

Critical Thinking Skills of Student Teachers in Yangon Region

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Abstract

The primary purpose of this study was to investigate the critical thinking skills among student teachers in Yangon Region. Then, this study aimed to investigate the difference in critical thinking skill of student teachers by institutions, gender, age groups, level of education, voluntary reading, socioeconomic status and using internet. And then, the relationship among critical thinking skill, level of education, voluntary reading and socioeconomic status were explored. A total of 450 student teachers from Yangon University of Education and two Education Colleges such as Yankin and Thingangyun participated in this study. Critical Thinking Skill Test (CTST) developed by Nu Nu Nyunt (2012) was used as the research instrument. In this study, 82 out of 450 (18%) of student teachers were found to be advanced skilled thinkers, 169 out of 450 (38%) were skilled thinkers and 199 out of 450 (44%) were unskilled thinkers. Among the five sub-scales, interpretation sub-scales was the highest but analysis sub-scales was lower than the other four cognitive skills. Moreover, inference skill was the second highest among the five sub-scales. In addition, evaluation skill was the third stand and explanation skill was the second last stand among the five critical thinking cognitive skills.

Key words: student teacher, critical thinking, voluntary reading, socioeconomic status

Introduction

Recent trend in education domain emphasizes the importance of critical thinking skill in academic as well as life success. More recently, the Partnership for 21st Century Skills has also identified critical thinking as one of several learning and innovation skills necessary to prepare students for post-secondary education and the workforce. In the field of teacher education, critical thinking skills also play an important role.

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Prospective teachers will face many challenges in teaching and learning problems, communication with other teachers and pupils and so on, in their future workplace. But, the ability to think critically helps them to overcome these challenges easily.

Ijaiya and Alabi (2010) asserted that the purpose of any teacher training is to equip student teachers with necessary skills to enable them train youths to become human capitals useful to themselves and the nation. One of these skills is critical thinking that should be trained to the student teachers in universities and colleges. Critical thinking skill is an essential skill for student teachers as it not only can improve their academic performance but also can prepare them for future work place.

Williams (2005) stated that emphasizing the critical thinking in teacher education could potentially increase society's effectiveness in addressing national and international problems. Williams (2005) found the linkage between teacher education and societal problem solving that is predicated on three major possibilities: (a) increased emphasis on critical thinking in teacher education will increase the emphasis on critical thinking in K-12 education, (b) increased emphasis on critical thinking in K-12 education will lead to increased use of critical thinking within society, and (c) increased use of critical thinking among society's leaders and citizens will produce better problem solving at a societal level. This linkage shows that teachers' critical thinking is the main resource of the welfare of society.

Definition of Key Terms

Operational definition of critical thinking: The ability to explain, evaluate, analyze, and interpret via logico-inferential modes of reasoning.

Interpretation: Comprehend and express meaning or significance of wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria,

Analysis: Identify the intended and actual inferential relationships among statements, questions, concepts, descriptions, or other forms of representation intended to express belief, judgment, experiences, reasons, information, or option,

Evaluation: Assess the credibility of statement or other representation which are accounts or descriptions of a person's perception, experience, situation, judgment, belief, or opinion and to access the logical strength of the actual or intended inferential relationships among statements, descriptions, questions, or other forms of representation.

Inference: Identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to deduce the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation.

Explanation: State the results of one's reasoning: justify that reasoning in terms of evidential, conceptual, methodological and contextual considerations upon which one's results were based and to present one's reasoning in the form of cogent arguments.

Student Teachers: Student teacher means a student who is studying to be a teacher and who, as part of training, observes classroom instruction or does closely supervised teaching in an elementary or secondary school.

Literature Review

Critical Thinking Skills

Beyer (1984) identified critical thinking as a set of nine discrete skills, including: (1) distinguishing between verifiable facts and value claims, (2) determining the reliability of a source, (3) determining the factual accuracy of a statement, (4) distinguishing relevant from irrelevant information, claims or reasons, (5) detecting bias, (6) identifying ambiguous or equivocal claims or arguments, (7) recognizing logical inconsistencies or fallacies in a line of reasoning, (8) distinguishing between warranted or unwarranted claims, and (9) determining the strength of an argument.

According to Halpern (1998), critical thinking is thinking that is purposeful, reasoned and goal-directed. It is the kind of thinking involved, in solving problems, formulating inferences, calculating likelihoods, and making decisions.

Critical Thinking Skills in Teacher Education

In recent years, critical thinking has become a major focus of teacher education. Finn (1991) stated the key competencies which will have major implications for teacher education providers and others: teachers will have to update and expand their knowledge and skills and modify their pedagogy in quite major ways. This will not happen easily, particularly given the national context of all ageing school teaching force. There will be major implications for pre-service teacher education and ongoing professional development for school. There will also be implications for the preparation

and professional development of trainers in private vocational education and training institutions and for enterprise-based providers. There is an obvious challenge for the teacher educators. Teacher educators will have to adapt in quite fundamental ways to incorporate the new approaches. To be able to develop key competencies, teachers need to be themselves skilled in these competencies. This is certainly the case for critical thinking (as cited in Hager and Kaye, 1992).

According to Dewey (1997), critical thinking should be foundational to the effective teaching of any subject and it must be at the heart of any professional development program such as pre-service teacher education programs (as cited in Elder, 2005). Critical thinking assumes greater relevance for student teachers because they will be responsible for instilling critical thinking in their own future students (Alhasan, 2012). If critical thinking skill is not taught efficiently at pre-service teacher education programs, student teachers will be unable to cultivate critical thinking efficiently to their future students.

Ashton (1988) pointed out that to improve student performance on critical thinking tests, schools of education must improve teacher training. Schools of education must teach cognitive skills to pre-service teachers before training them to teach these skills in the classroom. According to Walsh and Paul (1986), teacher education program should integrate critical thinking skills into all aspects of teacher preparation and train future teachers to be models of effective thinking strategies. Schools of education have several obstacles to overcome before accomplishing these goals, including an inadequate knowledge base on teaching critical thinking; a lack of consensus on methods of evaluating critical thinking programs; conditions that require classroom management at the expense of academic instruction; and a lack of support for collaboration between liberal arts and teacher education faculty (Ashton, 1988).

Methods and Procedure

Methodology

The methodology used in this study was descriptive statistics. Critical thinking skill of student teachers was investigated. In this study, the independent variable was student teachers and the dependent variable was critical thinking skill.

Sample

The participants of this study were student teachers who enrolled in Yangon University of Education (YUOE), Yankin Education College (YEC), and Thingangyun Education College (TEC). A total of 450 student teachers from Yangon University of Education and two Education Colleges participated. Specifically, 254 student teachers from Yangon University of Education, 98 student teachers from Yankin Education College and 98 student teachers from Thingangyun Education Colleges participated.

Instrument

The instrument developed by Nu Nu Nyunt (2012) was used to measure critical thinking skills of student teachers in this study. This instrument was developed by the guidance of existing standardized critical thinking skills tests such as California Critical Thinking Skills Test (CCTST), Thinking Skills Assessment (TSA), Critical Thinking Instrumentation Manual developed by University of Florida, and Critical Thinking Test in Sociology Item Development Manual of Michigan State University. The instrument adapted from the critical thinking component of TSA. But consideration was taken to construct an item appropriate with Myanmar culture and context. CCTST and TSA are general critical thinking skill tests, whereas Critical Thinking Tests developed by University of Florida and Michigan State University are discipline specific critical thinking skill tests. In this study, general critical thinking skill tests were used (Nu Nu Nyunt, 2012).

Data Analysis and Results

Critical thinking skill of student teachers was identified as three types such as unskilled thinker, skilled thinker, and advanced skilled thinker. Candidates who earned the scores less than 50th percentiles is identified as unskilled thinkers, the ones whose scores lie between 50th percentiles and 70th percentiles are classified as skilled thinkers, and those whose scores are greater than 70th percentiles are referred to as advanced skilled thinkers.

Concerning the type of thinker, 82 out of 450 (18%) of student teachers were found to be advanced skilled thinkers, 169 out of 450 (38%) were skilled thinkers and 199 out of 450 (44%) were unskilled thinkers. In addition, majority of advanced skilled thinkers were found to be final year

students. This may be due to the fact that they have more learning opportunities that enable them to develop the critical thinking skills.

Comparison of Student Teachers' Critical Thinking Skills Across Institutions

At the institutions level, the first Year and second Year student teachers from all institutions were chosen to compare the critical thinking skills across institutions. According to the Table 1, the significant differences on overall critical thinking skills were found among three institutions. Among five sub-scales, it was observed that there were significant differences on evaluation, inference and explanation sub-scales. The results showed that there was significant difference on critical thinking cognitive skills of student teachers across institutions.

To assess the institutional differences, Post-hoc Test was also executed by Tukey HSD method. Looking across the overall scale, the mean score of participant students from YUOE was significantly higher than that of students from TEC. Although entry behaviors of student teachers from all institutions are not too different, the mean scores on overall critical thinking skills of student teachers from YUOE were greater than that of the other institutions. It may be due to the fact that student teachers from YUOE were provided more learning opportunities such as group discussions, debates, impromptu talks, team works, projects that call for the development of critical thinking cognitive skill.

Table 1 ANOVA Results of Student Teachers' Critical Thinking Skills Across Institutions

Attribute	YUoE	YEC	TEC	<i>F</i>	<i>p</i>
Critical Thinking Skill (21 items)	15.54	14.28	12.98	7.68***	0.001
Interpretation (5 items)	3.55	3.24	3.26	2.16	0.117
Analysis (3 items)	0.48	0.40	0.53	1.125	0.326
Evaluation (3 items)	3.24	2.96	2.29	10.283***	0.000
Inference (6 items)	3.42	3.80	2.98	9.837***	0.000
Explanation (4 items)	4.85	3.88	3.93	6.071**	0.003

**The mean difference is significant at the 0.01 level.

***The mean difference is significant at the 0.001 level.

YUOE= Yangon University of Education, YEC= Yankin Education College,

TEC= Thingangyun Education College

Among five sub-scales, the mean scores on the evaluation, inference and explanation sub-scales of student teachers from YUOE were significantly greater than that of student teachers from TEC. In addition, the mean scores on explanation sub-scale of student teachers from YUOE were significantly higher than that of student teachers from YEC. On the other hand, the mean scores on evaluation and inference sub-scales of student teachers from YEC were greater than that of student teachers from TEC.

Concerning the type of thinker, 24% of participant students from YUOE, 4% of participant students from YEC and 1% of participant students from TEC were found to be advanced skilled thinkers while 22% from YUOE, 39% from YEC and 23% from TEC can be concluded to be the skilled thinkers. On the other hand, 54% from YUOE, 57% from YEC and 76% from TEC can be said to be the unskilled thinkers. Percentages of advanced skilled thinkers from YUOE were the largest among the three institutions whereas percentage of unskilled thinkers from YUOE was the smallest among the three institutions. Furthermore, percentages of advanced skilled thinkers and skilled thinkers from YEC were larger than that of TEC while percentage of unskilled thinkers from TEC was greater than that of YEC. The results showed that student teachers from YEC were provided more learning opportunities and experiences concerning making inferences, drawing reasonable conclusions and evaluating between reasonable and fallacious inferences; judging the probative strength of an argument's premises and assumptions with a view toward determining the acceptability of the argument than that of student teachers from TEC.

Comparison of Student Teachers' Critical Thinking Skills by Gender

Concerning gender, the significant differences on the overall critical thinking skill and five sub-scales were not found among the three institutions. According to Table 2, the mean scores of both males and females across five sub-scales as well as overall scale were found to be approximately identical. It can reasonably be concluded that male and female participants were provided the same learning opportunities and experiences that enable them to enhance their critical thinking cognitive skills.

Table 2 Mean Comparisons of Student Teachers' Critical Thinking Skills by Gender (Male= 213, Female= 237)

	\bar{X}_M	SD_M	\bar{X}_F	SD_F	<i>t</i>	<i>P</i>
Critical Thinking Skill (21items)	15.95	4.833	16.18	5.138	-0.494	0.621
Interpretation(5items)	3.8	1.198	3.85	1.255	-0.467	0.641
Analysis (3 items)	0.8	0.836	0.67	0.798	1.651	0.1
Evaluation (3 items)	3.07	1.442	3.18	1.568	-0.782	0.435
Inference (6 items)	3.68	1.477	3.74	1.402	-0.425	0.671
Explanation (4 items)	4.61	2.229	4.74	2.230	-0.651	0.515

\bar{X}_M =Males' mean score, \bar{X}_F =Females' mean score, SD_M = Standard deviation of males,

SD_F = Standard deviation of females

Comparison of Student Teachers' Critical Thinking Skills by Age Groups

In this study, participant teachers were categorized into three age groups; 16 to 17.5 (17 years and 6 months) years, above 17.5 to 19 years and above 19 to 23 years. According to Table 3, the significant differences on overall critical thinking skill and five sub-scales were found among three age groups. Regarding the 16 to 17.5 age groups, the mean scores on overall scale and five sub-scales were significantly lowest among the three groups. This may be due to the fact that the learning opportunities which they had been provided were not rich enough for them to develop the critical thinking skills.

Table 3 ANOVA Results of Student Teachers' Critical Thinking Skills by Age Groups

Attribute	1 st	2 nd	3 rd	<i>F</i>	<i>p</i>
Critical Thinking Skill(21items)	14.18	15.57	18.84	40.59***	0.000
Interpretation (5 items)	3.31	3.81	4.47	40.41***	0.000
Analysis (3 items)	0.44	0.63	1.18	39.34***	0.000
Evaluation (3 items)	2.88	2.99	3.55	8.49***	0.000
Inference (6 items)	3.28	3.61	4.33	23.36***	0.000

Explanation (4 items)	4.27	4.54	5.30	8.98***	0.000
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1st = 16 to 17.5 (17 years and 6 months) age groups, 2nd = above 17.5 to 19 age groups, 3rd = above 19 to 23 age groups

***The mean difference is significant at the 0.001 level.

Again, the second age group students' mean scores on overall scale and five sub-scales were significantly higher than that of the students from the first age group. It can reasonably be said that to some extent, the participant students from the second age groups were offered the learning experiences that enable them to become the critical thinkers. In addition, looking across the overall scale and five sub-scales, the above 19 to 22 age group was significantly the highest among the three age groups. It can reasonably be concluded that the older the students, the more experiences they get and thus the more they can think critically.

To be exact, mean scores on overall critical thinking skill and interpretation sub-scale of the students who were the above 17.5 to 19 age groups were greater than that of the 16 to 17.5 age groups. This may be due to the fact that the second age groups were provided more learning opportunities that enable them to develop the critical thinking skills and the ability to comprehend and express the meaning or significance of a variety of data, events, judgments, rules, procedures and criteria than that of the first age groups.

Comparison of Student Teachers' Critical Thinking Skills by Level of Education

Table 4 showed that there was significant difference on the overall critical thinking skill of student teachers among five levels of education; $F=46.938^{***}$, $p<0.001$. Furthermore, there was found statistically significant differences on the five sub-scales of critical thinking among five levels of education. This means that the student teachers' overall scale as well as five sub-scales was significantly different among five levels of education.

To obtain more detailed information of a particular level of education, Post-hoc test was applied. Looking across overall scale, the fifth year student teachers' mean score was significantly higher than that of the third, second and fourth year students. Furthermore, the fourth year and third year student teachers' mean scores were significantly greater than that of the second year and first year student teachers. Again, the first year student teachers' mean scores were significantly lower than that of the

second year student teachers. The result revealed that higher the level of education they attained, the greater the development of critical thinking skills they achieved.

Table 4 ANOVA Results of Student Teachers' Critical Thinking Skills by Level of Education

Attribute	1	2	3	4	5	<i>F</i>	<i>p</i>
Critical Thinking Skill (21items)	13.24	15.32	18.42	19.36	21.00	46.938***	.000
Interpretation (5 items)	3.10	3.60	4.77	4.70	4.80	52.762***	.000
Analysis (3 items)	.40	.54	.87	1.32	1.56	36.562***	.000
Evaluation (3 items)	2.74	2.93	3.69	3.42	3.98	10.186***	.000
Inference (6 items)	3.03	3.77	3.69	4.74	4.56	23.100***	.000
Explanation (4 items)	3.97	4.48	5.40	5.18	6.10	12.235***	.000

***The mean difference is significant at the 0.001 level.

1= First Year, 2= Second Year, 3= Third Year (First Semester), 4= Fourth Year (First Semester), 5= Fifth Year (First Semester)

It can be concluded that the fifth year and fourth year student teachers were offered the more learning opportunities and experiences concerning making inferences, examining ideas and analyzing arguments, doing interpretation, evaluating reasonable and fallacious inferences and producing accurate statements descriptions or representations of the results of their reasoning activities. And then, the results showed that to some degree, the participant students from third year and second year had the learning opportunities which can call for the development of their critical thinking reasoning ability. And then, it can be concluded that the first year student teachers have limited learning opportunities that enable them to develop the critical thinking cognitive skills.

Among the five sub-scales, interpretation sub-scale of fifth year, fourth year and third year students was significantly higher than that of the second year and first year students. Again, the mean score of second year student teachers was significantly greater than that of the first year student

teachers. It can reasonably be said that the fifth year, fourth year and third year student teachers possess the learning opportunities to develop the ability to comprehend and express meaning or significance of wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria.

Regarding the analysis sub-scale, the mean scores of fifth year and fourth year student teachers were significantly greater than that of the third year, second year and first year student teachers. In addition, third year student teachers' mean score was significantly higher than that of second and first year student teachers. This may be due to the fact that the fifth year and fourth year student teachers possess the more learning opportunities that enable them to develop the ability to identify the intended and actual inferential relationships among statements, questions, concepts, descriptions, or other forms of representation intended to express belief, judgment, experiences, reasons, information, or option. And then, it can be concluded that to some extent, the third year student teachers were provided the learning experiences to develop the ability of examining ideas, detecting arguments and analyzing arguments.

Concerning the evaluation sub-scale, the mean scores of fifth year and third year student teachers were significantly greater than that of the second year and first year student teachers. Moreover, fourth year student teachers' mean score was significantly higher than that of first year student teachers. The results showed that the fifth year and third year student teachers were offered more learning experiences to assess the contextual relevance of questions, information, principles, rules or procedural directions, and to assess the acceptability of any given representation of an experience, situation, judgment, belief or opinion. But, to some degree, the fourth year student teachers have learning opportunities to develop the evaluation sub-scale.

The mean scores on the inference sub-scale of fifth, fourth year and third year student teachers were significantly higher than that of the second year and first year student teacher. Again, the mean score of third year and second year student teachers was significantly greater than that of the first year student teachers. It can reasonably be concluded that the fifth year, fourth year and third year student teachers were provided with learning opportunities that enable them to develop the ability to abilities to produce accurate statements, descriptions or representations of the results of their

reasoning activities so as to analyze, evaluate, infer from those results. It can also be said the fact that the first year student teachers have limited opportunities to develop the ability of querying evidence, conjecturing alternatives and drawing conclusions.

Relating to explanation sub-scale, the mean scores of fifth year student teachers were significantly greater than that of the second year and first year student teachers. Moreover, fourth year and third year student teachers' mean scores were significantly higher than that of first year student teachers. This may be due to the fact that the fifth year student teachers were offered more learning experiences to produce accurate statements, descriptions or representations of the results of their reasoning activities so as to analyze, evaluate, infer from those results. On the other hand, it can reasonably be said that to some degree, the fourth year and third year student teachers have learning opportunities to develop the ability of stating results, justifying procedures and presenting arguments. Finally, this study revealed the fact that the higher the students' level of education, the greater their critical thinking skills.

Concerning the type of thinker, 52% of fifth year students, 38% of fourth year students, 15% of third year students, 6% of second year students and 13% of first year students were found to be advanced skilled thinkers while 44% of fifth year students, 52% of fourth year students, 73% of third year students, 46% of second year students and 10% of first year students can be concluded to be the skilled thinkers. However, 4% of fifth year students, 10% of fourth year students, 16% of third year students, 48% of second year students and 77% of first year students can be said to be the unskilled thinkers.

Comparison of Student Teachers' Critical Thinking Skills by Voluntary Reading

As shown in Table 5, there were significant differences on overall critical thinking skill and five sub-scales of student teachers within three groups according to level of voluntary reading. To obtain more detailed information, Post-hoc Test was executed by Tukey HSD method. Relating to the low level groups, the mean scores on overall scale and five sub-scales were significantly lowest among the three groups. On the other hand, the mean scores on the overall scale of Critical Thinking Skill Test as well as analysis, evaluation and explanation sub-scales of participant students from the high level group were significantly greater than that of the average level

groups. It can reasonably be said that the students with good voluntary reading habits developed more in thinking critically.

Table 5 ANOVA Results of Student Teachers' Critical Thinking Skills by Voluntary Reading

Attribute	Low	Average	Good	<i>F</i>	<i>p</i>
Critical Thinking Skill(21items)	12.89	16.21	18.48	22.426****	0.000
Interpretation (5 items)	3.11	3.92	4.06	13.526****	0.000
Analysis (3 items)	0.38	0.74	1.02	10.121****	0.000
Evaluation (3 items)	2.63	3.10	3.71	8.472****	0.000
Inference (6 items)	3.06	3.76	4.08	9.041****	0.000
Explanation (4 items)	3.7	4.68	5.62	12.449****	0.000

***The mean difference is significant at the 0.001 level.

Concerning the type of thinker, 45% of participant students from the good voluntary reading groups, 16% of participant students from the average voluntary reading groups and 3% of participant students from the low voluntary reading groups were found to be advanced skilled thinkers whereas 24% from the good voluntary reading groups, 43% from the average voluntary reading groups and 24% from the low voluntary reading groups can be concluded to be the skilled thinkers. On the other hand, 31% from the good voluntary reading groups, 41% from the average voluntary reading groups and 73% from the low voluntary reading groups can be said to be the unskilled thinkers. Percentage of advanced skilled thinkers from the good voluntary reading groups was larger than the other groups whereas percentage of unskilled thinkers from the low voluntary reading groups was greater than that of the others.

Comparison of Student Teachers' Critical Thinking Skills by Socioeconomic Status

According to the Table 6, the significant difference on overall critical thinking skill was found among three groups. Among the five sub-scales, there were significant differences on interpretation, evaluation, inference and explanation sub-scales. Although the significant difference did not exist on analysis sub-scale, a slight variation of mean scores was

found among three groups. The results showed that the students with high SES were supported more learning opportunities to develop more in thinking critically from their family.

Table 6 ANOVA Results of Student Teachers' Critical Thinking Skills by Socioeconomic Status

Attribute	Low	Middle	High	<i>F</i>	<i>p</i>
Critical Thinking Skill(21items)	12.81	15.83	18.13	11.851***	0.000
Interpretation (5 items)	3.38	3.8	4.08	3.098*	0.046
Analysis (3 items)	0.57	0.72	0.84	1.114	0.329
Evaluation (3 items)	2.19	3.13	3.35	4.923**	0.008
Inference (6 items)	2.76	3.63	4.37	13.918***	0.000
Explanation (4 items)	3.90	4.55	5.49	7.05***	0.001

* The mean difference is significant at the 0.05 level.

**The mean difference is significant at the 0.01 level.

***The mean difference is significant at the 0.001 level.

To obtain more detailed information, Post-hoc Test was executed by Tukey HSD method. The mean scores on overall scale as well as inference and explanation sub-scales of high SES groups were found to be significantly greater than that of the other groups. Regarding the analysis sub-scale, there was significant difference on mean scores between high SES and low SES. On the other hand, the mean scores on overall scale as well as evaluation and inference sub-scales of average SES groups were significantly higher than that of the low SES groups.

Concerning the type of thinker, 33% of participant students from the high SES level, 16% of participant students from the middle SES level and 5% of participant students from the low SES level were found to be advanced skilled thinkers whereas 44% from the high SES level, 37% from the middle SES level and 24% from the low SES level can be concluded to be the skilled thinkers. On the other hand, 23% from the high SES level, 47% from the middle SES level and 71% from the low SES level can be said to be the unskilled thinkers. Percentage of advanced skilled thinkers from the high SES level was larger than the other levels whereas percentage

of unskilled thinkers from the low SES level was higher than that of the other levels. It can reasonably be said that the students from upper class background or high socioeconomic status have the facilitated learning opportunities that enable them to develop more critical thinking skill.

Comparison of Student Teachers' Critical Thinking Skills by Using Internet

Table 7 showed that there was significantly difference in student teacher's overall critical thinking skill among three levels, $F=10.834^{***}$, $p<0.001$. Furthermore, the mean scores on interpretation and inference sub-scales were significantly different across three levels. This means that concerning the level of using internet, the student teacher's overall scale and interpretation and inference sub-scales were significantly different among three levels.

Table 7 ANOVA Results of Student Teachers' Critical Thinking Skills by Using Internet

Attribute	Low	Average	High	<i>F</i>	<i>p</i>
Critical Thinking Skill(21items)	14.41	16.45	18	10.834***	0.000
Interpretation (5 items)	3.4	3.9	4.3	12.211***	0.000
Analysis (3 items)	0.62	0.74	0.95	2.644	0.072
Evaluation (3 items)	2.91	3.19	3.29	1.731	0.178
Inference (6 items)	3.09	3.85	4.45	19.036***	0.000
Explanation (4 items)	4.4	4.75	4.98	1.443	0.237

***The mean difference is significant at the 0.001 level.

To obtain more detailed information of a particular level, Post-hoc test was executed by Tukey HSD method. The results showed that the participant students' overall scale as well as interpretation and inference sub-scales of high level group were significantly greater than that of low level groups. And then, participant students' overall scale, interpretation and inference sub-scales of low level group were significantly less than that of average level groups. This means that the participant students of high and average levels may get more experiences that enable them to develop their critical thinking skill than that of low level groups by using internet.

In addition, inference sub-scale of participant students from high level group was significantly lower than that of average level groups. It can reasonably said that by using internet, the participant students of high levels

may have more experiences to develop the ability to identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to deduce the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation.

Concerning the type of thinker, 44% of participant students from the high level groups, 14% of participant students from the average level groups and 18% of participant students from the low level groups were found to be advanced skilled thinkers whereas 37% from the high level groups, 44% from the average level groups and 22% from the low level groups can be concluded to be the skilled thinkers. On the other hand, 19% from the high level groups, 42% from the average level groups and 60% from the low level groups can be said to be the unskilled thinkers. Percentage of advanced skilled thinkers from the high level groups was larger than the other groups whereas percentage of unskilled thinkers from the low level groups was greater than that of the others.

Predictors of Critical Thinking Skills

To identify the best model for predicting the critical thinking skills of student teachers, backward elimination multiple regressions was used. Significant variance in critical thinking skill was explained by level of education, voluntary reading and socioeconomic status (SES). Level of education, voluntary reading and SES yielded the model best explaining variance in critical thinking skills of student teachers. Regression analysis revealed that the model significantly explained the critical thinking skills, $F= 75.169$, $p < 0.001$. R^2 for the model was 0.336 and adjusted R^2 was 0.331. Table 8 displays **unstandardized regression coefficient (B), and standardized regression coefficient β** for model.

According to the results, level of education, voluntary reading and socioeconomic status contributed 33% variance in shared variability to critical thinking skills. By applying the multiple regression analysis presented above, the resultant model for critical thinking skills (CTS) can be defined as in the following equation concerned with level of education, voluntary reading and socioeconomic status (SES).

$$CTS = 8.55 + 1.74X_{\text{educationlevel}} + 0.224X_{\text{voluntaryreading}} + 0.104X_{\text{SES}}$$

Table 9 Summary of Regression Analysis for Prediction of Student Teachers' Critical Thinking Skill

Variables	B	β	t	R	R^2	Adj R^2	F
Significant Predictor of CTS	8.55		11.926**	0.58	0.34	0.33	75.169**
1. Level of Education	1.74	0.48	11.319**				
2. Voluntary Reading	0.22	0.18	4.535**				
3. SES	0.10	0.09	2.384*				

$p^* < 0.05, p^{**} < 0.001$

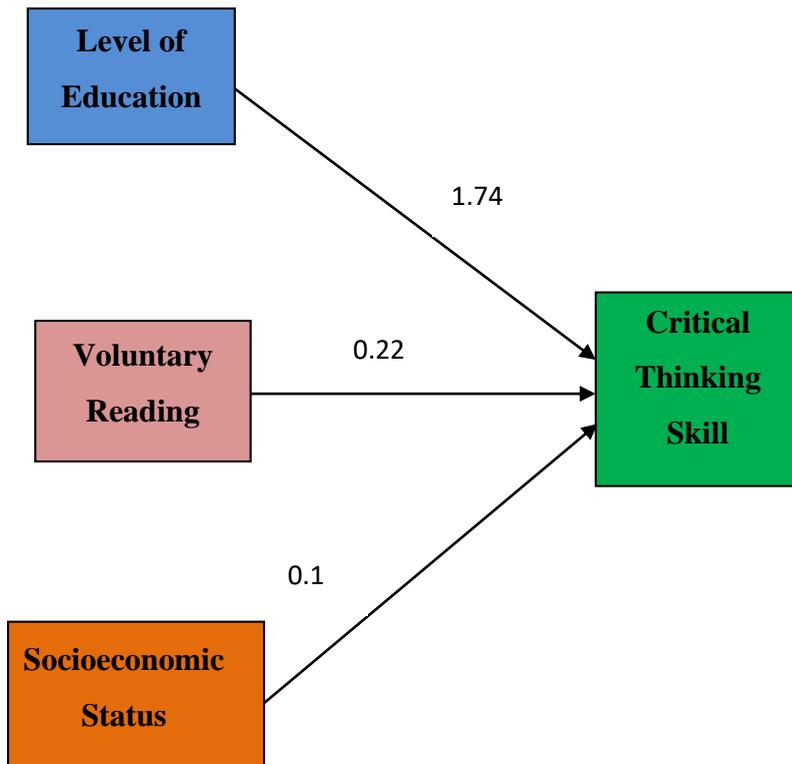


Figure 1 Critical Thinking Skills Model

According to the Critical thinking Skill Model, the higher the level of education they attained, the greater the development of critical thinking skills they achieved. It can reasonably be said that education as the means of developing the learners' greatest critical thinking abilities. Again, Critical thinking Skill Model explains that one's critical thinking skills strongly depend upon his or her voluntary reading habits. If a person possesses good habits of voluntary reading, he or she may think critically. Moreover, if the students live in a high socioeconomic status, they may have better support for their learning from their family. As a result, they can get the chance to develop their critical thinking skills.

Conclusion

The primary purpose of this study was to investigate the student teachers' critical thinking skills. And then, this study sought to examine differences in critical thinking skills among student teachers across institutions. Moreover, this study aimed to investigate gender related differences, differences between grade level and age related difference was investigated. In addition, this study explored differences by voluntary reading, differences by socioeconomic status and differences by using internet. A total of 450 student teachers (213 males and 237 females) from Yangon University of Education, Yankin Education College and Thingangyun Education College participated in this study. Critical Thinking Skill Test (CTST) developed by Nu Nu Nyunt (2012) was used in this study.

Based on the descriptive statistics, interpretation sub-scales was the highest among the five sub-scales, but analysis sub-scales was lower than the other four cognitive skills. Moreover, inference skill was the second highest among the five sub-scales. In addition, evaluation skill was the third stand and explanation skill was the second last stand among the five critical thinking cognitive skills. Concerning the type of thinkers, 82 out of 450 (18%) of student teachers were found to be advanced skilled thinkers, 169 out of 450 (38%) were skilled thinkers and 199 out of 450 (44%) were unskilled thinkers.

At the institutions level, the significant differences on overall critical thinking skills were found among three institutions. Among five sub-scales, it was observed that there were significant differences on evaluation, inference and explanation sub-scales. Although entry behaviors of student teachers from all institutions were not too different, the mean scores on

overall critical thinking skills of student teachers from YUOE were greater than that of other institutions. This may be due to the fact that student teachers from YUOE were provided more learning opportunities such as group discussions, debates, impromptu talks, team works, projects that call for the development of critical thinking cognitive skill.

Concerning gender, the significant differences on the overall critical thinking skill and five sub-scales were not found among the three institutions. Regarding the age groups, there were the significant differences on overall critical thinking skill and five sub-scales among three age groups. Post-hoc results by age groups showed that the mean scores on the overall scale and five sub-scales of the above 19 to 23 age group was significantly the highest among the three age groups. In addition, the above 17.5 to 19 age groups' mean scores on overall critical thinking skill and interpretation skill were greater than that of the 16 to 17.5 age groups.

Next, there existed significant differences on the overall critical thinking skill and five sub-scales of student teachers among five levels of education. According to the results of Post-hoc Test, looking across the overall scale, the fifth year students' mean score was significantly higher than that of the third, second and fourth year students. Furthermore, the fourth and third year students' mean scores were significantly greater than that of the second and first year students. Again, the first year students' mean score was significantly lower than that of the second year students.

Among the five sub-scales, interpretation and inference sub-scales of fifth, fourth and third year students was significantly higher than that of the second and first year students. Regarding the analysis sub-scale, the mean scores of fifth and fourth year students were significantly greater than that of the third, second and first year students. The mean scores on the evaluation sub-scale of fifth and third year students were significantly greater than that of the second and first year students. Relating to explanation sub-scale, the mean scores of fifth year students were significantly greater than that of the second and first year students.

Relating to the voluntary reading, there were significant differences on overall critical thinking skill and five sub-scales of student teachers within three groups. Relating to the low level groups, the mean scores on overall scale and five sub-scales were significantly lowest among the three groups. On the other hand, the mean scores on the overall scale of Critical Thinking Skill Test as well as analysis, evaluation and explanation sub-

scales of participant students from the good level group were significantly greater than that of the average level groups.

Concerning the SES level, the significant difference on overall critical thinking skill as well as interpretation, evaluation, inference and explanation sub-scales were found among three groups. The Post-hoc results revealed that the mean scores on overall scale as well as inference and explanation sub-scales of high SES groups were found to be significantly greater than that of the other groups. Regarding the analysis sub-scale, there was significant difference on mean scores between high SES and low SES. On the other hand, the mean scores on overall scale as well as evaluation and inference sub-scales of average SES groups were significantly higher than that of the low SES groups.

Regarding the level of using internet, the mean scores of student teacher's overall critical thinking skill as well as interpretation and inference sub-scales were found to be significant among three levels. These differences were confirmed by Post-hoc analysis. The results revealed that the participant students' overall scale as well as interpretation and inference sub-scales of high level group were significantly greater than that of low level groups. And then, participant students' overall scale, interpretation and inference sub-scales of low level group were significantly less than that of average level groups.

Discussion

Crow (1989) suggested that students must be given ample opportunity to practice critical thinking skills. For example, instructors can foster critical thinking through persistent questioning and encouraging students to do the same. Constantly, eliciting responses helps students to develop an investigative nature that is a key component of critical thinking. Brookfield (1987) also pointed to probing questions as an effective tool in stimulating independent thinking. But the instructors must listen carefully students' responses in order to draw out reasons, evidence, connections, and examples and familiar situations.

Useful learning strategies include rehearsal, elaboration, organization, and metacognition. Lessons should be specifically designed to teach specific learning strategies. Direct instruction (teacher-centered presentations of information) should be used sparingly. Presentations should be short (up to five minutes) and coupled with guided practice to teach sub-

skills and knowledge. Teacher-and/or student-generated questions about dilemmas, novel approaches should elicit answers that have not been learned already. Sincere feedback providing immediate, specific, and corrective information should inform learners of their progress. Small group activities such as student discussions, peer tutoring, and cooperative learning can be effective in the development of thinking skills. Activities should involve challenging tasks, teachers' encouragement to stay on task, and ongoing feedback about group progress. Computer-mediated communication and instruction can provide access to remote data sources and allow collaboration with students in other locations. It can be effective in skill building in areas such as verbal analogies, logical thinking, and inductive or deductive reasoning (King et al, n.d).

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