

# Developing Critical Thinking Skills among Education Students Through Formative Education

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## Abstract

*Formative Education is essential to produce a critically minded society. Teachers who are forerunners of societal development are tasked to have the unending role of creating opportunities that will foster holistic formation among the learners. The National Competency-Based Teachers' Standard (NCBTS) is a formation framework for the students in education. In this study, it was found out that the teacher formation encompassed in NCBTS significantly relates to critical thinking. The mental activities involved in the domains of the NCBTS appear to have an influence on the critical thinking skills of students. It was also revealed that a poor college study as evaluated by the competencies required in NCBTS has a great significance to the development of critical thinking skills of students. Importantly, a poor level of critical thinking skills is caused by a fair inference level. Moreover, the findings of the study showed that those with good NCBTS have the tendency to have good critical thinking skills. The simple linear regression result ( $F=67.46^{**}$ ) denotes that the higher the NCBTS learned, the greater is the level of critical thinking skills. Therefore, starting from the very foundation of teacher education, students need to engage in daily reflection using the standards of teacher formation to facilitate the construction of a habit that leads to the development of critical thinking skills.*

## 1. Introduction

Today, education has indeed evolved as the world advances. As a matter of fact, teaching has now become more than just asking students to “memorize, repeat and understand content” [1]. Teacher education is an important unit of societal reform. It has a challenging role of providing optimum learning experience which goes for quality, considering that teachers are tasked to educate the youth.

National Competency-Based Teacher Standards is a new paradigm for quality teaching, a common framework for understanding teaching quality” that serves to encapsulate the necessary components of teacher education and is “the heart of the various stages of Teacher Education Development Program” [2].

This was an answer to the demands of the education sector to have future teachers who are “equipped with a wide range of theoretical and methodological skills”. The National Competency-Based Teacher Standards (NCBTS) covers seven domains, namely: social regard for learning, the learning environment, the diversity of learners, curriculum, planning, and assessing and reporting, community linkages, personal and professional growth.

There is a need to absorb teachers to think deeply and scrutinize wisely; in other words, to think critically. This makes critical thinking a vital component in education, more importantly, in the construct of the NCBTS. The need to hone the skills of future teachers is imperative because whatever they transmit to students may be brought from one generation to another. The honing of skills and transmission of knowledge as implied by the NCBTS involves the use of critical thinking skills as well. This poses an even more challenge on the educators today.

Critical thinking seems to be an issue in education until recently. For one, there are few teachers who can communicate a logical idea of what critical thinking is about [3]. This leads to the uncertainty of ensuring greater number of educators and would-be educators who possess the standards of what constitutes a real teacher based on the standards of NCBTS.

To put it simply, this paper is therefore directed towards knowing how much competency have the education students learned and how they respond to the demands of critical thinking in education pedagogy.

## 2. Theoretical and Conceptual Framework

This study is anchored on the Cognitive Development Theory of Jean Piaget and the educational framework National Competency- Based Teacher standards (NCBTS).

Jean Piaget supposes college students to have Formal operational stage. This formal operational stage is what he calls the hypothetico-deductive reasoning or the ability to think theoretically. As the word implies, this thinking makes use of theories

which denote the processes of careful investigation, intelligent analysis, and based judgment.

Slavin supports that since the highest level a man can attain is the formal operational stage (which Piaget calls hypothetico-deductive thinking), the skills in formal operational stage are critical in the learning of higher order schemes. These skills are involved in a kind of thinking which is called critical thinking [4].

Critical thinking is defined by Ruggiero as the process by which a person examines assertions and arguments in order to determine which are valuable and which are not [5]. As implied in this definition, this kind of thinking involves the analysis of a belief or an observation in order to choose what is going to best fit a given situation.

Critical thinking involves different skills. These are inference, recognition and assumption, deduction, interpretation, synthesis, and evaluation. First is Inference. This pertains to the ability to discriminate among degrees of truth or falsity of inferences drawn from a given data. "An inference is a step of the mind, an intellectual act by which one concludes that something is true in light of something else's being true, or seeming to be true [3].

Second is Recognition of assumption. It follows that once a person reaches inference, he proceeds to making recognition of assumptions. Assumptions are suppositions taken from personal opinions that are beyond the range of facts. They are the unexpressed ideas that influence observation. "Humans make hundreds of assumptions without knowing it---without thinking about it" [3].

Third is Deduction. Essentially, this skill requires deductive reasoning. Such reasoning is more specific and involves the testing or confirming hypotheses [6]. It is a higher skill since it does not only accept the things that are given; instead it passes through trial and error as to which one would work best.

Fourth is interpretation. This is a skill that requires the ability to understand and convey sense or importance of a wide variety of experience, situations, data, events, judgments, conventions, beliefs, rules, procedures or criteria [7].

Fifth is synthesis. Synthesis is achieved when one builds a structure or pattern from diverse elements. It is putting parts together to form a whole, with emphasis on creating a new meaning or structure.

Sixth is Evaluation. This relates to the cognitive skill of reviewing the truthfulness of statements or other representations. Evaluation is the end process of the whole mental process which would yield action or behavior as its product.

According to Bruning, to develop critical thinking, knowledge and tactics are therefore needed [8]. This tactic is equivalent to a frame of mind which happens in three stages: acquisition (learning), automaticity (habit), and transfer (use in new

context) or in Piaget's theory, the accommodation. Critical thinking skills happen in the same manner as the formal operations of the mind. There is a constant assimilation and accommodation that happen in the mental process of a person.

As these skills are reflective and cognitive in nature, it is assumed that these skills are being influenced by the students' level of knowledge and mastery of NCBTS. NCBTS is a set of several theories and concepts aimed at identifying the different scope of effective teaching. From its guiding principle on the formation of quality teachers, the framework branches out into seven integrated domains. They include the following: social regard for learning, the learning environment, the diversity of learners, curriculum, planning, assessing and reporting, community linkages, personal and professional growth [2].

These seven domains are interconnected to each other in significant ways in such a way that the middle domains 2, 3, 4, 5, and 6 (the darkly shaded areas) represent standards referring to "The Teacher as Facilitator of Learning," whereas the two outer domains 1 and 7 (the lightly shaded areas) represent standards referring to "The Teacher as Learner".

The middle domains can further be divided into two sub-categories. The innermost domains 3, 4, and 5 [the darker shaded areas] represent the specific teacher practices related to the technical aspects of the teaching-learning processes, whereas the other domains 2 and 6 [the lighter shaded areas] represent the specific teacher practices that embed the learning process in appropriate contexts. Figure 1 shows the relationship of domains as an integrated whole.

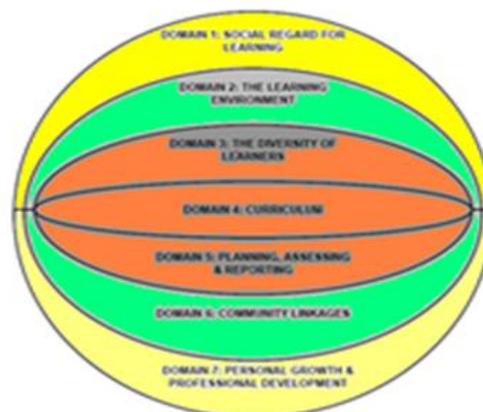


Figure 1. The Seven Domains of NCBTS

The first domain is Social Regard for Learning. This requires a teacher to act as a role model of students to value learning. Under this domain is the strand that defines teachers as a positive example for students. Being positive examples for students, they are expected to transmit clear messages not just on academic concepts but also acceptable social

behavior [9]. One indication is their observance of law as concretely expressed in following school rules and regulations. Values such as modesty, punctuality, and impartiality also facilitate learning as they help teachers become attractive to learners

The second domain is the Learning Environment. Such domain requires a teacher to create and maintain a safe learning environment which is conducive to learning and encourages fairness, respect and enthusiasm among others. Learning environment pertains to the physical and psychological contexts. Having good physical environment makes learning accessible. This means that a good avenue for learning is a place where there is an absence of distractions such as noise, scene or smell that would disrupt learners' focus in class.

Similarly, psychological atmosphere can make or make a learning process. Feelings and emotions are very important consideration as they are often the distracters of a person's state of mind. When a person is emotionally disturbed, it would be difficult for him to understand what he can see or hear. For example, when students are scolded by teachers before class, they will have difficulty understanding the discussion because of an unconscious or conscious feeling of remorse.

Diversity of Learners is the third domain. This requires a teacher to identify and address the needs of the various types of learners by demonstrating respect for individual differences, culture, backgrounds and learning styles. Culture is a necessary consideration in education. Maximum effectiveness of all school personnel, including teachers and other curriculum developers requires an understanding of the context in which a school resides.

The domain Curriculum Content and Pedagogy is the fourth domain. Expressed in this domain are the different strands that point out teachers are given the task to promote learning by using accurate content knowledge in addressing academic needs of learners through the use of appropriate instructional strategies, technologies and resources.

The fifth domain is Planning, Assessing and Reporting, which requires a teacher to plan, gather, analyze and use data to measure learning progress, guide instruction and provide timely feedback. Specifically, the domain focuses on the use of assessment data to plan and revise teaching-learning plans, as well as to incorporate formative assessment procedures into the plan and implementation of teaching-learning activities.

School, Home and Community Linkages, the sixth domain requires a teacher to link with the home and community as a laboratory for teaching and learning. According to Afe, education is a vital weapon to incorporate a person to the community in order for him to achieve self-realization, develop national consciousness, promote unity and strive for

social, economic, political, scientific, cultural and technological progress [10]. This is equates to saying that a person learns by the help of society in order for him to be able to help back this society to which he owed his education. As it appears, self-realization and national consciousness are reflective in nature. Thus, when this domain is manifested by a person, it can be assumed that he is capable of reflection, a characteristic of critical thinking.

Finally, the seventh domain, Personal Growth and Professional Development, requires a teacher to maintain behavior consistent with legal, ethical and professional standards and to engage in continuous professional development. This is an important consideration for teachers because how teachers look at themselves greatly affect student's learning [9]. As these domains involve learning process and skill, they are aligned to the skills identified in the critical thinking skills especially that to evaluate one's self means challenging one's thinking and attitude in order to accept the concepts in this framework and be able to project this through performance, specifically teaching.

The framework serves as a guide for teachers in the practice of their profession, it is important that indicators contained in this structure be used in the constant checking of one's conduct and values to be able to live according to such standards. To put simply, NCBTS is like a teacher's bible.

According to Walsh et al., training alone does not constitute education [11]. There has to be also a reflective attitude and a critical mind. Aside from that, William [13] points out that the integration of these things to the other aspects of life is important.

Pascarella also supports that greater exposure to psychological activities and tasks that foster scholastic experience would mean greater learning to students [12]. This means that when a student simply comes to class and does not participate at all, whether by his choice or by the circumstance given by a teacher, he will receive a little or no learning at all. According to Pace, the amount, scope, and quality of student effort are indicators of the quality of the educational process, and a key to identify the quality of educational product.

Considering that the domains involve several theories, it involves the understanding of the holistic individual; this competency is expected to bring out critically minded students. Besides, William cites that one of the requirements of critical thinking is the ability to have diverse sources of information [13].

Expectedly, the seven domains will bring the student teachers toward greater knowledge and will make them internalize behaviors needed for effective teaching. Such processes are leading to the reflective and purposive acts in critical thinking. This is illustrated in Figure 2.

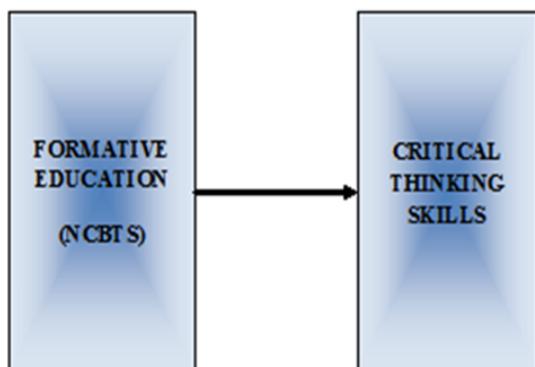


Figure 2. Interplay of Formative Education and Critical Thinking Skills

### 3. Statement of the Problem

This study determined the significance of formative education in the framework of NCBTS to the level of critical thinking skills acquired by education students of the teacher education institutions. More specifically, answers to the following questions were sought:

1. What is the level of NCBTS learned?
2. What is the respondents' level of critical thinking skills?
3. To what extent does the level of NCBTS learned explain the critical thinking skills acquired by the respondents?

### 4. Methodology

This study made use of descriptive research. Data were gathered from three private universities. In order to further investigate the results of the gathered data from observation and recording of events, the qualitative data were gathered by conducting an in-depth interview. It was conducted to the top three and lowest three performers among the respondents in each higher education institutions. The participants were selected according to their NCBTS scores. There were six representatives for each school, three top performers and three low performers.

Proportionate simple random sampling was used in the study. 156 respondents were considered. The respondents came from three different universities; all were given three questionnaires. However, only the top 3 and lowest three performers for each school were considered for the in-depth interview.

The researcher made use of three researcher-made questionnaires. The quantitative data were analyzed using descriptive statistics and inferential statistics

namely; frequency, percentage, mean, standard deviation, T-test, F-test and simple linear regression.

### 5. Results and Findings

Table 1 comprises the whole evaluation of the students' learning and skill in NCBTS. A striking figure can be noted that most of the students (62.18%) had Fair rating. The table further reveals that 36.54 had Poor rating and only 1.25 percent were Good in the whole test. The standard deviation at 4.27 signifies that there is a very wide spread of the students' scores. The indicators reveal that students were GOOD (mean, 3.24) in social regard for learning.

As students, they must have made some observations in their experience on the importance of learning. The table further shows that students are POOR (mean, 1.74) in curriculum and in planning, assessing and reporting.

**Table 1. Distribution of Respondents' Evaluation of NCBTS [ n = 156 ]**

Over-all Evaluation of NCBTS	Frequency	Percentage
Very Good [28 - 35]	0	0.00
Good [ 21 - 27]	2	1.28
Fair [ 14 - 20 ]	97	62.18
Poor [ 1-13 ]	57	36.54

Mean = 15.65      **Fair**      sd = 4.27

Indicators	Mean	Description
1. Social Regard For Learning	3.24	Good
2. Learning environment	2.69	Fair
3. Diversity of learners	2.32	Fair
4. Curriculum	1.74	Poor
5. Planning, assessing and reporting	1.74	Poor
6. Community linkages	1.83	Poor
7. Personal and Professional growth	2.08	Fair

A closer look at the table indicates that NCBTS has not been fully internalized by the students. Some of them divulged that while they were answering the test, they were also trying to recall the domains because they have already forgotten them. Learning NCBTS is not a plain rote memorization activity that can be taught and evaluated after a lecture. It is something that will affect the person's thought, action, and will eventually develop in him an attitude. In the case of the students, they may still be in the process of internalizing the NCBTS and so they have manifested up to the acquaintance level only.

To cite, curriculum, Planning, Assessing and Reporting and Community Linkages got a Poor evaluation. A question on curriculum (What generalization can be assumed from the given data?), which asked how a teacher aligns objectives to lessons, got the least number of right answer. Only 19.2% of the students responded correctly. The question asked in this item made use of sample philosophy syllabus. This might be contributory to their incorrect choice because philosophy is not that related to their course, though they had it as a minor subject. Piaget has this to say: Perhaps nearly all adults are capable of reasoning at formal level but do so only on problems that hold their interest or problems that have vital importance to them [14].

This signifies that interest plays a vital role in a person’s ability to reason and to perform in a problem solving activity. In the case of education students, the item on Philosophy may not have sparked interest to them. Added to that, they might have a negative consideration of the subject, being a subject that asks one to reason.

Furthermore, in the domain Planning, Assessing and Reporting majority of the respondents (73 out of 156) showed a POOR evaluation. Considering the low performance in analysis, a critical thinking skill, it is not surprising that the students would get low in this domain of NCBTS. Indeed, as Jean Piaget asserts, knowledge comes in hierarchy. Thus, according to Hockenbury, if the difficulty will not be resolved in the lower level, more difficulty will be experienced as one is faced with more complex mental processes [15].

Table 2 exhibits the distribution of the respondents’ critical thinking skills. The table shows that students have Fair to Poor critical thinking skills. The overall mean result of 35.97 indicates that the students have FAIR critical thinking skills.

**Table 2. Distribution of the Respondents’ Level of Critical Thinking Skills [ n = 156 ]**

Over-all Level of Critical Thinking Skills	Frequency	Percentage
Very Good [ 48 – 60 ]	1	0.64
Good [ 42 - 47 ]	26	16.67
Fair [ 31 - 41 ]	66	42.31
Poor [ 0-30]	63	40.38

Mean = 35.97      Fair      sd = 6.01

Indicators	Mean	Description
1. Inference	3.40	Poor
2. Recognition of Assumption	6.67	Fair
3. Deduction	6.27	Fair

4. Interpretation	6.47	Fair
5. Synthesis	6.84	Fair
6. Evaluation of Argument	6.33	Fair

As the table further illustrates, 40.38 percent of students are Poor in this area. This poor performance is greatly influenced by the respondents’ Poor evaluation in the inference level. Inference got the lowest mean among the responses.

Ten questions were used to measure this level. The test consisted of two statements of facts. After each statement are five questions that are supposed to be verified by the students as regard the degree of their falsity or truth. Since this skill involves experience and knowledge, diversity and breadth of the scope of a person’s exposure can affect its development. With a limited observation, it is expected that inferential skill is low.

The skill in making inference does not stop only in evaluating the text using experience and knowledge; it also involves the judgment based on the direct evidence from the text.

In the case of the students, they have failed to check on the given statement. They have probably made assumptions rather than reason according to what the given statements in the test paper provide. What the students exhibited is perhaps the common phenomenon of understanding without the use of reasoning.

According to Ruggiero, this is just an intuition [5]. He further states that such activity is just a starting point of the thinking process and not its end and that “the only conclusion worth drawing is one based on a thorough understanding of the problem or issue and its possible solutions or resolution”. Therefore to arrive at the correct inference, the students could have used their prior knowledge (as they read through the given passage and understood it). They are supposed to disregard personal biases.

This explains why the total performance of the test is Fair. Expectedly, they have Fair performance in the whole test. Forcier contends “learners must be provided with a rich environment of sensory experiences, to which they will respond in a problem-solving fashion in order to build understanding” [16]. With good college experience, thinking skills are enhanced. In a study of Terenzini, he found out that college experience is significantly related to students’ critical thinking skills [19].

Moreover, the table illustrates that among the indicators, synthesis got the highest mean (6.84). This signifies that the students are almost good in the synthesis level of thinking

The result of this study supports the claims of some researchers that students are still falling behind in their critical thinking skills. In a recent study of Absin [17], whose respondents are high school students, declared that the students’ level of critical thinking skills is generally fair. Also, the study of

Torres, whose respondents are college students, reveal that students have low critical thinking skills [18]. These are just few of the many studies that point to the fact that although critical thinking has long been an issue, it is a demand that persists to be addressed.

This can be supported by the study of Cruce et al. [20]. In their study, they have found out consistent evidence that the principles of good practices have positive impact on the cognitive development, learning orientations, and educational aspiration of students

**Table 3. Results of Simple Linear Regression Analysis between the Students' Evaluation of NCBTS and Their Level of Critical Thinking Skills**

Independent Variable	Regression Coefficient	T-Value	Probability	R
Evaluation of NCBTS	0.78	8.21	$8.15 \times 10^{-14}$	**

Constant: 23.81 F – value : 67.46\*\*  
R : 0.55 Significance Level :  $8.15 \times 10^{-14}$

$R^2$  : 0.30

Table 3 exhibits the result of simple linear regression analysis taking the students' evaluation of NCBTS as an independent variable and their level of critical thinking skills as the dependent variable to show the degree of the influence one affects the other.

The result reveals that the two variables have a highly significant positive effect ( $r = 0.55$ ) on each other. This denotes that the higher the level of NCBTS students, the higher is the level of their critical thinking skills. The coefficient of determination ( $r^2 = 0.30$ ) denotes that only 30 percent of the difference on the level of critical thinking skills is being explained by the level of NCBTS learned and 70 percent can be explained by other factors.

The regression model  $\hat{y} = 23.81 + 0.78x$  indicates that the coefficient of a or the y intercept is 23.81. This means that when the level of NCBTS learned is 0, the level of critical thinking skills acquired is 23.81. However, this prediction is not credible because the scores of the students in NCBTS is between 7 to 24.

The coefficient of b is 0.78. This means that for every change in NCBTS learned, the level critical thinking skills changes by 0.78 point. The null hypothesis is rejected because the test of significance shows a highly positive linear relationship between the level of NCBTS learned and the level of critical

thinking skills acquired. This further indicates that the higher the level of NCBTS learning, the greater is the level of critical thinking skills.

## 6. Conclusions and Implications

Education formation is very important to the development of critical thinking skills of students. Through a formation that is holistic like the NCBTS, various forms of thinking and strategies provide opportunities where students develop their cognitive abilities. Through the students' exposure to the different domains in NCBTS, they gradually assimilate new knowledge and accommodate them in order to carry out their daily experience. This is best referred to as formation because students do not use only their knowledge but their attitude and habit in situations given to them.

There appears a significant relation of NCBTS to critical thinking in that the mental activities entailed by the domains of the NCBTS poses a great influence on the critical thinking skills of students. The skills and knowledge acquired from the understanding and practice of these domains contribute to the development of thinking process which proceeds from simple to complex. Once they are habitually used, they form into higher level until they reach the formal operational stage, the highest form of thinking a man can reach, according to Piaget.

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