result is the result of the presumed relationship.
4. Interpretation, which refers to the ability to generalize and explain the conclusion, and to decide what conclusions are possible based on the given evidence.
5. Evaluation of arguments, which refers to the ability to assess information to determine if it is related to the topic and whether it should be included

or not.

Ennis (1985) classified critical thinking into two components: “critical thinking skills” and “disposition component of critical thinking”. With reference to the latter, a true critical thinker is:

1. open-minded, takes into account the opinions of others, is not self-determined, and makes decisions based on sufficient information
2. sensitive to the feelings of others and the level of knowledge of others
3. change position when the evidence and reasons warrant a change
4. well informed
5. realistic

Regarding the attributes of critical thinking, Paul (2003) identified two components: a) a set of ‘internal’ logic and intuition-based, information and belief generating skills, and b) ‘external’ habits that reflect the desire to use the above mentioned skills to shape or guide behavior. Roger, Sebraw and Ronning (1995, cited in Sirintorn Witaya, Sirinan Thisana, Kammanee, and Pimpun Dechakupt indicated that the characteristics of critical thinking were as follows:

1. Reflection-related – to do with understanding problems clearly
2. Focused – concerned with understanding problems with focus leading to clear evaluation and decision making
3. Decision-related - analyzing data to identify what should be done and what should not be done.
    - 3.1 Knowledge is a salient base for making decisions provided it is reliable.
    - 3.2 Inference helps individual understand situations meaningfully and profoundly, and that also goes for deduction and induction.
    - 3.3 Evaluation consists of analysis, decision making, weighing, and judgment of quality.
        - 3.3.1 Analysis is the ability to identify and select relevant

information.

3.3.2 Decision is the ability to assess knowledge candidly.

3.3.3 Weighing is the ability to compare existing data, selecting the most appropriate information, and arranging information systems reasonably.

3.3.4 Judgment of quality is using information to make decisions based on ethics and good attitudes.

3.4 Metacognition is the analysis of the appropriateness of thoughts, and changing them to correct thoughts. It is the evaluation of knowledge that can be used for decision making provided the knowledge is of sufficient quality and quantity.

Sonsanee Chatakup and Usa Chuchat (2001) discussed the characteristics of people with critical thinking. The first thing is that they set the questions clearly. The next important part is that they are curious to find the correct answer, by seeking information, gathering facts, checking data, analyzing hypotheses, evaluating arguments, deciding, and finding a conclusion based on reasons and facts, without emotion or bias. Moreover, they listen to the opinions of others and change their opinions if new and better information is presented to them.

Facione and Facione (1996,1998) proposed a definition of critical thinking using the Delphi technique in 1990(Delphi Research Project), which was supported by the American Philosophical Association or APA. This resulted in a consensus on the definition that critical thinking is 'purposeful self regulatory judgment,' which comes from interpreting, evaluating arguments, making reasonable inferences from a consideration of evidence, concepts, methods, criteria, and situations. According to this research, Facione and Facione changed the definition for strategies for real classroom instruction by pointing out that critical thinking is the skill needed for clinical judgment. Critical thinking in nursing practice consists of 3 components: 1) critical thinking skills, 2) metacognitive self-regulation, and 3) dispositional components of critical thinking.

1. Critical Thinking Skills are thinking skills that are related to many facets

of experience.

1.1 Interpretation is the ability to produce a rational conclusion or explanation through inference from statements or situations that are unclear or ambiguous.

1.2 Analysis is the ability to extract a clear and reasonable statement or argument from an issue or conflict.

1.3 Evaluation is the ability to identify whether an argument is strong or weak, and valid or invalid by analyzing the correlation between statements or situations and stated reasons.

1.4 Inference is the ability to derive possible premises by analyzing the relationship between the predicted premise and the given evidence or situation.

1.5 Explanation is the ability to logically describe the meaning of information based on its relationship to other or existing information.

2. Meta-cognition or Self-regulation refers to the ability to rationally monitor, reflect, and fix flaws in one's own thinking.

3. Critical Thinking Disposition refers to the personal qualities that are particular characteristics of nursing students in thinking, reasoning, and decision making in various situations, including other aspects of student awareness in promoting intellectual development processes.

3.1 Truth-seeking refers to the activity of finding the truth, asking questions, self-questioning, tracking targets relentlessly, and reevaluating when there is new data.

3.2 Open-mindedness refers to the traits of endurance, not expressing biases towards those with different opinions, and sensitivity to their own beliefs and feelings.

3.3 Analyticity refers to the trait of regularly analyzing data in order to evaluate the data reasonably, which requires the skills of

interpreting the data, forecasting situations, and connecting things observed in the clinic with theoretical knowledge.

3.4 Systematicity refers to the habit of working with a plan, having a sequence of actions, and having a clear structure to the plan.

3.5 Critical Thinking Self-confidence refers to the traits of self-confidence and self-independence in making decisions. When someone has confidence in his reasoning skills, he will be able to solve problems and make decisions effectively. This requires appropriately evaluation of the ability in thinking, not higher or lower than a reality.

3.6 Inquisitiveness refers to the habit or trait of being curious and eager to investigate. An inquisitive person, who is interested in researching a particular topic, does so seriously even if at the time it is not clear if the work can be developed and applied. A lot of fundamental research is driven by this trait or habit.

3.7 Maturity, in cognitive skills terms, is a characteristic of a person who is skilled in such thinking styles, and who practices them habitually. A mature person solves problems by using more than one approach, and applies standards, morals, and ethics when doing so.

Furthermore, Texter (1997) applied important skills of critical thinking based on Facione's ideas to the assessment of nursing students. Texter defined operational definitions of the skills as follows:

1. Interpretation includes: 1) correctly understanding and interpreting documents, verbal and nonverbal communications, empirical data, theory, graphs, questions, and etc.; 2) explaining the meaning of, or making others understand, something; 3) identifying the problem related to nursing in a practical situation; 4) connecting related situations to their own experience; 5) summarizing and explaining the meaning of documents or verbal communication correctly; 6) distinguishing contents

or information obtained from documents/texts apart from interpreted or translated data; and 7) bringing other alternative explanations that differ form their own choices into consideration.

2. Analysis includes: 1) survey, formatting, categorizing, and ordering the priority of the variables (such as symptoms, signs, evidence, research results, concepts, ideas, believe, etc.); 2)eliciting contents for clear arguments that include hypotheses, theories, principles, procedures, and summaries; 3) identifying advantages, disadvantages, and values of alternative decisions and distinguishing between empirical questions, concepts, and evaluation; and 4) exploring ideas/arguments/situations/ factors and the relationship between them.
3. Evaluation includes: 1) assessing reliability of data sources; 2) assessing the weight of evidence that supports a conclusion; 3) assessing the possibility that claims/arguments relate to evidence, concepts, and procedures; and 4) using appropriate criteria (morals/ethics).
4. Inference includes: 1) predicting or forecasting alternative assumptions or conclusions based on evidence and theory; 2) distinguishing between assumptions/conclusions that supported reasons and evidence that differs from the expected assumption/conclusion; 3) using knowledge related to rationale, induction, and deduction; 4) identifying a lack of knowledge and the need to supplement knowledge.
5. Explanation includes: 1) explaining things clearly, in writing or orally, proposing hypotheses and using reasoning when making a conclusion; 2) summarizing reasons and evidence when they do not support the expected hypothesis/conclusion; 3) clearly illustrating the relationship between variables in different ways, including the use of graphs and tables.
6. Self-regulation includes: tracking, reflecting, and questioning thinking in the processes of logical thinking; 2) tracking, reflecting, and questioning to come to appropriate conclusions. If there is data added or extended analysis, nurses should reinterpret and reconsider other factors; 3) monitoring one’s own biases and interests in order to eliminate them; 4)

reviewing or contemplating knowledge/explanations/interpretations in each context; 5) demonstrating ability in truth seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, and maturity.

The Office of the Basic Education Commission (2001, cited in Suwit Mooncome, 2004) suggested that critical thinking is involved in a wide range of processes, from defining the problem to making conclusions and deciding answers to problems. The details of the Commission's findings are as follows:

1. Defining the problem is an understanding of issues, conflicts, and vague information. It evolves by considering, collecting issues, classifying issues, prioritizing issues, and summarizing the main idea that defines the problem.

2. Gathering data is investigating things related to the problem or conflicts in data sources, selecting data or knowledge from existing experience, and gathering information necessary for critical thinking, possibly from observation.

3. Data system management is considering the reliability and adequacy of information, classifying the differences between clear and vague or unrelated and related information, and managing data in order to set priorities as guidelines for creating hypotheses.

4. Setting hypotheses is analyzing and inferring approaches, looking at data, finding relationships, and concluding what is the most likely explanation of the phenomena studied.

5. Inferring a logical base is considering the most reasonable approach from data and evidence when making a decision. The characteristics of critical thinking are related to logical, inductive, and deductive reasoning.

6. Evaluating inference is assessing reasonability based on logic, and including applications.

2.3 Critical Thinking and Nursing

Individuals who possess good critical thinking skills are well able to understand the meaning of situations, answer questions, and make appropriate conclusions, all of which are vital abilities for nurses (Oraphan Leebunchai, 2000). The Thailand Nursing and Midwifery Council stated that critical thinking is the 13th core competency in a set of 14 core competencies used by the nursing and midwifery profession. Core competency for nurses and midwives is defined by the set of knowledge, skills, and attitudes that nurses and midwives should have in order to meet the standards of curriculum and the guidelines established for assessing graduates of nursing and midwifery. Core competency is a prerequisite for gaining a nurse and midwife's license (Tadsana Boonthong, 2001).

A definition of critical thinking has been determined within the nursing profession. Critical thinking refers to rational-linear problem solving activity. It is an essential part of the nursing process as the standards in nursing practice for clients. It is categorized into 5 stages: assessment, nursing diagnosis, nursing planning, nursing implementation, and evaluation. It is a tool vital not only for nursing practice, but also for communication among staff. Alfaro-LeFevre (2011) stated that critical thinking in the nursing profession is more than just problem solving; it is problem solving in the extremely important areas of curing or treating disease, promoting health, and preventative medicine. Nurses have to find methods to enhance knowledge and skills that can make their efforts efficient and effective. Therefore, critical thinking is a commitment for best nursing practice based on existing knowledge. It can be developed via the questioning process. Questions that come up are about what the expected outcomes are, what can be done for better practice, how clients feel about the health service, and whether or not empirical evidence is used in nursing.

In nursing practice with patients, the important and necessary parts are using the 'nursing processes. It is a clear and systematic procedure that is about reliable and appropriate service. Each step is related to the next. The principles of the nursing form the basis of decision making and patients care (American Nurse Association, 2004). The nursing process consists in the following 5 steps:

1. Health Assessment

Health assessment is a systematic and dynamic process. Nurses interact with patients, involved persons, and health teams, and collect and analyze data in order to identify unusual evidence or risk factors to patients' health (For example, a smoking history may affect the recovery of surgical wounds). Nurses also need to know about information related to patient support, such as patient interests and patient knowledge of health and nutrition. Health assessment is divided into two categories.

1.1 Subjective Data is the data acquired from patients and their relatives. This information is usually obtained from the patient history, and from talking to the patients and their relatives. This type of information cannot usually be measured, and is typically about health status, lifestyle, feelings, and symptoms. Examples include headache (Nurses cannot measure headaches), difficulty in breathing, tiredness and feeling generally unwell.

1.2 Objective data is the data acquired by observation and physical examination and it is often measureable. Nurses obtain this data by viewing, touching, listening, and tapping. Such findings are called 'signs.' In collecting information from users, nurses try to get the information from reliable sources. Sources of data can be divided into:

1.2.1 Primary Sources - data is gathered from medical history, questioning, interview, or storytelling. This data is received directly from the patient, relatives, or those care takers close to the patient.

1.2.2 Secondary Source - data collected from other sources, such as the medical records, doctors' notes, nurses' notes, and hearsay from witnesses.

2. Nursing Diagnosis

Nursing diagnosis refers to making decisions in clinics about patient current and likely future health problems (American Nurse Association, 2004). In

this step, nurses define the problems or risks based on the data collected. This step is an independent role of nurses. Nursing diagnosis is different from health diagnosis. Health diagnosis focuses on physical problems that have a pathological presentation, while nursing diagnosis focuses on defining problems or health contexts that cover physical, social, mental, and spiritual factors of clients (patients and families).

3. Nursing Plan

A nursing plan is the decided upon sequence of activities that hopefully solves the problems of patient as defined by the nursing diagnosis. The nursing plan has four aspects:

3.1 Determine Immediate Priorities - nurses should be able to analyze what problems need urgent medical care, what problems can be attended to later, where nursing should be focused, and what problems should be solved together in multidisciplinary fashion.

3.2 Establish Expected Outcomes – nurses need to work out outcomes that are the results predicted after problem analysis. Outcomes can be determined in many ways, such as by looking at signs like decreased symptoms, lack of symptoms, and getting comfortable; however, they must be correlated with nursing diagnosis.

3.3 Determine Criteria of Evaluation - nurses determine criteria of evaluation, which are indicators that can tell them whether their actions achieved the expected outcomes, or not.

3.4 Individualized Plan of Care - refers to a plan for nursing activities that will be provided to patients in order to achieve objectives in nursing.

4. Implementation

This is the stage of transforming a nursing plan for patients into practice in order to achieve expected goals or objectives. In this stage, nurses need to have knowledge of nursing, skills in nursing practice, decision making, and good communication. This includes system management of teamwork, so all

patients receive quality care. There are three stages to implementation:

4.1 Reassessing the condition of the patients before providing the nursing service in order to investigate if there are any new problems and what need to be fixed first. Some of this may not be included in the nursing plan.

4.2 Nursing practice and nursing evaluation. After nursing, nurses should evaluate responses from patients immediately and see whether there is anything that needs to be improved. This stage could be proceed immediately without completing the after service evaluation.

4.3 Recording observations after nursing. Nurses need to make notes of their actions, reasons for their actions, and the results of what they did. Nursing notes can be used as legal evidence and data for research and development.

5. .Nursing Evaluation

Nursing evaluation is the monitoring of whether outcomes were consistent with the objectives. This is done by checking and comparing pre and post nursing symptoms, status of health, and behavior. Evaluation can be formative evaluation, which proceeds during the procedure and can occur anytime as required, or summative evaluation, which is used to build guidelines in nursing plans.

In conclusion, the nursing process is a tool for nurses in nursing practice that is systematic, and has procedure and clarity. The process is divided into five steps: 1) health assessment, 2) nursing diagnosis, 3) nursing plan, 4) implementation, and 5) evaluation. It is not only a tool used for treatment of patients; it is also a tool that aids communication between staff in the nursing team, and in this latter function it promotes common understanding, facilitates excellent and continuous patient care, and uncovers and prevents errors.

As mentioned above, the nursing process has systematic and continuous characteristics. Each step of the nursing process is related (Alfaro-LeFevre, 2010):

1. Health assessment and nursing diagnosis are related. Collecting data and diagnosis happen when nurses collect, interpret, and explain data. For example, when a nurse finds that a patient has an irregular pulse, difficulty in breathing, and a pale lip, she may diagnose dyspnea, potentially from lung function abnormality. Therefore, the nurse should further assess the patient's health by gathering more information using techniques such as cardiac monitoring and pulmonary radiography.

2. Nursing diagnosis and nursing planning are related processes for various reasons:

    2.1 If a nursing diagnosis is correct, the nursing plan should be correct. If nurses indicate a diagnosis that is incorrect, the nursing plan will probably not solve the patient's' problem and it may well be counterproductive.

    2.2 When evaluating, nurses should determine the specific results to each diagnosis, so they can plan proper nursing. For example, in the case of a patient with constipation, nurses can plan for them to defecate every 2 days, and then decide on treatment to ensure they do.

    2.3 Nursing practice happens after the nursing plan. Nurses determine protection, problem solving, or problem control that occurs during nursing diagnosis. For example, in the constipation example, nurses stimulate the function of intestines by having the patient increase water intake, eat fibrous food, and move their bodies.

    2.4 In emergency nursing practice, nurses have to have a nursing plan before knowing all the problems. For example, a patient admitted has stopped breathing. In that instant, the nurses determine the patient's problem - he or she isn't breathing. The nurses then immediately implement the necessary treatment. After solving the emergency situation, the nurses can then recheck, and diagnose what factors caused the problem and begin a new course of treatment.

3. Nursing planning and nursing practice are related processes. Planning happens during nursing practice. Nursing plans often need to be adjusted, because patients have emergency problems.

4. Implementation and evaluation. Implementation cannot be directed by nursing requirements. Nurses must be able to think critically, track problems and evaluate patients closely. Implementation may be changed if a planned practice does not work as expected.

Nursing practice needs critical thinking. However, nursing process differs from critical thinking. Nursing process is a tool, while critical thinking is a method in using tools (Alfero-Lefevre, 2010). In a comparison to everyday life, a car is a vehicle used to drive to destination and a nursing procedure is an activity done to care for patients, but a car cannot go anywhere, nor can a nursing procedure be carried out unless there are human brains in operation. The more a brain is used, the better it is at utilizing tools. Such concepts led Bandman and Bandman (1998) to their proposition that critical thinking is the examination of thinking, diagnoses, hypothesis, principles, arguments, conclusions, beliefs, and actions by the use of reason. SopidaTakpinit (2005) made a comparison of critical thinking and the nursing process, and the results of that comparison are shown on the following table 2.2

Table 2.2 Critical thinking application and the nursing process

Nursing process and definition	**Critical thinking and activities**
Health Assessment	
- Collecting data for decision making about patients' health in a continuous process	- Collecting data related to patients from observation, examination, interviews, medical history, reviewing the medical record. - Classifying related information out of unrelated information. - Classifying important data out of unimportant data. Checking reliability with

Table 2.2 (continued)

Nursing process and definition	Critical thinking and activities
	other sources. - Grouping data based on a health plan and indicating gaps in data. - Knowing a health plan and the relationship of data - Comparing health plan with standards and theory. - Monitoring biases concerning patients' condition.
Nursing diagnosis - Statement on patients' status of health that is concise, clear, and appropriate for nursing	- Making decisions about patients' health status. - Defining the status of health and checking it with the patients and the nursing team.
Nursing planning - Decision making on methods in helping patients in solving problems and recovery.	- Prioritizing the patient's problems. - Making decisions about the expected health status - Choosing appropriate nursing methods based on principles and theory. - Transferring knowledge to other fields. - Designing nursing plan based on scientific reasoning.
Implementation - Implementing according to the nursing plan by patients and nurses	- Applying knowledge in providing nursing. - Comparing basis information with changing situations

Table 2.2 (continued)

Nursing process and definition	Critical thinking and activities
	- Testing hypothesis in providing nursing - Improving a nursing plan to be current with a health team.
Evaluation - Systematic and ongoing processes in comparing patients' responses to the expected health status	- Comparing patients' responses to the expected health status - Utilizing tools that have criteria for evaluating the levels of progress in patients - Improving nursing practice

Source: Sopida Takpinit (2005)

The principles of critical thinking and the nursing process are related, and the procedures of the nursing process and critical thinking are also related, although they do not correspond at every step.

3. The Concepts and Learning Theory of Promoting Critical Thinking

3.1 Learning concepts and theories

Every human being has the instinct to learn. When babies are born, they soon learn to cry for milk from their mothers. We learn all the time, and under every kind of condition.

Learning is the process that makes humans change their behavior and thinking. The learning process begins with listening, touching, and reading, and is different at each age level. Children learn through questioning in the classroom. Adults learn from experience.

Administrators and stakeholders in teaching and learning management should have knowledge of learning theories in order to understand and apply them in managing teaching and learning appropriately so that the goals of educational institutions can be achieved. This is because learning theory explains the characteristics of learning and behavioral change. In addition, instruction should

be based on various learning theories (Tissana Kammanee, 2008).

Learning theory started with the idea that there were two main aspects of human nature: an ethical aspect and a behavioral aspect (Biggs & Tang, 2007) This division is an important part of the foundation of various learning theories and principles. Learning theories can be categorized into two periods: learning theories developed before the 20th century, which focused on mental discipline, and learning theories developed in the 20th century, which were learning theories based on behaviorism, cognitivism, humanism, and eclecticism. Learning theories commonly applied nowadays are the theories of multiple intelligences, constructivism, and cooperative learning. In applying every learning theory, educators and those involved should have a clear idea about the purpose of education.

3.2 Student Centered Learning Theory

Since the onset of learner development by the Ministry of Education, educators and those involved with education management have often discussed student centered learning. It is clear that Thailand has to reform education management to increase student participation in learning, and what is called for here is more emphasis on the student centered learning approach. Student centered instruction enhances learning performance more than traditional instruction, which is teacher centered. Although research has shown that student centered instruction is more effective, most universities still use the traditional method (Biggs & Tang, 2007). According to the Education Act of 1999 (Office of the Basic Education, 1999) in division 4, section 24, educational institutions and other related agencies should:

1. Organize content and activities corresponding to student interest and aptitude by taking into account the differences between individuals
2. Practice skills, thinking processes, management, facing situations, and knowledge application in order to prevent and solve problems
3. Manage learning activities to promote learning from real experiences. Students should be able to do and think for themselves, have strong reading habits, and a thirst for knowledge

4. Manage classes that incorporate multiple disciplines, and cultivate morals, values, and desired characteristics in all subjects

5. Develop teachers so they can manage learning environments, learning materials, and facilities that enable learners to learn for themselves, and be involved in research as part of the learning process. Teachers and students can study from learning materials and from various academic resources, together.

The National Education Act of 1999 emphasized the importance of students learning by themselves, doing tasks based on interests and skills from real experiences or activities, practicing thinking skills, and applying knowledge in solving problems. Educational institutions must create environments that promote learning. Moreover, the Office of the Basic Education Commission (2000) developed assessment guidelines based on national standards that require student centered instruction. It was stated in standard 6 that teaching and learning management should provide opportunities for students to acquire knowledge by themselves, and that teachers had to change their roles from providers to facilitators in managing appropriate learning experiences. The examples of positive 'indicators' were:

1. Having a variety of learning and teaching activities appropriate to the nature of the learner

2. Having the management of learning and teaching activities teach students to investigate, observe, collect data, think creatively, and construct their own knowledge.

3. Having the management of learning and teaching encourage the learners in studying, seeking knowledge, and finding answers by themselves.

4. Local knowledge, technology, and media applied in learning and teaching.

To summarize, student centered teaching and learning is an important strategy in promoting the learners to develop critical thinking and construct their own knowledge. The most salient point is that administrators and teachers correctly

understand the meaning and methods of managing teaching and learning according to student centered leaning theory.

3.3 Definitions of Student Centered Instruction

Student centered education is a teaching and learning process in which students acquire knowledge, developing their own knowledge, practice under real-world conditions, and can transfer and apply their classroom knowledge and skills in society. There are activities and processes to promote critical thinking, analysis, synthesis, evaluation, and creative thinking. The Office of the Basic Education Commission (2000) stated that every stage of student centered instruction should be aimed at developing the learners and creating the most benefits to students, so that the learners can develop their full potential and skills, acquiring knowledge from various sources, and applying that knowledge in real life.

Prawet Wasi (1999) ventured that instruction should be based on the students' real lives in order to better build their own knowledge, understanding of the world, independence, life-long learning habits, happiness, enjoyment, and thirst for knowledge.

Tissana Kammanee stated that student centered teaching and learning can be best based on the students by considering the appropriateness and benefits to them. Moreover, teaching and learning managers should provide students with experiences that promote active learning, and should implement various learning processes through which students study under real-life-like conditions.

Students need to be active participants and keenly involved in learning activities. In fact, students get actively involved in four ways:

1. Active Physical Participation: Teachers encourage students to participate in activities that require physical movement appropriate to their level of maturity in order to prepare the body and sensory system to receive stimuli and learn.

2. Active Intellectual Participation: Teachers encourage students to participate in activities that require thinking and analysis for construction of meaning and understanding.

3. Active Emotional Participation: Teachers encourage students to participate in activities where emotion and feeling are used to create meaningful experiences and increase motivation.

4. Active Social Participation: Teachers encourage students to participate in activities that require interaction with others and the environment, exchange ideas that lead to broader knowledge, and help learners enjoy studying.

In conclusion, student centered teaching and learning is about active participation in the learning process. It is important that activities chosen for classes are appropriate to the students and take into account student individual differences.

3.4 Student Centered Teaching and Learning Management

Learning and teaching management refers to the set up and control of the conditions or characteristics of teaching and learning. Student centered learning needs to be systematically managed in accordance with the institution's philosophy, theory, principles, concepts, and beliefs. Systematic management with various teaching strategies to promote teaching and learning conditions is based on determined principles. Therefore, teaching management need to take a good look at those principles and other key components first.

Nowadays, there are various teaching and learning approaches. An effective instructional approach should enhance student capacity to reach the objectives of the curriculum. The Ministry of Education mandated that educational institutions should include student-centered instruction.

Student-centered instruction has been widely promoted in instructional management. The use of the term 'instruction' rather than 'teaching' is of significance. The student is at the center of the activity; he or she receives instructions, and then sets off on a course of self-learning. The student should never be on the periphery and most certainly not a member of the audience. In Thailand, most instruction is still based on the teacher-centered approach, which is an easy and convenient approach for many. Moreover, teachers are accustomed to this traditional form of instruction. Unfortunately, support for the new student-

centered approach is still not adequate. Although the term ‘instruction’ is now used instead of the term ‘teaching,’ most teachers have not shifted their teaching paradigm (Tissana Kammanee, 2008).

Student-centered instruction is centered on the students, and the most appropriate and beneficial learning approach for the students’ needs to be considered. There are many teaching approaches for student-centered instruction in which the learner has an active role and constructs meaning based on authentic knowledge.

3.5 Bloom’s Taxonomy

Higher education systems found in many parts of the world make statements about instructional approaches, and most recommend that students should learn in the domains of: knowledge, skills, and attitudes. Teachers should always bear in mind educational purposes. After studying, students should be able to demonstrate improvements in skills, knowledge, and attitude. Benjamin Bloom (1965) stated that there were numerous valuable approaches to learning, and that instructional approaches by which students achieved learning objectives could be divided into 3 domains.

3.5.1 The Cognitive Domain focused on knowledge, comprehension, memorizing, remembering, and applications on a particular topic. The cognitive domain consists of 6 stages from lower-order processes to the higher:

1) Memory: is the ability to remember content knowledge, review information, and remember content when needed for applications like policies and rules concerning security.

2) Comprehension: is the ability to understand meaning, interpretation and structure. It is the ability to identify problems based on what one has learned, and the ability to explain them. A test of comprehension is to explain a complex procedure in your own language.

3) Application: is the ability to apply concepts and knowledge to a situation that has not been encountered before, and to apply

knowledge from the classroom to new situations in the workplace.

4) Analysis: is the ability to examine and break information or concepts into parts in order to identify elements, structures, principles, and or relationships, and to understand the relationships among those elements. Analysis is also the ability to distinguish between facts and references.

5) Synthesis: is the ability to compile data from elements and integrate new components in order to create a complete picture that places emphasis on, or creates, new meaning or new structure.

6) Evaluation: is the ability to make decisions regarding the value of ideas or things, and the ability to choose the most effective option.

3.5.2 The Affective Domain focused on the development of mental behaviors of the learners in areas such as emotion, feeling, value, appreciation, enthusiasm, motivation, and attitudes. Krathwohl, Bloom and Masia (1973) categorized behaviors in the affective domain from lower order to higher into 5 levels:

1) Receiving Phenomena is the first level of perception, without any implementation. It can be categorized into 3 types:

1.1) Awareness is the first behavior that people encounter when they learn to recognize things. It is a receptive state.

1.2) Willingness to receive is the process that shows a willingness or satisfaction to learn.

1.3) Selected attention is the process of selecting interests and identifying what to pay attention to and what not to pay attention

2) Responding is the process whereby the student becomes interested and reacts to situations. Outcomes are expressed in the

form of compliance in responding, willingness to respond, and satisfaction in responding. These characteristics can be seen in phenomena such as interactive conversation in the classroom, presentations in the classroom, inquiries about ideas, concepts, patterns, rules and safe practices.

3) Valuing is the process whereby the student assigns value to things, behaviors, and phenomena. The learners recognize the values and develop good attitudes toward those values. Teachers should arrange experiences or situations to help learners see the value of those things. Learners assign value to things when they uncover the pros and cons of those things. Valuing ranges from lower order to complex order, which is the committing level. The value a learner places on a thing depends on their personality. Learner behavior is categorized into 3 steps as following:

   3.1) Acceptance of value is the feeling of accepting. It is an emotional feeling.

   3.2) Preference for value is the step in which learners chose to give value and pay attention to a valuable thing.

   3.3) Committing or conviction is a strong feeling of value. This step of the affective domain is a clear characteristic of attitude and appreciation. For example, a person who values the institution of democracy follows through on their strong feeling. They participate in democratic processes, value diversity, are willing to tolerate some of the weak points of the democratic system, and may well fight to defend it.

4) Organization refers to the arranging or ordering of priorities by comparing, contrasting and combining them to produce a value system. This value system is applied in life. In this step, the teachers should encourage the learners to compare values, build

connections between their values and synthesis new values. Teachers should encourage learners to practice the following behaviors: 1) conceptualization of values, and 2) organization of a value system. Examples of behaviors practiced in organizing a value system are weighing the relative importance of freedom of expression and responsible behavior.

5) Internalizing Values or Characterization is a process that the learners regularly follow until the values become built-in. In general, educational purpose is related to students' decision making about personality, society, and emotion. Therefore, the teachers should encourage the learners to always be aware of, and reflect on, values until the values are internalized. The behaviors, based on values, that need to be developed at this stage are *generalized set* and *characterizations* such as confidence in working independently, teamwork, always having ethics in one's profession, and giving value to what someone is, and not just what they look like. Instruction based on the affective domain is learning to develop feelings, attitudes, interests, appreciation, ethics, and morals, all of which are at the base of behaviors. Eventually, this will lead to better control of behavior. This will lead to a change from undesired behavior to desired behavior, and the skill to recognize and cultivate wholesome values in ourselves and in others.

3.5.3 The Psychomotor Domain concerns educational objectives that are to do with developing students' physical movement, co-ordination and motor skills. Harrow (1972), who developed a concept of teaching and learning based on the psychomotor domain in Bloom's taxonomy, mentioned that many human behaviors are related to muscle movement in the body – such activities connect the function of brain or cognition to muscle. The psychomotor domain is divided into 5 levels.

1) Imitation is the first step of higher-order skills. After the learners are encouraged to do it, imitation is an action that stems from inner drive and repetition. It starts with the effort required to follow the demonstration and or explanation, proceeds via trial and error, and continues until the target action is copied successfully.

2) Manipulation refers to the step where learners still need to practice in order to be an expert in the topic or skill. However, the learners may still not be confident in their ability.

3) Precision is the step of practice where the learners have agility and expertise. The expertise leads to fast, smooth, and accurate action, using less energy, and without hesitation.

4) Articulation is coordinating and adapting various skills in a pleasing and efficient fashion.

5) Naturalization refers to the stage where learners have mastered an activity. The activity can be creative, physical, or some kind of operation. The student does it without thought. Bloom's taxonomy is studied and applied worldwide. The taxonomy focuses on the cognitive domain that is about understanding, comprehension, memory, and application in various contexts; the affective domains that develops things going on in the students' minds such as feeling, value, appreciation, enthusiasm, motivation, and attitude; and the psychomotor domain that develop students' behaviors in the area of body skills. Many educators mentioned various instructional models; however, they are predominantly concerned with these 3 domains: the cognitive, affective, and psychomotor domains.

3.6 Constructivism

Constructivism is a theory based on the ideas of Piaget and Vygotsky. One of the key ideas of the theory is that a student constructs knowledge about observed

events and phenomena by creating a cognitive structure, which contains the meaning, definition or understanding of their experience of the event or phenomena. This meaning cannot be transferred from teacher to student, but it is constructed in the student's mind from the relationship between the student's senses and the external world. A cognitive structure is the result of mental effort. If the student predicts situations correctly based on existing knowledge, the cognitive structure remains stable and stronger. However, if the prediction is incorrect, the learner has doubts and questions. According to Piaget, the student is in a state of disequilibrium, which occurs when there is a conflict in the student's mind. The student then has three alternatives:

3.6.1 adhere to the original idea in the cognitive structure and deny or ignore the new one. Cancelling or modifying a cognitive structure is difficult.

3.6.2 attempt to adjust the cognitive structure by connecting the original ideas or experiences with new one. This should correspond to meaningful learning.

3.6.3 not pay attention to what happened.

The connection between the external world and the internal world of the learner happens through sensory and neural mechanisms, physiology, and biochemistry. The pathway from sensation to the intellectual process called *assimilation*. Intellectual conflicts leads to *disequilibrium* and imbalance, which results in a change within a cognitive structure called *accommodation*. Accommodation is tied closely with meaningful learning. A change in a cognitive structure occurs when an individual learns by an active process. Teachers should facilitate student learning by setting up disequilibrium. This makes students modify their cognitive structures. There is no specific instructional guideline for this theory (Sirintorn Wityasirinan, Tissana Kammanee, and Pimpun Dechakup, 2001).

3.7 Apperception or Herbartianism

Apperception or Herbartianism is a theory that comes from a group of educators including John Locke, Wilhelm Wundt, Titchener and Herbart. They believed that humans were not born with good and bad in themselves but learned those things,

through contact with the environment and external reinforcement. Locke believed that people were born with an empty brain. Individual learning occurs due to personal experience through the five senses, and when the people who get various kinds of support learn more.

Wundt believed that the mind consisted of two parts: the five senses and feeling. A person then constructs or interprets from exposure. Titchener believed that the mind was composed of three parts: the five senses, feeling, and imagination, which is the source of critical thinking. In addition, Herbart indicated that learning happens on three levels: sense activity, memory characterization, and conceptual thinking or understanding. Learning occurs when a person experiences something through the five senses, processes it, and then integrates or builds the relationship between that new knowledge and old knowledge (Apperception) (Biggs &Tang, 2007; Tissana Kammanee, 2008).

Herbart believed that teaching should begin by assessing the students' prior knowledge, and then followed up by the introduction of the new knowledge that teachers plan to teach. This approach helps students build the relationship between prior knowledge and new knowledge before coming to a conclusion. Students can then apply the conclusion to new problems or situations.

Therefore, teaching and learning by using the Apperception theory that emphasizes students gain experience through the five senses and are able to create a relationship between prior knowledge and new knowledge which will help the students understand well. Tissana Kammanee (2008) stated that the important principles of teaching and learning management that flow from this theory are:

3.7.1 The necessary thing for student learning is to ensure that students to gain plenty of experience through the 5 senses.

3.7.2 The way to enhance student understanding is to help students create relationship between prior knowledge and new knowledge.

3.7.3 According to Herbart, a good way to assist students to learn well and quickly is covered in the five following steps:

1) Preparation - the processes whereby teachers stimulate student

attention and assess their prior knowledge.

2) Presentation - the process of putting forward new knowledge.

3) Comparison and abstraction of prior and new knowledge - refers to the process of expand knowledge widely by motivating students to build the relationship between existing knowledge and new knowledge in various ways.

4) Generalization - it is the process of learning in summaries, concepts or rules, which can be applied to other problems or situations.

5) Application - it is the process whereby teachers assign students the tasks to applying the concepts that they have learned to solve the problems in the different situations.

In conclusion, Apperception theory is about connecting thinking and body senses in a way that enhances effective learning. This learning process contains several steps including: preparation, presentation, building the relationship between existing knowledge and new knowledge, generalization, and application. According to this theory, new knowledge needs to be linked in the brain, via thought and imagination, a process that makes understanding occur promptly.

3.8 Thorndike's Connectionism

The theorist Thorndike believed that learning occurs from the connection between stimulus and response. Via a reflection mechanism, the individual uses trial and error in various approaches until they get a response that makes them satisfied. After the learner has already learned, that person chooses only the appropriate response and tries to connect that response to other learning experiences.

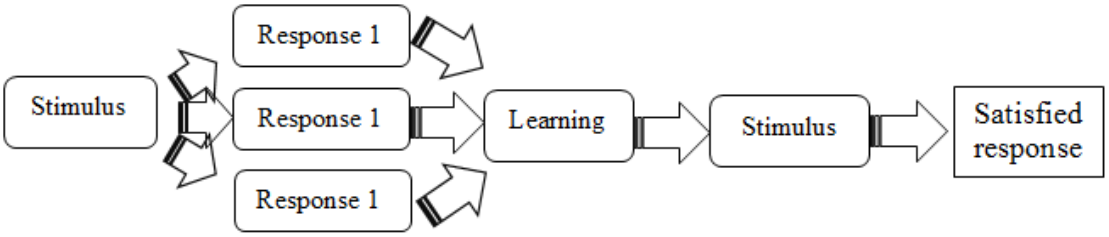

Figure 2.2 The connection between stimulus and responses

Thorndike's connectionism has 4 rules (Hergenhahn & Olson, 1993 cited in Tissana Kammanee, 2008) as follows:

1. The Law of Readiness. The learners must be physically and mentally ready in order to have learning effectively.
2. The Law of Exercise is a rule that connects the relationship between the stimulus and the response correctly. The learners should be trained. They should repeat desired actions often in order to have an understanding and ability to do them permanently.
3. The Law of Use and Disuse says that learning is constructed from the connection between the stimulus and the response. The learner understands and understands well and permanently if they learn and do the target regularly. If they do not repeat it enough, their learning will not be permanent and eventually forgotten.
4. The Law of Effect is a rule regarding learners who show or demonstrate learning behaviors. If they receive satisfactory results, they are motivated to continue their learning. If the results are not satisfactory, the learners will no longer feel motivated to learn. Therefore, the teachers should connect the stimulus with response in order to build student motivation.

In connectionism theory, teachers must prepare students for learning by reviewing the prior knowledge or the content for next class before class, and provide the opportunities for students to practice what they have learned in order to stabilize the new knowledge. When the results are satisfying for students, they gain have life-long learning.

3.9 Sociocultural Theory

Lev Vygotsky was a constructivism theorist. His work focused on society and culture, and it provided the basic ideas for research in a number of areas including the field of cognitive development. Vygotsky theory emphasized the fundamental role of social interaction in the development of student learning. He believed that the environment played a key role in the formation of meaningful learning.

Vygotsky (1987) stated that children, from the time of their birth, are exposed to

socially and culturally based natural and man-made environments, and their intellectual development begins with the family. Vygotsky (1987) believed that all children have a natural curiosity, and they want to learn, investigate, and understand new things by themselves. He also believed that the skills that students learn whilst interacting with others today will help them to act on their own in the future. However, Vygotsky also noted the importance of a mentor in the process of children's socially mediated learning. The mentor is an important person as he/she seems to be a model for students in behaving and communicating. Communication and interaction play a big role in children's search for understanding of actions, and guidance from their parents and teachers. Having interacted with their parents and teachers, they bring what they have learned into account and use it as part of their own practice in the future. Sheffer (1996) explained this point through the use of the example of a girl who was playing a jigsaw game. She did not do well when she played alone. But when her father was sitting nearby and showed her some simple moves, such as starting by selecting pieces from the corners first, she then picked up another two or three pieces and tried for herself. The girl then started to develop other little skills and tricks by herself. This story illustrates the role of cooperation and participation in Vygotsky's social theory.

Vygotsky also focused on language by saying that language plays an important role in the cognitive development of learners, in two aspects.

1. Language is a tool that adults use to communicate with children.
2. Language is a powerful tool in the development of human intelligence.

'Private Speech' or 'Internal Speech' happens when a person speaks loudly to himself or herself. Vygotsky was one of the first psychologists to write about this. He stated that 'private speech' was valuable and meaningful to the cognitive and social development process. He believed that it was normal for students to talk to themselves, and that action, plan or strategy helped in the development of student intelligence. Therefore, language is a catalyst of thought and understanding. The more the students talk to themselves, the more they develop their social skills. Berk (1986) supported this idea that children speaking to themselves supports

their actions. This often occurs when they have to do something by themselves, or is alone during the teacher's absence. Children speaking to themselves is the basis of cultural development. Vygotsky also emphasized the importance of culture and social learning in the development of intellect. His proposed two stages of intellect:

1. Basic level: Basic cognition that naturally occurs without learning
2. Advance level: Intellect that is the result of the interaction with adults who pass on knowledge through language. Vygotsky's language development is divided into three stages:
    2.1 Social language, the language used in interaction with others
    2.2 Self talk, or thinking out loud, found in children 3-7 years of age
    2.3 Inner speech, found in children aged 7 years and over

According to Duffy and Jonasses (1992, cited in Tissana Kammanee, 2551), things do not have their own inherent meaning, but acquire meaning by people who try to describe them. The way that people give meaning is generally based on their own experiences, which vary for each individual. Thus, experience is a part of people's thinking. As a result, Vygotsky (1978) highlighted the importance of the differences between individuals, and the need to help students to develop to a level where they reach their maximum potential. He proposed the concept of the 'Zone of Proximal Development' or the 'Zone of Proximal Growth' to affect change in the areas of teaching and learning.

In general, the way to assess students' cognitive development is via a standardized test, which measures their competencies in a range of skills and practices in line with their age. This can indicate student strong and weak points, and highlight areas that need improving. Teaching must be consistent with the level of development of learner. Vygotsky (1978) had much to say about the 'Zone of Proximal Development' or the 'Zone of Proximal Growth' the area where very sensitive guidance and instruction should be given. This area relates the student's original cognitive level and the ability level that they can potentially achieve with help from a mentor. However, the neighboring areas are different in each person.

The level of the learners starts with their ability to perform some task on their own. The area of maximum development of learners arises from the consideration of the ability of the students to take actions or solve problems under the guidance of adults or friends who have more ability in the tasks nominated. This is summarized in figure 2.3

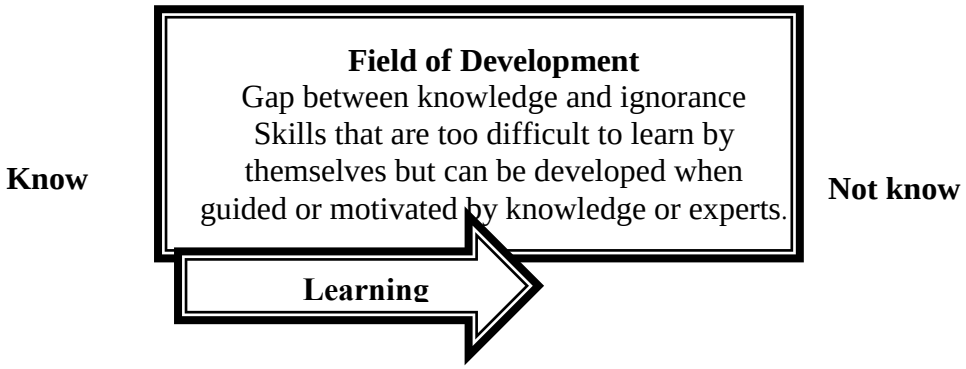

Figure 2.3 Vygotsky Cognitive Theory from McLeod, S. (2007)

Vygotsky stated that the Zone of Proximal Development is an important region that instructors have to pay attention to when they present new knowledge and skills, and attempt to tap into, and build, on students' experiences. Instructors have to provide opportunities for learners to improve their skills by themselves by doing tasks and or by interacting with peers. Instructors have to cooperate and participate in promoting learning among peers.

Tissana Kammanee (2008) discussed teaching and learning of a group of 8 year-old children 'performing' with a group of 9 years-olds. Someone was guiding the students and doing demonstrations. Some of the group reached a level of maturity whereby they were able to develop their potential whilst others did not really 'catch on,' despite repeated demonstrations. This meant that for some of the students in this group there was a gap between their development level and the development level they wished to reach. Therefore, this group could not reach the maturity level of the 9 years-old students and it was apparent that the instructors would have to wait for the developmental level of the 8 years-old students to increase naturally, or assign age-appropriate tasks. Concerning this issue, Vygotsky (1978) believed "Assisted Learning" or "Scaffolding" is important because it can assist learners to reach their potential. This can be done with

emphasis on authentic context because the creation of meaning to act under any context requires the performance of authentic activities/tasks. Vygotsky classified scaffolding into 4 phases.

Phase 1: Actions: seeing the teacher using annotations

Phase 2: Learning skills by imitating the actions of the teacher. In this phase, the teacher must focus on the learning of the students and offer assistance and provide feedback.

Phase 3: This is the time that teachers withdraw scaffolding - they offer less and less support and feedback as the students make gains on the task.

Phase 4: This is the phase in which students can do the task proficiently, and construct their own tasks. No further assistance is needed from the instructor.

However, teaching may be troublesome for some. To make teaching and learning effective, Vygotsky described three aspects of the process:

1. Teachers must avoid helping too much and for too long. If they help too much, the students become overly dependent on them. After initially preparing students for the activity, teachers should begin to solve the problems but then let students finish them. The teacher may intervene if the students are way off track.
2. Teachers should not show their solutions to the problem they assign in phase 1. Rather, they should let the students complete the task. An appropriate level of scaffolding should be provided to the students. If the tasks are too easy, the students get bored. On the other hand, if the tasks are too difficult, the students get frustrated and not want to study.
3. The most important thing for teachers is to be clear about the academic concepts that students are trying to learn. If they are not, students return to their original concept. Because the students may be afraid to abandon their original idea, even if it is incorrect, it is necessary for teachers to use this method to emphasize a correct conceptual understanding.

Education must enhance the development of learners. Students are able to develop their abilities through experience, which consists of social interactions such as collaborations and interactions with teacher, family, and friends (Berk & Winsler, 1995: 26), as described below:

1. The instructional model focused on collaboration is a teaching and learning activity that promotes students and teachers to work together, and involves dividing learners into groups which may be both small and large groups. The main aspects of it are: 1) the exchange of knowledge between the teacher and the students, and between students and students, 2) The importance of the interaction between the teacher and the student, 3) The teacher is like an intermediary between the students, and 4) the groups contain students of a range of strengths – students learn from their friends who are at a higher level than them.

2. The Instructional model of interaction: the best way is to utilize the concept of Vygotsky. Scaffolding is to assist the appropriate circumstances of teachers or friends who have the higher abilities necessary to help students learn and solve problem by themselves (Elliot, Kratochwill, Littlefield, Cook & Travers, 2000).

In conclusion, Vygotsky's sociocultural theory says that all humans live in an environment from birth that is a sociocultural environment. The family influences intelligence development. Children are naturally curious and want to learn on their own. The child's original intelligence development level and the level they are able to develop by themselves are different for each person. All children have a certain ability to develop their knowledge and skills for themselves. However, this development can be greatly enhanced through
interaction with adults or experts, or more knowledgeable friends.

4. Strategies to Promote Critical Thinking for Nursing Students

The education system in Thailand, as a whole, manages teaching and learning in a way that supports a broader consumer culture. In this way, the Thai education system incorporates the values of other countries, and fails to recognize and build in an awareness of the cultural context of Thailand (Paitoon Sinlarat, 2010). Current Thai

educational culture does not encourage students to construct, invent, or develop knowledge. Thus, in order to improve the quality of education in Thailand, and to make it more socially constructive, administrators should make the system move in a direction that produces more concrete and practical results in the field of education. The system changes needed should sponsor more creative student outcomes.

Ultimately, the people who have the responsibility for promoting the critical thinking of students are the administrators of academic services. Weaknesses and strengths need to be analyzed before setting up various strategies. The most important thing is that teachers understand that students have their own individual learning styles. The teacher's style and the student's personality affect the learning process. Even though students may already have similar background knowledge, there is no single strategy that can be applied to every student. Therefore, strategies to promote critical thinking for students must take into consideration teacher development, the teaching and learning process, and student development.

4.1 Strategy Development for Teachers to enhance the Critical Thinking

Teachers are a vital factor in the process of students building critical thinking skills because they are close to the students and can transform the students. Teachers are like painters, and part of their role is to color their students. In the teaching and learning process, teachers have to help students achieve the course objectives and the desired results. Therefore, teachers must be able to analyze the characteristics of individual students, and create truly empowered students. Education in the 21st century will need to change to meet new learning styles, as learners are entirely different from learners the past. In the same way, teachers, too, have to change the way they do things, and focus on student-centered learning. Moreover, teachers have to acquire new knowledge and teaching techniques; they have to improve and upgrade their teaching, and to appreciate the fact that their roles in the educational process have evolved. The focus used to be on knowledge transfer from the teacher to the student. The focus is now on encouraging learning experiences for the student. The teacher's role is now about facilitating new behaviors in the students; the teacher's job is to motivate and coach, but the principal players are the students, and not the teacher. The teachers

have to teach less, but learn more. To overcome the substantive subjects to teach as learning skills for the 21st century, learners must learn on their own (Jiamjun Panichpalinchai, 2011). However, Glusac, Karuovic and Tasic (2010) stated that the big problems that make teachers not want to change the way they teach are:

1. A fear of change, a fear of facing new roles, and a fear of a greater burden.
2. A lack of knowledge about practicing new tasks and a fear that students may be able to prevail.
3. A fear of losing their status as the center of the learning process.

Teachers have to modify their role so that it includes offering students the chance to manage their own learning. In this role, teachers are co-planners and set up learning objectives in co-operation with the students (MuntrikaWitoonchart, 2008). In the beginning, teachers experience difficulties in adjusting to their new role. Therefore, policy setters and administrators need to propose and set up measures that strengthen teacher skills and improve teacher attitudes so as to support this important goal of fostering student critical thinking skills.

Administrators have the very important task of driving and helping to improve the quality of teaching and learning methods. They also have to help teachers understand their changing roles. Burke, Christensen and Fessler (1984) described typical stages in the working life of a teacher, and the details follow:

1. Competency Building Stage

   Teachers develop knowledge and expertise in the management of teaching and learning. Some teachers participate in workshops. Some of them like to search for knowledge and skills by themselves. Some make serious commitments to their trade and undertake long post-graduate courses.

2. Enthusiastic and Progressive Development Stage

   When teachers develop their knowledge and skills, as described in Stage 1, they gain a lot more confidence. They work hard to improve the

competency of their students. They also enthusiastically assist other teachers and share knowledge with them.

3. Stable and Stagnant Stage

   If teachers are unable to make progress in stages 1 and 2, they become inactive. They feel they cannot positively influence the students. Many teachers feel they are ineffective and lack self-esteem. Thus, they may well put less effort into their teaching. And, at the same time, they may put most of their time into a hobby, or business other than teaching.

4. Career Frustration Stage

   Teachers expect adverse reactions from their students, and are generally operating in a pessimistic manner. They have a negative view of the job, and feel frustrated. Many teachers take solace in activities outside of the school. However, most teachers choose to remain in the teaching profession at this stage.

5. Career Wind-down Stage

   Some teachers teach until the end of their career. Many of them still like to teach or take on academic responsibility, but are prepared to leave the teaching profession.

It can be seen that individuals entering the profession hold various views of the teaching job. Administrators need to understand this, and should encourage teachers who are in the first two stages of their career to provide maximum benefit to the students. Therefore, the people who are involved in the development of teachers need to understand the feelings of teachers and make them realize that they have the ability to design their own teaching that will benefit student-centered learning, particularly student-centered learning in the 3R and 7C areas. The 3Rs consist of: 1) Reading, 2) Writing, and 3) Arithmetic and the 7Cs are comprised of: 1) Critical Thinking and Problem Solving, 2) Creativity and Innovation, 3) Cross-cultural Understanding, 4) Collaboration, Teamwork and Leadership, 5) Communication, Information, and Media Literacy, 6) Computing

and ICT Literacy, and 7) Career and Learning Skills.

Munson (2012) observed that not just anybody can become a teacher or an instructor. Teaching requires a set of skills that differ from those required for other professions. The skills necessary to become a teacher are:

1. A passion to teach

   Teachers must have a love of the profession. They need to know their subjects well, and must enjoy teaching. This inherent enjoyment of the process motivates teachers to work harder and improve their knowledge and skills.

2. Patience

   Patience is essential for teachers because they deal with students of diverse cultural backgrounds, personalities, behaviors, levels of interest, and academic abilities.

3. Good communication skills

   Communication skills include speaking and listening. Teachers need to be skilled at listening and speaking. When they give students opportunities to share ideas, teachers have to listen with attention and create an atmosphere of freedom of expression. Furthermore, a teacher's voice is an important motivating factor for students. Teachers who speak in a monotone put their students to get bored.

4. Problem Solving

   Many problems and questions arise when people are teaching and studying. Many students are curious by nature, and in subjects like science the unexpected can happen. Teachers have to be able to play the role of problem solver, and ideally they should be good problem solvers.

5. Support

   Students often have the expectation that the teacher is there for them when they have a problem, offering support and guidance. Problems come up inside and outside of class. The teacher should be comfortable

in the role of supporter.

6. Leadership

   The teacher is a leader by role. Students learn from their teachers. Thus, teachers need to demonstrate good behavior. Students watch their teachers, and often imitate them.

There are a number of ways to foster teachers' abilities such as training, academic conferences, workshops, and seminars. However no matter what strategy is chosen, it should enhance teacher ability to promote the critical thinking of students. Teacher training should aim to equip teachers in the following areas:

1. Belief in the students

   The real heart of teaching is to believe in the students' ability to learn and develop themselves, and to realize that the students are the most important players in the game. Teaching is really concerned with helping students to be able to improve themselves to their full potential.

2. Managing content

   Teachers need to ensure that the material chosen for class is morally sound, to do with the educational needs of the students, and of the right level.

3. Holding activities

   Teachers must have the skills necessary to carry out instructional activities that meet the interests and aptitudes of students. This requires teachers taking into account the differences between individuals.

4. Arranging practice

   Teachers need to provide opportunities for students to practice and reinforce skills, and to have authentic experiences.

5. Establishing a classroom atmosphere

   Teachers need to prepare the class environment, instructional media, and learning facilities.

The most important considerations that teachers have to aware of while conducting learning activities are as follows:

1. The differences between individual students
2. The needs of students
3. The level of wellbeing of students
4. The level of interest of students
5. Their level of kindness to students
6. Students curiosity
7. The right and optimal time for students to learn
8. An atmosphere or situation in which students learn by practice
9. Support
10. Their own purpose
11. Understanding of learners
12. The background of the students
13. The use of a suitable number of methods
14. The level of dynamic and variety in the classroom. Things need to be changing and moving frequently.
15. The relevance of the content to students' daily lives
16. Management of teaching and studying plans

4.2 Instructional Strategies to Promote Critical Thinking

The National Education Act of 2542, as amended (2^{nd}) Act 2545 strands 4 standard 24 defined the learning process in terms of the practice of thinking skills needed to handle situations, the application of knowledge to present and solve problems, and the activities in which the students learn from real experiences. These strategies taken together enable students to be able to work, and to develop a love for reading and study (Office for National Education Standards and Quality

Assessment, 2004). It appears that the educational reform focused on important issues in the reform process and on student-centered learning.

Teaching and learning that is really about practicing thinking skills began in the United States in 1980, and it was followed by the introduction of programs aimed at developing creative and critical thinking in 1985. By 1990, classes that focused on critical and creative thinking had been developed. These classes reflected the awareness and control of the cognition of learners, and the culture of reflective thinking lessons (Fogarty and McTighe, 1993). It is accepted almost universally that critical thinking cannot be taught from lectures. Fisher (2005) believed that critical thinking skills can be taught and should be. Rodd (2007) observed that students' good thinking skills cannot develop on their own but rather must be taught. However, a huge effort is required to teach students to develop critical thinking skills. Such programs and classes take a lot of time to prepare, are difficult to plan, and can only use restricted content.

Swatz and Parker (cited in Innabi and El Sheikh, 2006) suggested that there are two approaches to teach the critical thinking: 1) The Embedded Approach, which is taught indirectly, without telling the students about what is going on, and 2) The Infusion Approach, which is way of teaching critical thinking with content integrated in. Burris (2005) discussed which methods of teaching were most effective in developing the ability of the students to think critically. The concept of students learning from the problems they face is an approach that conforms to the theory of constructivism. Learning occurs when students construct their own knowledge by analyzing authentic and real-world problems and then reflecting on their experiences.

Educational experiences that promote critical thinking for nursing students emphasize the development of cognitive processes through the use of basic knowledge, comprehension, analysis, and synthesis as bases on which to build and to foster students' logical thinking. Teachers can help nursing students to build their critical thinking skills by encouraging them to: 1) analyze various situations, 2) not be afraid to be critical, 3) reflect deeply, 4) think deeply before deciding to believe, 5) be rational, insightful, and thoughtful, 6) be generous, just and open

minded about new thing that have not yet been studied, and 7) be committed to seeking the correct answer. Nursing students who practice these skills should develop improved critical thinking skills. The skills, if practiced should also guide the students to behave well and appropriately.

Chanatip Pornkool (2001) maintained that teaching students to develop critical thinking is actually teaching them to think more deeply; such teaching imbues the students with better powers of reasoning and logic. Furthermore, such tuition encourages students to think in ways that are in tune with the scientific method. It is expected that students who develop their critical thinking will show some of the following changes in the way they mentally act. The students change from:

1. guessing to estimating
2. liking to assessing
3. grouping to classifying
4. believing to assuming
5. referring to referring with reasoning
6. connecting to understanding the concepts
7. observing a relationship to observing the relationship between relationships
8. assuming to hypothesizing
9. sharing ideas to sharing ideas with reasoning
10. deciding to judging with clear criteria

Students must be encouraged to take up the habit of critical thinking. They need to be better able to link the various elements that make up the problem, and come to a rational decision. The following points are ways in which critical thinking skills are, or can be, developed:

1. Teachers and students interact with each other.
2. Teachers change their teaching style to encourage students to expand or transform their thinking style. When faced with a problem, students

should examine it from different perspectives, think deeply, think 'big,' think correctly, and think freely. Teachers must design and implement activities that encourage students to practice thinking skills and process ideas.

3. Teachers provide opportunities and time for students to think and express their thoughts.
4. Interactions between teacher and student, and student and student include open and lively debate and discussion.
5. All parties participate in the 'drawing conclusions' phase.
6. Evaluating teachers assess both cognitive content and process.

Maliwan Somsak (1997) developed a way of facilitating critical thinking, and her method included the following:

1. As a first step, teachers explain the purpose of teaching. Teachers then offer arguments or issues that are ambiguous in order to encourage the students to identify and comprehend issues.
2. Teachers encourage students to think for themselves and to practice a range of critical thinking sub-skills, which include, problem definition, data collection, data system postulation, making logical statements and references, setting up a hypothesis, forming a logical conclusion, and inferring. Students have the freedom to think. Teachers should encourage students to think by providing an environment that promotes student thinking and learning; teachers ask thought-provoking questions, offer clarification, guide the students to information resources, and reinforcement desirable students ideas and behaviors.
3. Students are trained to think in small groups. They form into groups of about 4-5 people in order to exchange ideas with each other. Students' sharing of, and listening to, the ideas of the others is a useful way for them to evaluate their own ideas and compare their ideas to those of others. Students can then, as a group, find the most reasonable conclusion and supporting data.

4. Discussion of ideas is a process that allows students to present their ideas to their own group, and then to a larger group or audience. This activity enables the class to consider and discuss a summary of each group's work, then find out or establish a class consensus. With this approach, students have opportunity to share ideas and comments with teachers. Teachers only act in a way that motivates students to cognize. They may, however, provide additional problems and also strengthen the conclusions of the study. At the end of the presentation, individuals consider their own thinking processes and make improvements to the conclusion.

5. Teacher and peer feedback and evaluation are ways in which the students can evaluate their critical thinking processes. Teachers should pay careful attention to the results of the presentations and assessment, whether these meet the objectives or not, and provide feedback to the group.

In addition to teaching and learning to enhance the critical thinking skills of the students, teachers need to modify the teaching process so as to optimize it in all three areas: knowledge development, thought, and behavior. An important goal of education is to develop intelligence because intelligence is about students having knowledge, understanding it clearly and accurately, and using it appropriately in various situations.

Tissana Kammanee (2008) noted that the essence of education, knowledge or contents includes three areas: academic knowledge, thinking skills, and ethics; these three areas must be interrelated and balanced in both theory and practice. Therefore, the learning approach that is appropriate is a process which encourages students to think critically and learn by doing, until they are competent in what they are doing. Hence, the learning process has to promote students' overall cognitive learning, and not just separate the learning into parts, which causes students to understand concepts separately and causes learners to gain knowledge in a fragmented way. Therefore, educators must allow students to link the types of knowledge – and the tasks they practice should contain a balanced mix of academic knowledge, thinking skills and ethical knowledge. A learning strategy to foster the critical thinking of the nursing students can be summed up as follows:

4.2.1 Construction of Knowledge Strategies

Learning approaches that emphasize students' knowledge construction are currently highlighted in the field of education. One example is the CIPPA Model Instruction, which is a form of instruction that focuses on the learners. A student-centered model was developed by Tissana Kammanee (2000), who detailed a teaching activities plan that focuses on knowledge construction by nursing students. In this approach, students learn on their own, interact with friends, and other people and the environment around them, and take part in process skills activities that include the following 5 concepts:

1) Constructivism
2) Group Process and Cooperative Learning
3) Learning readiness
4) Process learning
5) Transfer of Learning

These ideas, when included in a balance way, optimize learning. Furthermore, the learning that takes place is meaningful. Students develop a rich store of knowledge and understanding, and can apply their newly acquired knowledge and skills in a broad range of situations. The teaching of these concepts consists in seven steps:

Stage 1: Review of prior knowledge.

This is a procedure that allows the students to be ready to link new knowledge to their existing knowledge. Teachers may use a variety of different ways of doing this.

Stage 2: Pursuit of new knowledge.

Students seek knowledge from multiple knowledge sources that the instructor may have or may not have prepared. Teachers may introduce information, or suggest resources that the students search for themselves.

Stage 3: Study to understand the information/knowledge.

Students try to understand and relate their new knowledge to existing knowledge using the various techniques that can develop learner cognitive processes and critical thinking such as group discussion, and summarization of information.

Stage 4: Exchange of knowledge.

This step involves students using group learning to monitor cognition, expand knowledge, and broaden understanding. Students not only share their discovered knowledge to the others; they also grapple with and hopefully understand the knowledge of others.

Stage 5: Summary and organization of knowledge.

This stage is concerned with systematically organizing old and new knowledge to help students easily recognize what has been learned.

Stage 6: Practice and/or display.

This step allows students to showcase the creation of new knowledge that has been gained to others. Furthermore, it verifies the understanding of learners and encourages them to use their creativity.

Stage 7: Application of knowledge.

In this step, learners are encouraged to put new knowledge, skills and understanding in practice in various situations to increase the level of mutual understanding and creativity.

The 6th (practice and /or display) stage may be used after stage 7. As we can see, steps 1-6 are about enhancing student knowledge building. Teachers organize activities for students to continuously learn and practice exchange information, interact and train. Each stage allows students to go through a range of physical, cognitive, emotional, and social activities that keep them active and learning effectively. When students learn new concepts and skills, and understand those things deeply, they can then apply them to new

situations. Finally, this ability to effectively apply what they have learned is rooted in critical thinking skills,
creativity, group work, communication, and their own desires and efforts.

In conclusion, the CIPPA Model is a learning model. In this model, teachers assign activities to students who are eager to learn new things, share ideas with each other, and do physical learning activities that keep themselves motivated and awake. If teachers can conduct learning activities that meet the above criteria, then this model really is a recipe for student-centered education.

4.2.2 Concept Mapping Strategies

A mind or concept map is a way of promoting critical thinking. It is a tool that has its origins in educational psychology. The concept of this strategy is to determine whether the instruction the students learn and develop ideas. However, educators often emphasize the differences between individuals and classes, and thus learning strategies must be appropriate to each learner and class. Teaching styles that promote the exchange of knowledge are critical to the development of critical thinking. Teaching methods should encourage interaction between classes, who can learn from activities like discussion, argument, and narration (Gravett, 2001).
Ausabel (http://www.theoryfundamentals.com/ausubel.htm) stated that good teaching can be defined ‘as students learning in a meaningful way.’ Students have a right to, and can, decide what constitutes meaningful learning. Students should be responsible for their own learning. They should also choose to learn the things that they assess are meaningful to themselves and be able to integrate the new knowledge into what they have learned previously. Being knowledgeable is not just about having a good memory. An advantage of teaching and learning concept maps is that the technique offers a clear conceptual framework and affords itself to the use of language that is easy to understand. To encourage students to construct a framework of knowledge and ideas of their own, students should be given opportunities to create their own significant learning activities and new ways of thinking

with mind maps (Gravett, 2001). Activities in the classes must be meaningful and logical if students are to relate to, and adapt, their old knowledge to the new learning (Chabeli, 2010).

Concept mapping is a way to express relationships between ideas and imagination. Concept maps can take the form of sentence diagrams representing the grammar, or circuit diagrams showing the operation of the power system. In a concept map, each word or phrase is associated thoroughly. A concept map is a way to develop thinking skills and powers of logic (http://www.energyeducation.tx.gov/pdf/223.pdf)

A concept map is a method used to teach and evaluate critical thinking in classes. There are many ways to teach this way. One way is to have the students write their key words and concepts down on squares of paper. They can also write down various connecting devices like arrows and equals signs on other squares, and then create a concept map of the problem. This approach allows students see the problem at hand clearly and to look for new relationships between the elements of the problem. This identification of links enables the students to gain knowledge, experience, and skills, and to think creatively. It is widely accepted that this type of approach in developing critical thinking skills improves recognition skills and is applicable in information systems science as well (Staib, 2003).

Profetto-McGrath (2003) noted that cognitive thinking skills are not necessarily the same type of skills used in creating concept maps, and the degree of similarity depends on the context and the past learning experiences of the student. These ideas are summarized in Table 2.3

Table 2.3 Core Cognitive Skills of Critical Thinking Skills, Minor skills related, and Personal characteristics involving the use of strategies to educate the concept map

The Cognitive Skills of Critical Thinking	**Minor skills related**	**Personal Characteristics**
1. Gathering information (identify concepts)	Examining ideas Identify the debates	Curiosity Analytical thinking
2.Planned structured interaction process of learning activities (Analysis, interpretation, inference to explain)	Examining ideas Analysis argument Classification Decoding the importance Applying the definition of clarify Reasoning process	Open minded Systematic reliance-Self Searching for truth
3. Evaluation and reflection (Self-control)	Questioning Guessing the other alternative Inferences Output The argument Evaluating arguments	Intellectual maturity

Source: Profetto-McGrath, 2003

However, Daley and Torre (2010) did a systematic review of research on strategies used to teach medical students, and found that such strategies often involved the fostering of learning and developing: a) the student's store of content knowledge, b) critical thinking skills, and c) complex clinical problem solving skills. A number of the studies reviewed concluded that the use of concept maps was a strategy that was appropriate to the curriculum of medical students. The research databases ACADEMIC RESEARCH, ERIC, EBSCOHost, PsychlNFO, PsychARTICLES, CINAHL, PubMed/MEDLINE and EMBASE include 35 studies that

conclude that there are four concepts common to effective concept maps, Concept maps: 1) foster learning in a meaningful way, 2) provide learning resources appropriate to a variety of subjects and learning styles, 3) facilitate instructor feedback to the students and, 4) enable students to assess their learning and better express themselves. Therefore, it is necessary that those who are responsible for the design and implementation of concept maps ensure that these 4 main features are active in their projects.

4.2.3 Authentic Learning Strategies

An authentic learning strategy is a technique of knowledge management that ensures that knowledge is relevant to the context. Such strategies can be used to provide learners with learning tasks that are applicable to daily life. Because the students are faced with real actual problems, they develop a thirst for knowledge, are eager to learn and solve problems, and develop the skills necessary to survive and thrive.

The principles of authentic learning management provide learners real-life context learning tasks. At present, such strategies are usually put into practice in the classroom. The instructor arranges situations in the room, and key elements of the set up are similar to the actual conditions of the students. Gordon (1998: 390-393) mentioned the following components:

1) In real life, students face both small and big problems; they have to decide what actions to take. Hence, they have to identify the elements that are relevant to the real problem. This requires a thought process, decision-making, and effective implementation of the decisions made.

2) In authentic learning situation, learners seek a solution using resources, the environment, and people around them who can help. Therefore, teachers have to manage the learning environment so that learners can access the information resources such as books and newspapers they need to fix the problem, or take corrective action as needed.

3) In daily life, when a person decides to take action and takes action, they do so using a combination of knowledge and skills, and take action in order to achieve continuous improvement. Therefore, learning under authentic conditions should encourage the students to think, use knowledge and acquire information, and decide what is best and then take action. This whole procedure influences students' knowledge, skills, and attitudes.

4) Learners choose to recognize and learn skills that are meaningful to themselves; skills like understanding others, working with others, and problem solving and decision-making approaches. Thus, in the actual learning management, teachers should be aware of these elements and promote their occurrence.

5) Learning in real conditions helps students to link with others and exchange information and skills. In addition, student development undergoes continuous modification. Thus, this kind of learning can encourage learners to add new and novel original ideas to their base of existing knowledge.

6) Learning in real conditions should provide feedback to the students. They can thus judge if their learning is appropriate or inappropriate and develop their real-life standards of quality.

In summary, authentic learning strategies provide students with classroom learning situations that are 'real-life-like:' students interact in 'real' contexts, facing problems together, and together designing and implementing solutions to those problems. The students can then apply the lessons learned in real life.

4.2.4 Problem Based Instruction

Problem-based instruction is based on the natural principle that a person, when in doubt, or facing a problem, seeks answers. Thus a course should involve students, usually in a group, facing problems and finding solutions; in other words, being challenged collectively. Students learn meaning

through this development of processes and skills that can be applied throughout their lives. (Tissana Kammanee, 2008).

Problem-based instruction is an approach that uses a problem as a tool to stimulate learning. Knowledge and skills arise from critical thinking skills applied in problem solving. When this process is performed regularly, the knowledge and skills developed are remembered easily and stored for a long period. Furthermore, knowledge and skills developed through problem solving are easy to recall, and can be applied again quickly. When practice regularly, problem-based learning becomes an automatic process (MdZabit, 2010).

Problem-based instruction is about solving problems under the conditions of the class instruction. Teaching problems are tools used to help learners achieve learning goals. Teachers raise problems and encourage learners to seek the knowledge they need in order to solve those problems. With this approach, teachers must allow students to decide themselves what they need to learn and research. An important issue to be recognized is the value of teamwork. This approach encourages practice by learners in the learning process, group thinking and problem solving, and the discovery of alternative solutions to the problems.

The process of problem-based learning encourages students to learn in groups by sharing knowledge with each other. The process of learning can be divided into three steps as follows:

1. Introduction and creation of an atmosphere within the group

   Students must get to know each other. In the first group meeting, there should be an introduction where students describe their educational background, interests and expertise in any subject in order to create a relaxed atmosphere; an atmosphere that is not stressful. In addition, a set of rules should be agreed upon, comments should be called for, and a president and secretary elected. Furthermore the responsibilities of the group leader and secretary should be determined and agreed upon. For example, the

secretary has a set of duties that include recording and storing important information that comes up (i.e. into the e-learning system, or personally, depending on the group consensus), opening and closing the session, and dealing with issues of group membership.

2. Assigning the problem

   Most courses are taught following a curriculum that states what students need to have learned by the end of the study. For example, a nursing curriculum describes what the nurses must learn about a disease and its treatment. Teachers should assign a problem or situation in accordance with the course curriculum. If the course is open to students learning about society, teachers may give students problems that are topical and of strong interest to them. When the problem is identified, the members start to exchange views about the causes of the problem, and the questions that need researching. Every time a thought about the issue presents, it must be written on the board to help the students pay attention and follow up on issues being discussed. In addition, there should be an exchange of information that each student has come up with. Students must be able to explain their conclusions as regards the cause of the problem, and also summarize the assumptions they made in coming up with their answers. If the students do not understand the issue or cannot access the issue in the early stages of the group meeting, the teacher may examine their understanding through questioning. Once the students understand that the classes are based on problem-based learning instruction, the teacher becomes an advisor, and facilitates the learners' pursuit of knowledge. Students study and seek knowledge on their own, and embark on their own journey of data collection, analysis, summary, and data evaluation. At the end of the learning process, teachers assess what students have learned together.

3. Following up on the problem

   This is the process of review. The students get back into their groups again later to re-examine their solutions and the assumptions inherent in the problem and in their solutions to the problem. The sources of information used are looked at again, because the reliability of the data used has an influence on the validity of the solution. Some of the problems may be unsolvable, but the important thing is that the students learn about teamwork, problem analysis, finding the cause of, and ways to solve a problem, and learning to search for the answers to the questions that arise.

4.2.5 Scaffolding Strategy

Scaffolding is a strategy through which students learn deeply by having teachers present to support them when they need assistance. It is concerned with helping learners to achieve their learning goals (Sawyer, 2006). Scaffolding, researched and reported on in 1978, is based on a Vygotsky concept; it was used in the context of experts helping new graduates who had little or no experience. In youth educational and developmental terms, scaffolding is about social interaction between adults and children, and is about children developing knowledge and skills that they cannot acquire on their own. Cazden (1983) described scaffolding as temporary framework that supports processes carried out. When the students can learn or act on their own, the teacher removes the scaffolding. Teachers do not change the nature of the task or reduce the level of difficulty of the task. But rather, they encourage students to successfully complete the task; the teachers create a structure that is analogous to the scaffolding built around a house that enables builders and technicians to safely and effectively build the home. When the structure is strong enough to stand on its own, the scaffolding is removed.

Dickson, Chard and Simmons (1993) noted that the provision of scaffolding is essentially the provision of knowledge, documents, and materials in a

systematic way, plus the presence of teachers and friends. When the students can learn on their own, teachers, who provide assistance or support, reduce their role as teachers, an instead focus on monitoring and assisting the self-learning going on in the students. So the more learners learn or act, the more instructors substantially reduce their role. Dickson (1994) said that when a child is unable to manage a slide for itself, an adult lifts the child up onto to the slide and helps them down the slide several times. The adult is using scaffolding when they do this. They then may reduce the scaffolding as they position the child on top of the slide, but let the child slide down by themselves. The child is now at least partially self-guiding. The adult finally removes all scaffolding, that is, they longer help the child at all, when the child can mount the slide and slide down on their own.

The Scaffolding teaching technique facilitates the learning of concepts and process skills in the first step. Support for this technique should include: 1) resources, 2) compelling tasks, 3) template and guide, and 4) guidance on the development of cognitive and social skills. There are a number of types of scaffolding that can be erected and used depending on the context. The teacher may create forms or work, providing guidance or maintain the status of helper. The teacher's support is gradually withdrawn from the student so that the student can develop their own learning strategies that promote their cognitive learning, physical and mental skills as well as concepts and knowledge.

Simons and Klein (2007) divided scaffolding into two levels: a soft level and a hard level. An example of soft level is when the teacher goes around the classroom and talks to the students, and asks them a question or two. The students and the teacher then reflect on the student responses. How much support the teacher offers depends on the need for help that the students demonstrate in their answers. Hard level scaffolding is about planning to assist students in lessons that are difficult. For example, when students solve Pythagoras' theorem, teachers may help students by encouraging them to analyze what they have done. However, for both types of methods to proceed smoothly, the teachers should be experts in the

process of scaffolding in class.

There is also a kind of peer support group scaffolding. In this method, learners may pair work together. This situation allows the students to learn from each other's knowledge and experience. Thus, this scaffolding is about sharing with each other, and working together effectively. Vygotsky said that students develop better and higher level thinking skills with the scaffolding provided by experts or capable friends. This idea conflicts with the concept of Piaget, who believed that the students abandon their own ideas when they come into contact with people they think are of higher ability.

Using scaffolding in teaching is a strategy that can be used in conjunction with other methods of teaching as well, especially problem-based learning (PBL). In the PBL classroom, students search and work together as a team, in small groups, to help diagnose problems, solve problems, and evaluate solutions. It was found that many teachers integrate scaffolding and PBL. Scaffolding enables learners to understand the problem more deeply and fix the problem, but it is the instructor who must design it, decide when to start using it, monitor its effectiveness, and recognize the time to end its use (Lajoie, 2005).

Hogan and Pressley (1997) conducted a review of the literature related to scaffolding and found that teachers do eight things when using the strategy:

1) Pre-engage with the Student and the Curriculum

   Teachers must select an appropriate assignment for the students by considering the needs of learners and the objectives of the course.

2) Establish a Shared Goal

   Learners are motivated and dedicated to the learning process when teachers and students cooperatively create the goals of the course.

3) Actively Diagnose Students Needs and Understanding

   Teachers need to be very familiar with the course content, and

sensitive to the students' abilities and knowledge if they are to make good decisions and really help the students.

4) Provide Tailored Assistance

   This also includes knowing the right time to assist, making demonstrations, asking questions, and discussing things with the students. Teachers have to use these methods when necessary, and must be able to adjust their efforts according to the needs of each student.

5) Maintain Pursuit of the Goal

   Teachers must set up questions, have clear explanations, compliment learners, motivate the students, and continue to focus on the needs of all learners.

6) Give Feedback

   This is to help learners learn to check their progress in learning. Teachers may create a summary of progress in learning that occurred, and of behaviors that led to success. This may be done for each student.

7) Control Frustration and Risk

   Teachers must create an environment or atmosphere in which students are free to manage their own learning. This is often done by the teacher providing options.

8) Assist Internalization, Independence and Generalization to other Contexts

   Teachers allow or encourage students to rely on them at least in the beginning, and to complete a task successfully. They also provide opportunities for practice in a variety of contexts.

Larkin (2002) interviewed and observed teachers who applied scaffolding strategies in their teaching with the aim of helping their students to become independent learners. He found that these teachers have integrated

elements of all of the above eight factors into their teaching. In addition, he provides guidelines which if followed make scaffolding more effective. Teachers should:

1. Begin with what the learners can do

   Learners need to recognize their own strengths. Teachers should give students the chance to feel good about what they can do on their own or with a bit of help.

2. Help the students achieve success quickly

   Although it is a fundamental of the process that learners need to be challenged in order to learn, and that in reality this can be a frustrating and at times negative experience, the teacher must, in many cases intervene promptly when the students are unsuccessful.

3. Help learners to be the same as other students

   Students want to be friends and want acceptance from their peers. Thus if some learners are given the opportunity and assistance to take more actions, they can better contribute and achieve success within the group.

4. Know the time to stop

   Practice is a very important way in which students can learn and apply knowledge. However, if it becomes excessive, it will hinder learning. “Less is more” is a rule that teachers need to learn when allowing students to settle matters, show their abilities, and learn successfully.

5. Help the students to work independently and think freely

   Teachers need to know how much to assist, when to be involved and when not to be involved. Teachers need to partially withdraw from the task when the students begin to demonstrate that they can it do by themselves, and completely step out when students can perform the task independently.

Scaffolding is useful for learning. However, it must be used in a way that still challenges the students. Larkin (2002) offers the following advice to teachers who wish to use scaffolding:

1. Use scaffolding in a timely manner

   Teachers need to remember that not all learners need every piece of scaffolding. Thus, teachers should provide scaffolding only for an appropriate group, and at the right time.

2. Be knowledgeable about the course

   Being knowledgeable about the subject matter helps teachers to understand the difficulty of learning a particular concept, and thus enables them to better support students, and to maximize the benefits for students.

3. Practice creating or refining methods necessary for assisting learners

   The first method a teacher uses may be a failure. The teacher then must find other ways of helping the students.

4. Be patient and positive

   Teachers may become a negative for the students. If a student is not responsive, or is failing to learn under the scaffolding regime, the teacher should modify the scaffold by changing factors like his or her voice and manner. Sometimes a few kind words are all it takes.

Alber (2011) suggested that there are six steps to a scaffolding strategy:

1. Show and explain

   A demonstration is much better than a whole lot of lecturing or talking. Teacher modeling is an important principle of the scaffolding learning process. The teacher displays or demonstrates and explains to the class what they have to do. Showing students what to do, then letting them do it for themselves is a lot more

valuable than a lot of teacher talk.

2. Tap into Prior Knowledge

   This stage provides students with a chance to share their past experiences, and their opinions on the content and concepts of the class and if possible, create a link between the classes and their own lives. Some teachers may use clever strategies at this point to personalize the class and get students to think further. If students can relate to the concept, they will better understand the process and link it to the future.

3. Give Students time to learn

   All learners need time to process new ideas and link information. They also need time to learn to communicate and connect with a group of students who all have the same experience. It is well known that talking in a group of friends is useful because the members of the group work together well and relate well.

4. Pre-teach Vocabulary

   Assigning vocabulary for students to research before the class allows learners to more fully participate in learning and develops student enthusiasm. Furthermore, teachers should create opportunities for students to study in small groups.

5. Use Visual Aids

   Charts and graphs are parts of many a scaffold. Charts help students to understand relationships like cause and effect. Scaffolding is a method that facilitates learning that can be applied in the future. Some students may think for themselves, analyzing their own assumptions in various ways without the use of aids like charts, while others benefit greatly from the use of such tools.

6. Pause, Ask Questions, Stop, Review

   This method is used in investigating student comprehension of the

concepts presented. It is also a good way for teachers to gauge the difficulty of the material assigned was for the students. This method allows students to talk and exchange ideas with each other. After the pause, in which students have time to think, teachers ask open-ended questions and then stop again. Teachers use some of the students' conclusions to assess the importance of what has been learned. If the class cannot provide answers at this stage, teachers need to give the students further time to think and discuss.

7. Try Something New

   According to the learning outcomes in a class, teachers may need to develop and try new scaffolding strategies. It is said that scaffolding is a strategy that may take time to teach, but produces results that are worth the effort.

4.2.6 Teaching Strategies to Promote Critical Thinking

In the teaching and learning process, most teachers focus on the teaching and learning objectives that relate to course content and coverage requirements. Thus, the teaching method used in too many cases is 'lecture.' In many ways, nursing profession-related courses differ from other courses. Nursing science education was, in the past, focused on the content and competencies that were necessary and needed for the nursing profession. Nowadays, new graduate nurses who work in a variety of health services including outpatient clinics and emergency departments require a different set of nursing skills and knowledge. Jones and Brown (1991) noted that the content that needs to be learned is in excess of what is possible to teach. Nursing education cannot provide nursing students with all the information they need at once. Therefore, the aim of nursing education is to prepare students to become thinkers and lifelong learners. For adults, the important thing is learning how to learn (Billing & Halstead, 2005). Critical thinking is necessary and important in the synthesis and integration of knowledge for clinical decision-making. Nurses must have the skills or the ability to think critically to ensure safety as well as have efficiency and expertise in the care

of patients. Accordingly, a key performance requirement of the nurse in the 21st century is to have well-developed critical thinking, which will lead to sound clinical decision-making (National League for Nursing Accreditation Commission, 2005). The research evidence (Hoffman, 2008) suggested that critical thinking consists in 4 types of strategies:

1) Reading Strategies

A study of 437 students who attended large educational institutions on the east coast of the United States found that reading with understanding was significantly related to changes in critical thinking, academic success, and registration examination performance (Hoffman, 2006). This was consistent with Robino (1998), who reported that reading skills correlated closely with average grades in the first semester.

The Graduate Program in Nursing contains a lot of content that has to be memorized, and reading strategies are important in the learning and teaching of nursing. Reading is not only a necessary discipline through which students get ready for morning classes; it is also a traditional part of the preparation for patient care. It is often the case that patient care, and various health and disease issues, cannot be covered in class. For this reason, nursing students must have the ability to read and understand the disease process, pathological physiology, the diagnosis and treatment of disease, and be able to apply this knowledge when caring for patients. Preparation for these clinical needs requires reading skills and critical thinking skills.

A strategy for developing nursing students' reading comprehension skills should be taught to new students who enroll in Bachelor of Nursing Science degrees. Fopma-Loy and Ulrich (1999) described a strategy to teach critical thinking through reading. The strategy involves: 1) The students write a paragraph about what they think the reading is about after reading the text, 2) The teacher identifies the content that the students do not understand and explains how to find

the answers, and 3) The students write a summary of the main point of the text and identify three major issues with the text. Students must identify assumptions inherent in the text and key relationships, critically assess evident references, and create a summary, all of which are elements of critical thinking.

Students need to have reading assigned in preparation for classes, and they need the skills to read and understand and create new knowledge. They also need time saving skills and critical thinking capabilities when caring for patients in clinical scenarios. Content taught in class will often not be immediately applicable in the clinic or ward. Critical thinking skills are required in order for the knowledge and skills they have acquired through reading to be applied in the real world. As students read in preparation for the ward, they should apply critical thinking skills as they do so. In fact nursing students are expected to have or develop the reading skills and reading comprehension that enables them to meet demands of the challenging and dynamic hospital environment. Reading and writing help students to choose the issues, which leads to a better academic performance (Chen & Lin, 2003.

2) Applying Case Studies Strategies

Case studies are one of teaching strategies that are often mentioned in the literature. They provide a way for students to investigate the complexities of patient care, in the classroom, and strengthen student critical thinking (Jones & Sheridan, 1999). This learning approach is a good one as it provides students with an opportunity to thoroughly prepare for real-world nursing care. The study of case studies encourages students to learn through real world problem solving, and to test hypotheses postulated that are contrary to the literature, related research and personal experience. It also provides students with chances to discuss real-life situations and the challenges of nursing, and also encourages students to think critically. Moreover, teaching

through case studies helps reduce the gap between the newly graduated nurses and nurses with experience.

The study of case studies is one member of a set of strategies based on the use of problems to promote critical thinking. Students may work together in small groups. Group study helps them to develop their communication skills, and better highlights the problems of the real world as students, as a group, relate their relevant real-world experiences. At the same time, it allows students to investigate what they should learn. Teachers ask questions that lead students to develop their skills of critical thinking, and students use their own existing knowledge store and knowledge from external sources in doing so. This strategy enables students to take responsibility for their own learning, and it is very important in terms of patient care. It is quite relevant to the process of consultations with patients before and after nursing. The dialogue issues should be derived from the actual patient care experiences of nursing students. Interactive discussion helps teachers to evaluate and give students feedback about the problems faced during their case studies-based learning experiences.

The discussion about case studies may include examples of actual dialogues that occurred. Students are pre-assigned case studies to examine before class. Class sizes may be large, but the importance of the strategy is that students are engaged and motivated. This technique, which involves students reviewing and critically examining actual cases, also helps to prepare students with their application procedures for their professional certificate. Because students have conversations about the case study, the teacher can immediately gauge their level of understanding.

Case study teaching and learning emphasizes the application of knowledge rather than bringing knowledge to use directly. As the teaching and learning in Nursing Science Program is also content based, the nursing students are expected to pass pathophysiology and

pharmacology exams. The case studies are designed to provide students with opportunities to apply the knowledge learned. Although most students like to learn through the use of case studies, there are some students who do not. They are often individuals who are accustomed to traditional lecture style teaching methods. Thus, teachers should get students to understand the educational objectives of the course before attending classes because these objectives will provide students with an opportunity to prepare the content. The purpose is to make students aware of the actual course content. In this way, students have an opportunity to review their existing knowledge before the class and write down key points. This is similar to note taking, an activity they often engaged in while attending classes; an activity with which they were familiar. Rowles and Brigham (2005) summarized the points that can increase the effectiveness of the teaching and learning of case studies, as follows:

1. Case study learning has to focus on the most important concepts.
2. There is often no single answer that comes out of a case study. Thus, teachers must motivate students to find other possible answers.
3. Teachers must create an open, safe, and non-threatening learning environment.
4. All students must take part in the class, and the class size must be appropriate. Also, the class has to get a summary of important content, so that students can understand ideas correctly.

The research on instructional design of case studies shows that it is really about application of knowledge, analysis of clinical situations, and the creation of a framework that facilitates learning under new circumstances and situations; situations such as those found in nursing wards. Ideally, case studies study should equip the students with

knowledge and skills consistent with what they will need on the job. The result should be that students are better prepared to understand and treat patients in all ways required. This teaching method is useful for students who need to learn about the signs and symptoms of the disease, every day, as they do their job. It also encourages practical training, which is necessary for rookie nurses.

3) Questioning Strategies

The asking of questions to students to make them think and come up with answers is an age-old approach. However, many studies evaluated this strategy and found that its value depends on the type and quality of the questions asked. Often the questions just call for a memorized answer. Such questions, although they may be of value in some situations, do little to stimulate the critical thinking skills of the students. On the other hand, there are other types of 'high quality' ones that will stimulate and demand critical thinking skills from the students. Such questions are useful and lead to the success of the student in the clinical situation (Profetto-McGrath, Smith, Yonge, and Day, 2004; Rossignol, 1997).

Questioning strategy can build critical thinking according to a lot of nursing research. House, Chassie and Bowling (1990) pointed to the usefulness of questioning in stimulating students' high level cognitive processes, including critical thinking skills. In addition, Sellappah, Huusey, Blackmore and McMurrey (1999) reported the benefits of questioning. They said that questions that require high level cognitive processes lead to the development of critical thinking, and better clinical decision making. Furthermore, such high-level cognitive activity sphere questions can be used to measure and assess the clinical practice of nursing students. Questioning strategy is an important skill, which is related to student achievement. King (1994) noted that students set up question by themselves following the cognitive process leading to the concepts and understanding which

resulted in the creation of knowledge and efficiency. Questioning is one of the strategies used to promote critical thinking, and Socrates and other philosophers used this method to teach (MdZabit, 2010). Paul and Elder (2003) explained that questions must make students search for data in order to examine issues and discover hypotheses, and also to criticize the truth of a judgments and analyse values. In addition, questions can detect weaknesses in the students' use of logic. Moreover, Banning (2005) reported that the use of questions that require higher level cognitive processes encouraged students to think critically.

The key principle of using questions is that the instructors ask the students a question. When they can answer, teachers then set a new question, and they continue to do so until the students cannot find the answer. If the teachers just ask the students about what they already know, the students will not learn anything. Such questioning is a big waste of time. Students need to understand why the teacher asks a question that they cannot answer, or the students get stressed. They need to see that it means that they have to do more research, and develop more knowledge. Teachers then need to allow students enough time to research more, and to research from other sources.

The use of advanced questions enables students to synthesize, apply content knowledge, and evaluate existing data. In clinical practice, these questions can come from students or teachers. Advanced questions which are useful in the clinical practice, are typically of the forms, "What if…when …how…why…" For example, suppose that a teacher wants to review the treatment of hypertension. Rather than asking if any there are any indications of action and side effects of this drug, a better and advanced question would be

"How does the ACE inhibitor reduce blood pressure?" and

"How is it different to a calcium channel blocker" or

> "How can students take care of the patients when they feel numb and dizzy and have unclear vision 45 minutes after giving them this medication?"

These advanced questions make students think about how these situations occurred and what knowledge and language are needed to provide answers.

In addition, the use of advanced questions can be integrated in the objectives of the practice of clinic and consultation. This strategy helps learners later apply the content learned in the present case. Learning in classes may not involve exposure to people with sicknesses. Therefore, students need to learn to integrate knowledge about the various signs and symptoms of patients whose cases have been assigned by the instructor in order to better apply the knowledge learned in class to patient care. For example, if the class is on the care of patients with disorders of the kidney, a question that the teachers might set that would help students to function better in the clinical environment might be

> "Explain the results of water and minerals analysis compared to the health assessment of patients with abnormal renal function."
>
> "What symptoms might lead to a patient being diagnosed with renal dysfunction?
>
> "If Blood Urea Nitrogen and Creatinine Serum levels detected are high, what medical treatment should be commenced?"
> "Will the presence of diagnosed kidney disorder, or treatment for that condition on a patient's history increase the risk of further severe kidney disease, and how?"

These questions helped students to link textbook symptoms to clinical symptoms that were detected in patients with renal dysfunction to whom they were assigned. Moreover, other students also used a similar method. Students then presented to the group, and individuals

learned of other disorders from their peers.

Rowles and Brigham (2005) suggested that in order for questioning strategies to develop student critical thinking:

1. The questions should require deep thinking skills and not just recall.
2. Instructors need to be well prepared and knowledgeable, in case the students lack knowledge of the main concepts.
3. The questions should be assigned in advance so that students have time to do some research, prepare well, and reflect.
4. The class atmosphere must be receptive so that students feel safe, and comfortable when answering. Nurses must have the capability to think critically in order to take care of patients.

It could be said that in situations where technology has changed a lot, and where there are various ways of conducting treatment, teachers should modify outdated methods, and emphasize that there are a number of ways of solving the problem.

5. Related Research on Strategies to Promote Critical Thinking

Regarding reviewing research related critical thinking enhancement for students in Thailand, there are many researches which the results are as followed.

Aucharaporn Sriphoosanapan and Rochanee Jindawat (2002) asked nursing instructors in Thailand about ways of developing student critical thinking skills. 68 nursing instructors from the Faculty of Nursing, Chiang Mai University, were asked which methods were effective in stimulating student critical thinking skills, and the results were as follows: 94.2% of respondents indicated that criticizing an article was effective, 85.5% thought the study of case studies was, and the remaining results in decreasing order of agreement were: brainstorming (82.6%), seminars (75.4%), questioning (72.5%), and researching (56.5%). In the case of the practice on the wards, the percentage of respondents that approved of the following methods were: case conferences (95.7%), case studies (82.6%), questioning (79.7%), using the nursing process (71.0%), and clinical visits (66.7%).

Wareerat Keawaurai et al. (2004) studied the reform process of education management. The results showed that a key principle of the reform scheme is the provision of education and learning courses that use results as a basis for the introduction of more diversity into the learner-centered learning. The combination of information, knowledge and learner-centered learning strategies makes for a balance, and allows for the development of body, mind, intellect, knowledge and culture. This combination can be shared with others, promotes happiness, and facilitates learning continuously throughout life. The elements of the style contain five components: 1) the theory and basic concepts of the reform process of learning 2) the learning process and the concept of learning management 3) learning methods 4) elements/factors that promote the reform of the learning process 5) the results of using the model to reform the learning process. The results from the validation, suitability and feasibility testing of the implementation of the model are in harmony with the empirical data. Thus, it can be suitably used for the education.

Sopida Tudpinich (2005) studied teaching models that promote nurse critical thinking skills. She studied the development of nursing skills and critical thinking skills in two groups, one of which was conducted using the developed model, and the other of which was taught using traditional methods. She conducted the research and broke it down into two phases as follows:

> Phase 1 was developing the teaching model using the research-based concepts of Cammis and Mc Taggard The sample group consisted of eight 2nd year nursing students. The findings showed that the teaching model that promoted critical thinking skills contains six elements: 1) goal 2) principle 3) teaching process 4) supporting system 5) social system 6) reflection. This model focuses on teaching in two stages: Stage 1: promoting the ability to generate nursing knowledge including a review of relevant knowledge, creating cognitive conflict, and the creation of new knowledge; and Stage 2: promoting the abilities to use the nursing process and critical thinking skills including learning to think together as a group and scaffolding.
>
> Phase 2 was about the comparison of ability to use the nursing process and critical thinking skills between one group that studied as per the developed model of

teaching and the other group that received traditional teaching. The research was conducted following the guidelines of Randomized Control Group Post-test Design Experimental Research. The participants were 32 3rd year nursing students. They were divided into an experimental group and a control group, with sixteen people in each group. The result showed that the experimental group (developed teaching model) scored higher than the control group (traditional teaching model) with a statistical significance level of 0.05.

Ruchanee Sachanpurk (2005) studied the effects of self-media scaffolding learning on the writing of six undergraduate students, using pre-test, learning from a the media series, followed by post-test. This proved to be a positive way for students to improve their writing and their process of writing. Self-media scaffolding helped students write in a shorter space of time, and better apply the five steps of the writing process. Furthermore, the quality of students' writing gradually improved, even though at the same time the level of aid declined. Students later used all five steps of the writing process to pass writing tests after school without any guidance or instructions. From the positive effect on the students' written work, we can conclude that the media series helped students to improve their ability to write. However, students still had a low level in certain skills, especially in the grammar area. In terms of the feelings of students toward the scaffolding types, the research suggested that every kind of assistance was acknowledged by the students as being beneficial to their learning, and all such assistance was about right. However, the part that the students were dissatisfied with was the level of support for Simple Past Tense.

Sudsakorn Srilasuk (2006) also studied the development of management that focused on student-centered learning. The researcher found that a strategy that could be applied to elicit good performance included: 1) the principles of learner-centered management, 2) the techniques of learner-centered management, 3) teachers as the managers of teaching and learning, and 4) administrators as the developers of curriculum, learning resources, classroom research, and instructional materials. Administrators should also supporting and supervise teaching and learning. Moreover, they should follow and evaluate teaching and learning, and their focus should be on student-centered learning.

More over Mantariga Witoonchat (2008) studied the development of administrative

strategies for promoting child-centered learning in private basic education schools levels 1-2 in Bangkok and indicated that the development of administrative strategies of private schools comprised of 5 main strategies: 1) leadership strategies; there were 16 sub-strategies; 2) teachers development strategies; there were 7 sub-strategies 3) academic development strategies; there were 52 sub-strategies; 4) development of general management strategies; there were 13 sub-strategies; 5) development of strategies for community cooperation with school network; there were 8 sub-strategies.

In the area of teaching and learning that emphasizes the cognitive development of students, Tiwari, Lai, So, and Yuen (2006) studied undergraduate nursing students using the California Critical Thinking Disposition Inventory (CCTDI), and measured problem-based learning over a period of two years. After an initial test of critical thinking, 79 students were randomized and divided into a control group of 39 students, and a study group of 40 students. Both groups were taught the same content and purposes of studying basic nursing for two semesters. Students in the study group were divided into groups of 10 students, and learning by problem solving was the main focus. Furthermore, there were six hours per week for 28 weeks of classes while the control group sat lectures classes of three to six hours for 29 weeks as well. The results showed that the instructional model that used problem solving as its main method motivated and reinforced student critical thinking better than the lectures only method. Consistent with these studies was the work of Suchitra Tian Sawad, Aapai Jariwacharapanichkool, and Yupin Pianmongkol (2007), who researched the use of concept maps and the ability of nursing students in planning. It was quasi-experimental research that involved 3rd year students studying in the Faculty of Nursing, Chiang Mai University. The sample group consisted of 50 students studying in the second semester of academic year 2005. The research instrument was nursing-related lesson plans that involved concept maps created by Suchitra Tiansawad. The data collection instrument was a nursing care ability survey created from a literature review that had a 1.0 content validity and 0.87 Cronbach. The results revealed that at the end of the course using concept maps, students recognized that their nursing ability in terms of the nursing plan had increased significantly ($t = -9.006$, $p < .001$) and determined that the nursing plan that used concept maps was easier to follow, saved time, stimulated more analytical thinking, and gave an overview of the patient's problems that was superior to writing the plan in a

tabular format. In addition, Panita Wanpiroon (2008) conducted research, and developed a blended learning strategy on the web that involved problem-based learning in order to develop the critical thinking of undergraduate students by managing the learning and measurement with critical thinking and authentic assessment. A sample of undergraduate students, totaling 38 people, were evaluated for critical thinking skills such as making conclusions, making meaningful explanations, inductive inference, creating hypotheses, making predictions, and defining and identifying assumptions, and an above average score for critical thinking was determined, which was statistically significant at the .01 level.

Wheeler and Collins (2003) studied the use of concept maps using a quasi-experimental study with pre-post design studies to develop critical thinking skills. This research studied undergraduate nursing students totaling 76 people, who were divided into a study group 44 people and a control group of 32 people. The study group used concept maps based on patient information in preparation for nursing practice. The control group used regular routine nursing care plans and both groups' critical thinking skills were measured using the California Critical Thinking Skill Test (CCTS). The analysis of total score and scores of each side included measurement of analysis, assessment, inference, deduction, and induction. The results found that by the end of the research phase, the study group showed significantly improved critical thinking skill in terms of the overall, analysis, and assessment. However, the control group showed only increased skills in assessment and in fact decreased in respect to deductive skills. The researchers concluded that using a concept map is effective in helping students develop critical thinking skills.

Simpson and Courney (2008) studied strategies to promote critical thinking among nurses in the Middle East. The objective was to develop, trial, and evaluate strategies to promote the critical thinking of nurses in the Middle East. The parameters of critical thinking measured included questioning, creating arguments, role-play activities, and activities in small groups. The experiment was done with 20 nurses in order to promote critical thinking skills, encourage problem solving, develop clinical decision making, and facilitate ordering of the nursing services. The teaching and learning in the classroom was transformed from memorization to more learner-centered ideas. The results showed that the experiment improved the critical thinking of both teachers and

students. This trial program successfully integrated strategies to promote critical thinking into the course of instruction of nursing students in the Middle East. The researchers suggestions were to: 1) integrate empirical evidence and the use of questions into the program to encourage students to define problems that required critical thinking, 2) support where necessary instructors to be able to practice teaching strategies that enhance the learners critical thinking skills, 3) modify things so that learners feature in the learning process and, 4) encourage learners to be open minded, \ creative and problem solvers.

In addition, Yuan, Kunaviktikul, Klunklin and Yuan (2008) studied problem-based learning (PBL) in undergraduate nursing students using a 2-group pre-test/post-test study. 46 students were randomly divided into a control group and a study group. All students had to do the California Critical Thinking Skill Test Form A (CCTST-A) before the course. Both groups learned the same course content and key concepts, and studied for 36 hours over an 8-week semester. The control group studied via the traditional teaching method, which was lecturing; students were taught content rather than investigating knowledge by themselves. Students in the study group were divided into groups, with 11-12 people in each group. The study found that PBL stimulated and fostered critical thinking skills. In line with this was the work of Lyons (2008), who studied the effects of PBL on the critical thinking of nurses who had enrolled in a nursing diploma course with the National Council Licensure Examination for Registered Nurses (NCLEX-RN). A total of 54 people were involved. This course, which was an elective one, went for 17 weeks. Participants were divided into a control group (in which teaching and learning was teacher-lectured), and a study group who participated in the PBL approach. Each group was composed of 27 students. The critical thinking skill of all students was tested using the Assessment Technologies Institute (ATI) Critical Thinking Test. The two groups had to meet every week for 2 hours, and had to do the NCLEX-RN test on a computer. The results showed that overall 48 students (88.9%) of the total sample of 54 students passed the NCLEX-RN. However, on an experimental and control group breakdown, 93% of the group that received PBL instruction passed, whereas only 85% of the control passed the test. The researcher concluded that PBL learning approach helped learners in the areas of problem solving, knowledge development, critical thinking skill building, and nursing practice. Such

traits, which are important for nurses, helped students on the NCLEX-RN.

Cruz, Pimenta and Lunney (2009) conducted a study that looked at learning from case studies and its effect on nurses' critical thinking and clinical reasoning skills. The study took place in Brazil, and the participants were 60 nurses who volunteered to join it. After an initial medical examination, the sample size was reduced to 46; a further 7 were eliminated because they did not take part properly. Therefore, the final number of participants was 39. The participants studied for 16 hours over a period of 4 days, and the study theme was medical and surgical nursing. Each case study consisted of a 14-sentence diagnosis. In the first part, the participants had to do a gap-fill about the factors that caused the disease, and this had to be in relation to information from the case study. They had to answer questions from 2 case studies within 30 minutes before the teaching program started. Questions examined by the research were about 1) the need to use critical thinking in clinical reasoning during nursing 2) who, what, where, when, why, and how about with the critical thinking, which totaled 7 hours 3) findings related to the clinical data analysis of the nurses precisely, totaling 3 hours 4) analysis of the case study by using critical thinking, totaling 3 hours and 5) guidelines for the self-development and the development of teaching, 2 hours. During the teaching, the case studies that were to be part of the test samples were not brought into the process. After the four days of the teaching program had been completed, the participants once again did a gap-fill on the case studies, and pre and post scores were analyzed by the Wicoxon Matched Test. The test results showed that the 16 hours of case study-related education did indeed significantly ($Z = -3.34$, $p = .001$) improve the nurse level of critical thinking and clinical reasoning.

Vacek (2009) studied the use of concepts map to promote critical thinking. The researcher said that critical thinking is necessary for two reasons: 1) The Nurses Association and the National Association Academy of Nursing of the United States determined that nursing students need to have critical thinking skills when they graduate and 2) even more importantly, medical professions need to possess the skills of critical thinking and the ability to solve problems. It has often been found that traditional teaching does not provide activities that promote critical thinking. The researcher used the theoretical framework developed by Ausubel (1968) and Novak (1998) to give students an opportunity to study the cognitive skills in relation to critical thinking.

According to Ausubel's theory, the learning process can be divided into 5 steps: 1) define the conceptual framework 2) definition 3) classification of differences 4) integration 5) collection for learning. Novak (1998) used these steps to create concept maps. The researcher concluded that concept maps assist in problem-based learning, and strengthen the learning process. They also improve perception and critical thinking skills such as analysis, interpretation, explanation, and self-regulation. These strategies challenge students to think more critically.

6. The Research Framework

The development of strategies to promote critical thinking for nursing students is akin to the development of student-centered learning. Teachers have to modify their concept of teaching so that students can be more involved, and teachers need to replace lectures with student-centered learning classes that incorporate concepts like Bloom's, which can truly develop student cognitive and affective domains. Such strategies can also to be linked to the learning theories of Piaget, and Thorndike and the sociocultural theory of Vygotsky.

The researcher examined strategies that enhance critical thinking in some detail, and considered evidence and issues from a wide range of literary, documentary, and media resources. Such strategies strengthen students' critical thinking skills and help students to become lifelong learners. One key point here is that teachers need to modify their roles. This also requires the cooperation of education managers, who are responsible for setting and implementing educational objectives.

A development process that enhances critical thinking should include teaching methods that strengthen cognitive processes and development of basic knowledge, comprehension, analysis, synthesis and logical thinking. An important part of this study is 'scaffolding', which is a method used to encourage students to think and practice by themselves. Teachers may assist students in the early stages, but when students can operate on their own, the teachers gradually ease themselves out of the process, allowing students the chance to think critically and acquire and integrate new knowledge for themselves. The intended outcome is the development of students with critical thinking skills like: 1) inference 2) the acceptance of the basic agreement 3) deduction 4) interpretation and 5) evaluation of arguments (Watson & Glaser, 1964:10).

Critical thinking is necessary and important for nurses, because nursing practice utilizes the nursing process, which involves the Rational Linear Problem Solving Activity. This is a standard of nursing care for users, and defines a clear and systematic process that helps to provide continuous and proper service. It reflects the results of close monitoring of the patients and may be the basis of modification of nursing services if nursing activities are not working as specified (Alfaro-LeFevre, 2010).

In conclusion, the strategies to promote critical thinking should include: 1) the management of teaching and learning, 2) the development and the management of factors that are conductive to teaching, 3) instructor development, and 4) the promotion and support of the development of students to be the critical thinkers. This process of developing student critical thinking skills is an important one. Such skills are closely aligned to important skills that are vital in nursing practice, and it hardly needs to be said that developing the thinking skills of youth and medical professionals is a good thing for society in 21st century. The framework of the research is summarized in figure 2.4

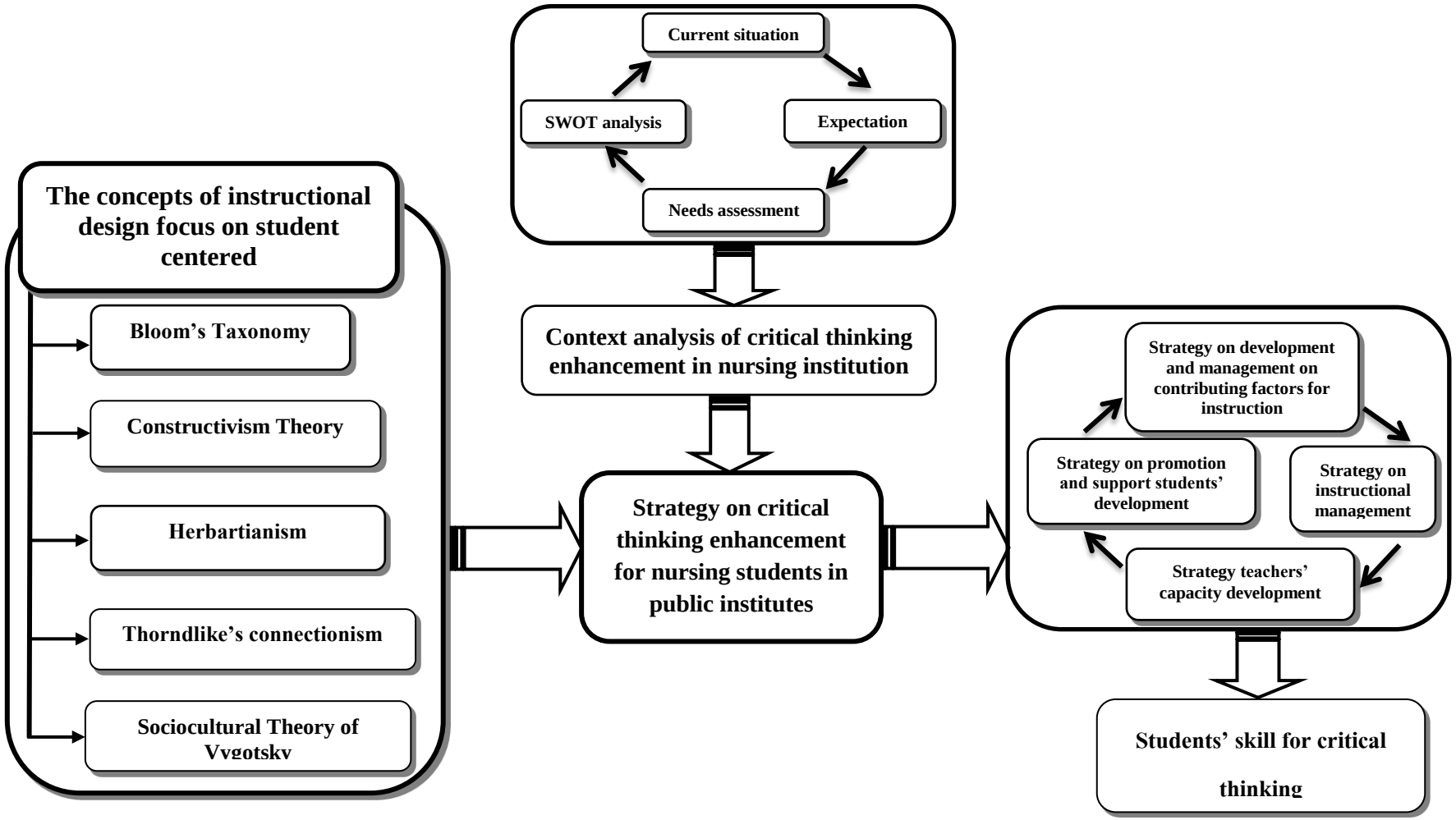

Figure 2.4 Framework on Strategy Development to Enhance Critical Thinking for Nursing Students in Public Institute