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A BETTER APPROACH TO DEVELOPING FIRST YEAR STUDENTS' RESEARCH ABILITY

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Synopsis:

We propose a methodology to develop first year students' research ability. We introduce first-year seminar entitled "Critical thinking & Freshman Research" for the development of first year students' research ability.

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I. Introduction

First year students usually think that research is a special task for someone whose job is a researcher. But in this age of information overload, research ability that can frame the right questions and focus intellectual resources to produce the right answers is essential to first year students as well as seniors. MIT established the first campus-wide undergraduate research program (UROP) [1] in 1969, founded by Dean Margaret Mac Vicar. Since then, many undergraduate research programs had been developed and recent studies show that undergraduate research experiences enhancing critical and analytical thinking skills of undergraduate students [2].

Yonsei University is one of the major research-oriented universities in Korea and adopted the concept of Residential College for its new campus at Songdo, Incheon in 2012. In the integration of living and learning environments, faculties and students can interact at a deeper level socially and academically. Furthermore, students can easily share their interests and activities with one another and learn to think and act.

One of the methods used at Yonsei Residential College to teach first year students about research basics and critical thinking is a one-credit First-Year Seminar entitled “Critical thinking & Freshman Research”. This course was designed to meet the need of freshmen`s expectation under the criteria of Residential College Courses to develop Yonsei`s 5 competences - Creativity, Communication, Christian Leadership, Cultural Diversity, Convergence. We would like to introduce this course in detail and show the result of effectiveness assessment. Finally we discuss future implication for development of first year students` research ability.

II. First-Year Seminar Development: Critical thinking & Freshman Research

This First-Year Seminar is an introductory level of research, one credit class. It consists of two steps: the first step is to understand and practice critical thinking and the second step is to write a term paper which consists of research theme, study background, drawing process of formulating hypothesis. Introducing others` research idea such as Bicilavadora [3] project and Kent Larson`s TED lecture [4] to help students to understand the concept of research at first. Then applying the Paul & Elder`s Critical Thinking model [5] to practice critical thinking and discover new fact or mistake using Gapminder [6].

Research basics begin with rigorous observation with a minimal error. For this, students are encouraged to practice to discern which knowledge is scientifically correct or not in class. And then, the class has the workout time for investigating facts (true knowledge) that have valid sources. After these trainings, freshmen can understand proper research process and apply an appropriate measure for verifying research hypothesis. Making bad (inappropriate) questions would help students raise better research questions in the end. The final output of this seminar is a term paper. It consists of research theme, study background, drawing process of formulating hypothesis. Table 1 shows the 16 weeks course schedule.

Table 1. First Year Seminar-CTFR COURSE SCHEDULE.

Week	Step	Subject
1	Course Orientation	<ul style="list-style-type: none"> ▪Course Overview ▪Critical Thinking & Freshman Research:What It Is and Why It Counts
2	step1- Critical Thinking	<ul style="list-style-type: none"> ▪What is Research? - case study1: `Bicilavadora` - case study2: `Brilliant designs to fit more people in every city`
3		<ul style="list-style-type: none"> ▪Nature of the Thinker ▪Why do we need “Critical Thinking”? - The truth of Balearic Islands - The Life Expectancy Comparison between Sweden & Burundi - Issues in Residential College
4		Applying Paul& Elder`s Critical Thinking Model
5		Discover new fact or mistake by using `Gapminder`
6		Presentation 1: Team Project used `Gapminder`
7		Presentation 2 & professor coaching session
8		Mid-term period
9	step2- Research	<ul style="list-style-type: none"> ▪Learn the research by Movie “Temple Grandin”
10		<ul style="list-style-type: none"> ▪Knowledge & Research ▪Various ways for Inquiry of Knowledge ▪How can we get the Scientific Knowledge? ▪Class Activity: Finding the errors of getting knowledge
11		<ul style="list-style-type: none"> ▪Acquirement of Scientific Knowledge ▪Class Group Activity: Investigating true knowledge
12		<ul style="list-style-type: none"> ▪Presentation 3: Investigating true knowledge ▪Research Design
13		<ul style="list-style-type: none"> ▪Research Process ▪Research Question and Hypothesis
14		<ul style="list-style-type: none"> ▪Class Activity: Making bad research questions ▪Class Activity: Making an appropriate research hypothesis
15		Wrap-up
16	Term assignment: Individual Paper	

III. Assessment and implication for development of first year students` research ability

We used the simple survey questionnaire. Because of methodological limitation, the interpretation of result may have its own limitation.

At the wrap up day in 2015 fall semester, students got three structured questions, "The importance of critical thinking in undergraduate study", "The importance of critical thinking in daily life", and "The improvement extent of critical thinking ability when compared to taking class before". The results are as follows shown in Table 2.

Table2. The effectiveness assessment; Central tendency.

n=29, 2015 Fall Semester

	Mean	Standard Deviation	Mode
The importance of critical thinking in undergraduate study	3.72	.455	4
The importance of critical thinking in daily life	3.48	.574	3
The improvement of critical thinking ability compared with taking class before and after	3.00	.413	3

Likert 4-point scale in each item;

4=very important, 3=important, 2= a little important, 1= not important at all in the first & the second item,

4= improved a lot, 3=improved, 2= improved a little, 1= not improved at all in the third item

We are able to draw a positive feedback of this seminar from the results: 72.4% of students recognized critical thinking was very important in undergraduate study and 27.6% of students reported critical thinking was very important in daily life after taking the class. When compared with taking class before and after, 79.3% of students generally thought that they improved the critical thinking ability.

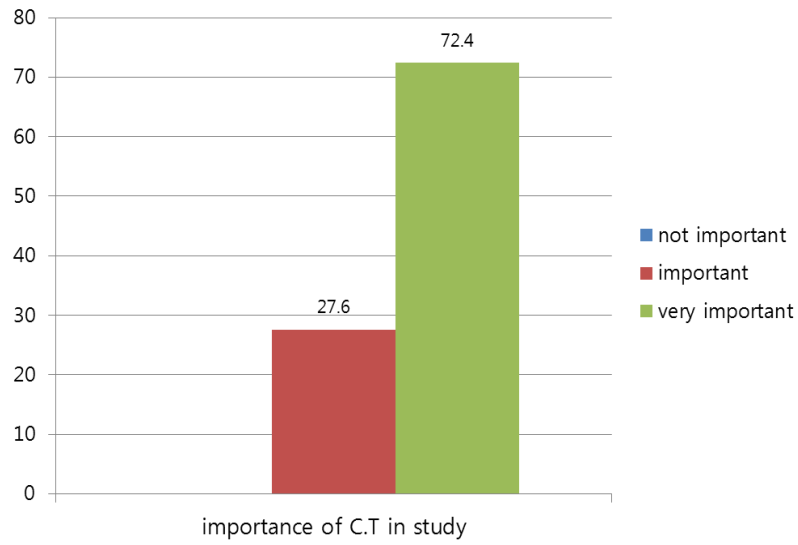


Figure 1. The effectiveness assessment-Responses on the importance of critical thinking in study.

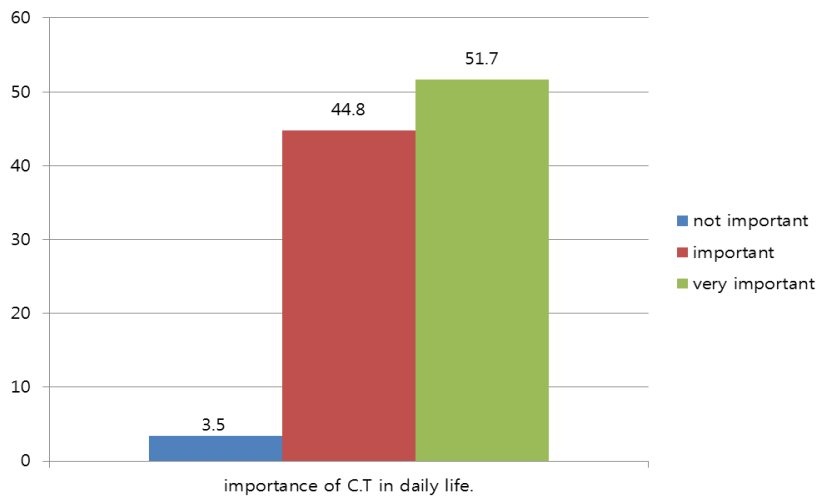


Figure 2. The effectiveness assessment-Responses on the importance of critical thinking in daily life.

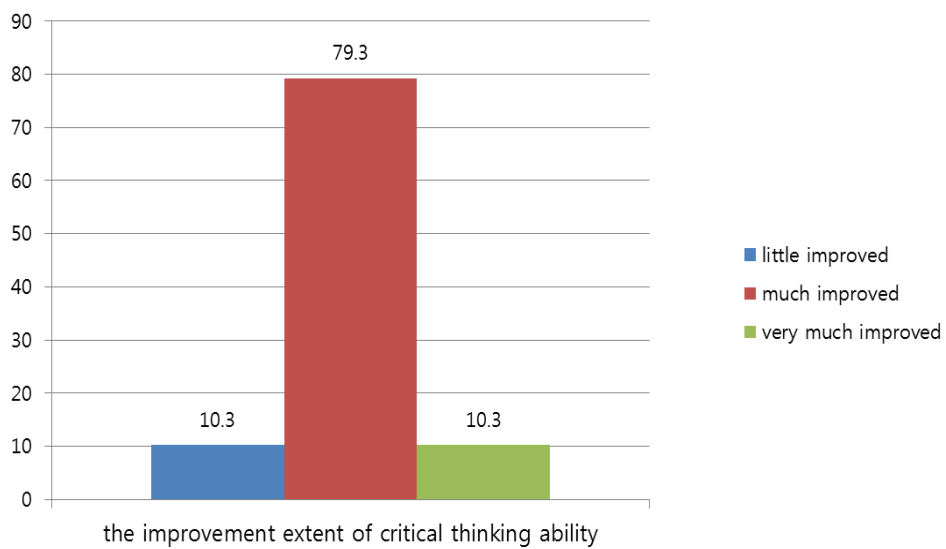


Figure 3. The effectiveness assessment-Responses on the improvement.

IV. Further Studies

This is an introductory level course of designed to improve the ability of critical thinking and 4 competences - Creativity, Communication, Cultural Diversity, Convergence. We are planning to expand the upper level classes and extra-curricular activities in the future. Furthermore the effectiveness of this course can be assessed by experimental design.

V. References

- [1] <https://libraries.mit.edu/mithistory/institute/offices/undergraduate-research-opportunities-program-urop>
- [2] C. A. Merkel, "Undergraduate Research at Six Research Universities: A Pilot Study for the Association of American Universities", California Institute of Technology, 2001. Retrieved from <https://www.aau.edu/assets/0/76/354/390/75d36cb3-64fd-4a3f-80e9-560d50506041.pdf>.
- [3] <https://pdos.csail.mit.edu/~yipal/papers/bicilavadora-ideas05.pdf>
- [4] https://www.ted.com/talks/kent_larson_brilliant_designs_to_fit_more_people_in_every_city
- [5] R. Paul and L. Elder, "*The Miniature guide to Critical thinking Concepts and Tools*", 4thEdition, The Foundation of Critical Thinking, Dillon Beach, CA, USA, 2004
- [6] <https://www.gapminder.org/downloads/life-expectancy-ppt/>