

Critical Thinking in The University Curriculum

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Abstract

The emergence of critical thinking skill development in Japanese education has been taking place, but the concept of critical thinking goes back to 2500 years ago when the ancient Greek scholars saw the necessity of having informed citizens with critical thinking skills in order to maintain a just society. They believed that human thinking and decision making when solely based on intuition or personal experiences was prone to error and flawed. They also knew that to develop critical thinking takes time in one's life, and that education played a crucial role because critical thinking needed to be taught explicitly to overcome human fallibility.

In this paper, what we should understand and how we put into practice critical thinking skills in the course, where students actively consider the problems and figure out how they know what they know, are discussed. First, an unpacking of what the concept of critical thinking means is provided. Second, why it should be taught and its various instructional roles within a university curriculum are addressed. Third, pedagogical considerations are discussed regarding implementation of critical thinking courses at the classroom level. In addition, results from a questionnaire asking how students felt about taking a critical thinking course are included.

Keywords: critical thinking /philosophy / education / university curriculum / implementation

Introduction

The development of critical thinking has been a core learning objective of many university programs (Murawski, 2014). For example, in Japan, there has been an interest in implementing critical thinking into the curriculums since the Ministry of Education (MEXT) had included logical thinking as one of the aims of the revised secondary

curriculum over a decade ago. Dunn wrote, “This has caused the need for educators in Japan to quickly adapt to the inclusion of logical thinking, and by extension, critical thinking in their curriculum (MEXT, 2011) from 2013” (2021.p.197). Moreover, the desire of universities to implement critical thinking in their curriculums has continued as a result of MEXT’s draft in 2017 to further revise the curriculum for high schools; it was clearly stated that in 2022 there should be class discussions in all subjects with active learning activities that aim to cultivate students’ critical thinking abilities (Japan eyes new curriculum, 2018). Since the concept was developed from Greek philosophers and passed on from generation to generation, it has gathered a broad range of definitions and various ways to implement it. Thus, it is still challenging today to agree on the meaning of the concept; its role in university curriculums; and its implementation in the classroom. These were the concerns of the author who was tasked with teaching a critical thinking course, which prompted her to address these issues through an exploratory study presented in this paper.

The Meaning of Critical Thinking

There is a plethora of definitions proposed by a number of scholars on critical thinking and therefore it is impossible to come up with a single definition of the concept, especially because they derive from several disciplines grounded in philosophy, cognitive psychology and education (Lai, 2011). Nonetheless, some have offered useful insights into what critical thinking entails. For example, the following observations emphasize the rational nature of critical thinking. Siegal (1988) characterizes the critical thinker as one who is “appropriately moved by reasons” (p.32) to think and form judgements rationally for an event or action. Ennis (1987) a leading scholar on critical thinking defined it as “reasonable reflective thinking that is focused on what to decide and do” (p.10). Lipman’s (1988) description further stated the rational nature of critical thinking as “skillful, responsible thinking that is conducive to judgment because it relies on criteria, is self-correcting, and is sensitive to context” (p.39). Gibbon (2009) emphasized the logical nature of critical thinking and wrote it involved “pursuing a coherent line of reasoning” (p.21). Otherwise, what learners will end up with is “knowledge of isolated facts” (p. 21).

Further definitions denote that critical thinking is part of an ordered thought process requiring self-reflective and systematic approaches:

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- Critical thinking is, in short, self-directed, self-disciplined, self-monitored, and self-corrective thinking. It requires rigorous standards of excellence and mindful command of their use (Paul & Elder, 2006, p.4).

The dynamic, systematic nature of the concept and associated abilities are further outlined:

- Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action (Scriven & Paul, 1987, p.1).

Dewey's early definition, in which he referred to the concept as 'reflective thinking' included the active and reflective nature of critical thinking. He stressed that it involved characteristics such as determination as well as being discerning and skeptical until proven conclusions emerge:

- Active, persistent, and careful consideration of a belief or supposed form of knowledge in the light of the grounds which support it and the further conclusions to which it tends (Dewey, 1910, p. 6).

Faccione extends the definition to not only focus on the individual nature of critical thinking, but also the dialogic aspect of opening-up one's mind to the social realities of others:

- The ability of a person to present well-reasoned arguments, and to evaluate correctly the arguments others present (1986, p. 222).

The above descriptions holistically point out that critical thinking is a reasoned (rational), systematic, judgmental, purposeful, dialogical and disciplined process that requires certain abilities, and characteristics (temperament), which Ennis referred to as dispositions. Below is list of abilities (Table 1.) and dispositions (Table 2.) that Ennis formulated for assessment purposes (1987, pp. 9-26).

Table 1. Critical Thinking abilities

Clarification	<ul style="list-style-type: none"> to identify the focus: the issue, question, of conclusion. to analyze arguments
Basis for decision	<ul style="list-style-type: none"> to judge the credibility of the source to observe, and judge observation reports
Inference	<ul style="list-style-type: none"> to deduce, and judge deductions to induce, and judge inductions: <ol style="list-style-type: none"> to generalizations to explanatory conclusions (including hypotheses)
Metacognitive abilities— involving supposition and integration	<ul style="list-style-type: none"> to consider and reason from premises, reasons, assumptions, positings, and other propositions in which one disagrees or about which one is in doubt—without letting the disagreement or doubt interfere with one’s thinking (“suppositional thinking”) to integrate the other abilities and dispositions in making and defending a decision

Table 2. Critical Thinking Dispositions and Criteria

Dispositions	Criteria
Care that their beliefs be true and that their decisions be justified; that is, care to “get it right” to the extent possible.	<ul style="list-style-type: none"> Seek alternative hypotheses, explanations, conclusions, plans, sources, etc.; and be open to them. Consider seriously other points of view than their own.
Care to understand and present a position honestly and clearly, theirs as well as others’.	<ul style="list-style-type: none"> Seek and offer reasons. Be reflectively aware of their own basic beliefs.
Care about every person (Caring critical thinkers).	<ul style="list-style-type: none"> Avoid intimidating or confusing others with their critical thinking prowess, taking into account others' feelings and level of understanding. Are concerned about others’ welfare.

The unpacking of what critical thinking means coming from various disciplines, and the abilities and dispositions it entails listed in the chart above offer a rather broad, standard view of the concept. Even so, a baseline definition can be useful to help faculty form a shared understanding of the concept. This is particularly important because it can help

decide which courses and materials to use when setting out to improve students critical thinking skills. For further clarity about critical thinking, next why it should be part of a university curriculum is addressed.

Why there should be critical thinking in the university curriculum

In view of defining the concept of critical thinking above, the reason for including it in the university curriculum is self-explanatory. It should be assumed that one of the purposes of higher education is to create an environment to impart in-depth knowledge and understanding conceptualized by reflective thinking. As students go through the educational process, they further their self-development in ways that help them self-actualize their individual potential and at the same time collectively contribute to the betterment of society. Thus, “The goal of critical thinking is to learn a way to think more deeply, solve problems better, communicate, collaborate and innovate more effectively in our personal as well as organizational lives” (Murawski, 2014, p. 28). In this sense, the university can be the light that guides and inspires students to go beyond limitations by upgrading their knowledge, and one way to do this is through critical thinking. That is, the formal education of a university provides a structural framework, an educational process that can lead the students to reach their learning potential in ways they could not do on their own. Because left on their own, without self-correcting abilities enhanced by critical thinking, their thinking can be flawed. Of course, flawed thinking should not be solely attributed to students, but for all humans in general.

A very well-known parable pointing out humans’ proneness for fallibility is the *Allegory of the Cave*, Plato’s famous narrative, written over 2,400 years ago. The story demonstrated how prisoners, who were forced to dwell in a cave all of their lives, were metaphorically and literally kept in the dark. In turn, their perception of reality was deeply flawed. When confronted with reality, the truth, they still held on stubbornly to their beliefs and resisted any form of education that critically challenged their misrepresented beliefs. In the *Allegory*, Plato’s message is that even if education is resisted, it is necessary for society to prevail. Therefore, this is why the concept of critical thinking should be essential to one’s university education, which brings up the next issue in this paper of how to implement critical thinking.

Implementing critical thinking

When implementing critical thinking, two important questions emerge: What is the general role of critical thinking in the university curriculum, and what type of pedagogy is needed to teach it? First, the issue of the role of critical thinking as an intervention in the curriculum is addressed from four areas. Then, pedagogical approaches that complement the inclusion of critical thinking courses are explored.

Types of critical thinking instructional interventions in the curriculum

On one side of the spectrum of critical thinking in the curriculum is the generic or generalist view. In this approach, critical thinking skills are general skills that can be applied across the curriculum, regardless of the subject (Ennis 1989; Paul, 1985; Siegal 1988). On the other end is the specialist view most established by Mc Peck (1981), who argued that critical thinking skills are meaningless on their own. In his view, critical thinking skills are separated from specific content or knowledge, “To the extent that critical thinking is not about a specific subject X, it is both conceptually and practically empty” (p. 5). Ennis (1989) provided a typology of four types of critical thinking courses that cover the wide spectrum. The courses were labeled as *generic, infusion, immersion, and mixed*, and are described as follows:

- *Generic courses*

The generic, general approach represents teaching critical thinking as a stand-alone course. The skills and dispositions are the course objectives with no particular subject matter. In other words, the course explicitly focuses on critical thinking skill development rather than on the content of specific subjects. Students learn the principles of critical thinking in general terms of logic and reasoning as they epistemologically explore how we know what we know through systematically looking at the meaning of evidence, theoretical frameworks and how theoretical claims manifest in practice. The educational reasoning is that students are encouraged to think critically when they are in their specific subject courses by applying general principles of critical thinking they have learned. Consequently, they can be expected to transfer their critical thinking knowledge across

the varying subject disciplines (Ennis, 1989; Paul, 1985; Siegal, 1989).

- *Infusion courses*

Unlike the generic course, infusion requires that teachers blend critical thinking skills instruction along with the subject matter knowledge. Instruction is deep and thought provoking and well understood by the students, who are encouraged to think critically. The infusion approach, like the generic approach does require critical thinking skills to be taught, explicitly.

- *Immersion courses*

The immersion course shares the same principle as an infusion course of focusing on specific subject matter knowledge. Proponents of this approach are Mc Peck, who posit that students also need in-depth knowledge of the subject content. Like the immersion approach, it is intensive in its presentation of the material, however, it presents it in ways that provoke critical thinking skills *implicitly* rather than *explicitly*. Lessons and cohering activities are designed in ways that involve students in critical thinking without explicitly teaching the skills and dispositions.

- *Mixed method courses*

The mixed method or integrated course is a hybrid of a generalist and a specialist, content specific approach. Within a specific subject course, the teacher explicitly teaches critical thinking skills and dispositions as a separate track. Thus, subject-specific knowledge is explicitly taught in parallel to a separate strand of critical thinking knowledge. The mixed method intervention applies a praxis approach: The transfer of critical thinking skills must be practiced and theoretical knowledge of those skills must be explicitly taught (van Gelder, 2005).

Abrami et al. (2008) conducted a metanalysis literature review of critical thinking interventions with the four listed above. They looked at 117 studies to determine how these approaches impacted critical thinking skill development and dispositions. They

found that the mixed method had the most positive impact and immersion the least. The results point out that explicit instruction had the largest effect “, whereas the immersion method, where critical thinking is regarded as a by-product of instruction, had the smallest effect” (p. 1121). The results suggest that making critical thinking clear as a part of the course design and explicit instruction of critical thinking skills is more effective than introducing it indirectly. Additionally, Hatcher (2006) found in a study of a particular university for a 15-year period in its general education program that the mixed method, integrated approach when comparing it to a stand-alone, generic course was more effective in teaching critical thinking skills. In both studies they also found that pedagogy matters when implementing a course with critical thinking as a goal, which brings the study to the next issue of teaching critical thinking.

Pedagogical approaches in critical thinking

Introducing new courses in university curriculums require that designers consider course objectives, specific content (subject matter) and evaluation. Moreover, an equally important consideration is that there needs to be attention given to complementary pedagogies to carry out the curriculum goals (Takegami, 2023). If attention to alternative or appropriate pedagogies is overlooked, then problems occur as there is a mismatch between expectations of curriculum planners and those who teach it. Thus, it is particularly necessary to have clarity about the pedagogical approaches needed to teach the course including having a clear understanding of subject knowledge about what is to be taught, and methods of how it should be taught. In the former case, teachers generally agree that critical thinking skills should play an important role in university education, but few could explain what it is. For example, in a California study of 120 teachers in 57 colleges a majority (89%) of the teachers said critical thinking was a main objective in their courses, but a much smaller number (19%) could offer a clear definition of the concept, and only a few (9%) were clearly teaching it (Paul, Elder & Bartell, 1997). While interviewing a private liberal arts college faculty, Halx and Reybold (2005) explored instructors' perspectives of teaching critical thinking to undergraduates. The study reported that although the teachers were quite eager to teach it, they were unsure about what critical abilities they were supposed to teach, and more importantly they did not feel they were adequately trained to do so. Lacking in professional development, the

teachers were left on their own to develop their own definitions of the concept. The result was that instructors intuitively each developed and promoted their own distinct definition of critical thinking and taught it accordingly without having any formal professional pedagogical methods to guide their instruction.

The implications of the two studies mentioned above are relevant to why pedagogy matters when implementing critical thinking into a curriculum. Paul (2005) wrote, “When faculty have a vague notion of critical thinking, they are largely unable to identify ineffective teaching practices or develop more effective ones” (p.27). That is, teachers need to have a substantive and shared understanding of *what* the concept means, and appropriate pedagogical knowledge of *how* to teach it to effectively teach it. Both of these salient issues require formal professional pedagogical knowledge. Firstly, as a part of the university teachers’ faculty development (FD), they would need to sit down and decide on a working definition of *what* critical thinking is by first settling on a baseline definition. They would also need to agree on the skills and dispositions presented in Ennis’ topography. Secondly, *how* these could be carried out in the course most likely would require the knowledge of alternative pedagogies to teach it. For teachers at the university level, as in Japan, without any FD, there could be a mismatch between using transmission-based pedagogies delivered in monologic-type lectures that reduce students to passive receptors to teaching critical thinking requiring alternative pedagogies that are constructive, student centered, collaborative and dialogic (Lai, 2011).

Therefore, without having pedagogical knowledge how to teach critical thinking or a shared understanding of what it is and how to teach it among faculty can create a situation where teachers avoid implementing it. Teachers will filter out any attempted changes or demands in a curriculum that do not meet the realities they face in their classrooms. In short, if they do not themselves understand the subject matter (i.e., critical thinking) and how to teach it, they simply won’t. Therefore, it is essential for curriculum planners and other faculty members to be involved in FD to work out the shared knowledge of critical thinking and ways to teach it, otherwise problems with implementation occur as the author found in her own experience.

A critical thinking course in the university curriculum: a case example

The author was asked to teach a new critical thinking course that had already be planned and designed for the curriculum in a department of English. She had no input in the course design when it was planned. The following offers an example of the author's experiences with the course.

Course design

The course was designed as a stand-alone course for the generic purpose of teaching critical thinking skills to the students. The outline of the course was broad and emphasized that the purpose was to develop students' critical thinking skills. Students were divided into three groups with about 15 students in a class. The author would teach the course with two other teachers in rotation of a fifteen-week course meeting once a week for 90 minutes. Each teacher would teach the course for five sessions and then the class would rotate and the next group of students would enter. Thus, each teacher would need to prepare for five lessons teaching the same material for each rotation. The teachers were handed a textbook that students would use. There was not much FD to prepare other than agreeing to teach the course and then to collectively reflect at the end of the course to share ideas and make improvements. This situation was reminiscent of what Halx and Reybold had found that without professional development, teachers were left on their own to define course content and to teach it based on their personal teaching experiences without any formal discussions on appropriate methods to teach it. Consequently, since none of the teachers including the author had any explicit training teaching a course designed for critical thinking, feedback was minimal at the end of the course. Besides the lack of FD support, teachers' busy work schedules increased by administrative duties had a constraining impact. An example of a time constraint experienced by the author was due to planning for the course in isolation. Considerable time was used to try to define what critical thinking meant and what skills to teach. Much time was spent on working out how to effectively deliver the information presented in the textbook with pedagogically appropriate methods and techniques.

This being the case, there were some assumed critical thinking activities that were fruitful. One example was a project that the author created from the course textbook

which was based on international baccalaureate (IB). Critical thinking plays a role in the IB curriculum (see Takegami, 2022) and textbooks are designed to have an epistemological focus on how we know what we know by exploring theories of knowing (TOK): in view of, what is regarded as evidence, what is the best theoretical model and how do theories connect to the real world; through ways of knowing (WOK): emotion, reason, faith, language, perception, intuition, memory, and imagination; and areas of knowing (AOK): analyses in subject areas such as natural science through observation and the scientific method, and in history using justification by cause and effect (Sprague, 2016). Other areas are mathematics, the arts and indigenous knowledge systems. In relation to the indigenous knowledge systems in the critical thinking course taught by the author the students were expected to develop critical thinking abilities and dispositions by examining folk remedies. They searched particular local folk remedies, looked at what was considered evidence through WOK by collecting information of local knowledge considering faith, memory and emotion. Then, they applied AOK of natural science making connections to aspects of the folk remedies that could be explained scientifically. The result of the research was that they could sharpen their critical thinking skills and dispositions as they were engaged in the process of justifying areas of folk remedies that were further proved to be effective because of triangulating data collected from methods used in the natural sciences.

Student feedback

As a part of the author's quest to better understand what a critical thinking course should entail and how it should be taught, a questionnaire was conducted. The design of the questionnaire was exploratory and focused on two areas: first, student understanding of what critical thinking is and would it be a necessary skill to have in their future; second, what the instructional role of critical thinking should be in the curriculum, and how they felt about their participating in the rotation stand-alone one year course. The students were 1st-year, English major students. The total number of respondents were 18, representing the full number of students who were enrolled in the rotation course that the author taught with two other teachers. The students were in their second semester of taking the course.

Question one was an open-ended inquiry into what they thought critical thinking meant. Following Ennis' list (see Table 1. and Table 2.), the responses were divided into two categories: critical thinking skill abilities and dispositions, respectively. Similar results were accumulated into one response and counted accordingly.

Question 1. What is the meaning critical thinking?

Critical thinking skills:	Critical thinking disposition skills:
<ul style="list-style-type: none"> • To try to see through the essence of things. To acquire the ability to make judgments on your own by finding evidence on your own, without being influenced by superficial notion such as rumors. • I don't doubt what I see and listen and usually believe it, so I think critical thinking skills is the skills to be acquired. • To think about things from multiple perspectives. Not only research and present what we have found, but also deepen our knowledge of what potential (possibility) can be. • Critical thinking allows me to stop to reconsider what is what we see and know. It is difficult though; I think this skill can be used for future. • The way of critical thinking wakes me to see the world differently and this makes me feel fear a little, though, I feel the things taken for granted seems differently and I think it is important to get the skill. 	<ul style="list-style-type: none"> • Critical thinking is the way of thinking. It's important to doubt some things familiar with us and know why and how we know what we know now and what kind of things are taken for granted with what reasons. (7) • Before you accept something that everyone undoubtedly accepts, stop and ponder why. (2) • To think about the phenomenon deeply and carefully. For Japanese, critical sounds negative. But critical thinking is not being critical (negative) but accepting many ways of thinking and consider deeply (2). • To doubt what I believe and what might be the truth. To doubt everything that we had been seeing as truth. (2) • The attitude of trying to ascertain the truth without being bound by preconceptions and common sense. • Instead of thinking about the facts that you believe to be correct from a single point of view in one field, we should think about them from a variety of different points of view

In reference to the various and wide-ranging definitions of critical thinking that

were presented earlier by scholars, the results above show the students were able to articulate fairly well what critical thinking entails. They understood that they should further develop their critical thinking skills abilities and dispositions by not readily or superficially accepting information or making judgements based on quick superficial decisions, but to question their preconceived beliefs with healthy skepticism. They became aware that they needed to look at issues from different perspectives, within a discipline process of finding evidence before forming judgements. The respondents' comments indicated they saw a personal educative value in having critical thinking skills and dispositions. This result is further enhanced in responses to the following questions. Reasons for the responses to the following questions two, three and four are listed in the Appendix.

Question 2. Do you think it is necessary to have critical thinking skills for your future?

Not necessary	Not so much	So so	Necessary	Very necessary
0	0	1	8	9

Almost all of the students, felt critical thinking skills were transferable and therefore would have much relevance in their future, excluding one (so-so) who felt they were not transmissible skills for daily life, but saw them useful for (academic) research. The next set of questions provided students' assessments for the instructional role of critical thinking in the curriculum.

Question 3. Do you think critical thinking should be taught in only in special classes or should be integrated in all or other subjects?

Only in special classes	Integrated in all or other subject classes
8	10

For those students who preferred critical thinking in stand-alone courses, most responses emphasized worries about course overload. They felt that with the inclusion of instruction on critical thinking in addition to dealing with subject matter content that they would fall behind in the course. On the other hand, those who favored the integration of critical

thinking with subject matter courses, overwhelmingly felt that it would further deepen their understanding of course material.

Question 4. Were the rotation courses last semester and this semester effective in learning critical thinking?

Not effective	Not so much	So so	Effective	Very effective
0	0	1	12	5

In question four, the responses were positive about having the critical thinking course taught by three teachers. Their responses mainly focused on the educational advantages of different perspectives and teaching styles that the teachers brought to the classroom (see Appendix). These supportive responses to the course with rotating teachers might also offer insights into rotation instruction of courses of not only critical thinking, but in other content courses in the university in general.

Discussion

Implications of this exploratory study from reviewing research on critical thinking in education and data from the questionnaire further substantiate that the development of critical thinking skills should be a core educational goal of universities. Furthermore, when planning to introduce it into curriculums there are important criteria that have to be met. First, there has to be considerations among planners regarding the instructional role of critical thinking in the curriculum on whether it should be explicitly taught in a stand-alone course or explicitly or implicitly integrated with a subject course. A review of studies presented in this study found that results were somewhat favorable for critical thinking courses that were explicitly taught and integrated with subject courses. These results are similar to those with the results of the questionnaire above showing a slightly higher preference by students for integrated courses. Second, another posing of this study is that it is necessary for the faculty to have a shared understanding of what critical thinking means; why it should be taught; what abilities and dispositions need to be developed, and how they should be implemented. In relation to implementation, pedagogy matters.

When new courses are planned for a curriculum, there needs to be measures to establish appropriate pedagogies, otherwise a gap occurs between the intentions of pre-planned course goals and implementation at the classroom level. An important role of FD would be to fill the gap by familiarizing teachers with pedagogies that are compatible with developing critical thinking skills and dispositions. Therefore, what is needed is a critical thinking pedagogy that involves students in problem solving situations in which they are given opportunities to apply reasoning and logic in order to make sound arguments and good judgments. Carefully scaffolded, student centered pedagogies, such as critical pedagogy, constructivist approaches, cooperative methods and inquiry-based learning would be applicable (Takegami, 2023). Through adapting a critical thinking pedagogy, teachers could develop teaching strategies that would assist the performance of students to develop and demonstrate their acquisition of critical thinking skills and dispositions across the curriculum.

Conclusion

This paper explored critical thinking within three parameters by defining what the concept means; its instructional role in the curriculum and how it should be implemented. There is a broad spectrum of definitions regarding critical thinking because it has been developed out of three contributory disciplines, philosophy, cognitive psychology and education. The defining characteristics are that critical thinking involves logic and reasoning thinking skills that are deliberately applied in a persistent and systematic way to arrive at correct judgements. Moreover, judgments are made only after they are substantiated with epistemological considerations (TOK and WOK) from various perspectives. Holistically, a critical thinker needs both certain skills and dispositions to approach problems and find appropriate solutions. In order to develop these skills and dispositions among students in a university curriculum, there is a tendency to have better results if they are taught, explicitly either as a generic stand-alone or in a hybrid course, integrating subject content with critical thinking.

Moreover, as this paper maintains, pedagogy matters. When introducing a new course in the curriculum, there needs to be considerations for appropriate or complementary teaching approaches and methods to effectively implement intentions of

course designers. This claim is magnified in the case of introducing critical thinking. Helping teachers to make adjustments in their instruction that may run counter to their normal way of teaching should be a role of FD. If pedagogical professional development is a function of educational centers within universities, then a productive goal would be to support faculty to teach with effective practices to improve student achievement.

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Appendix

[Critical Thinking Questionnaire]

2. Do you think it is necessary to have critical thinking skills for your future?

not necessary	not so much	So so	necessary	Very necessary
0	0	1	8	9

So so : I think that critical thinking is not irrelevant in our daily life (in living a normal life). Of course this skill is very important for research.

Necessary:

- It is a necessary to connect various things and think without sticking to one domain.
- By thinking about one thing from multiple perspectives, I began to think more deeply about society.
- I think it's very important to think in your own because most people don't think critically.
- In today's world, which is overflowing with a lot of information, I think it is necessary to have the ability to discern what is correct.
- Critical Thinking allows us to notice that we might trust wrong information and to realize what part has been questioned.

- It is necessary to have critical thinking skills in order not be confused by false information.
- Not to believe all information from SNS easily to avoid harming myself.
- In the future, we need to answer the questions of “why do you think so?” since I am very passive all the time.

Very necessary:

- To tell the truth, I don't usually question things. However, I think that the problems that are happening now are caused by not thinking about the future and lack of knowledge. I think it is important to have a mind of questioning and trying to know better.
- I have less opportunity of thinking of “how?” “Why”, though, there must be some reasons and effects behind every event so, getting the skill of thinking of “how?” “Why” help me grow.
- We have a lot of false information though SNS, so we need to have mind of questioning whether I can trust or not.
- The skill of critical thinking help me not to accept what we get from SNS but stop to think about it by myself.
- We can gain knowledge by questioning, thinking critically, and investigating.
- I think the process of making hypotheses and verifying those assumptions is essential for future work.
- It's hard to come up with new ideas from scratch. I believe that by redefining and reconfirming what we know, new ideas will be reconstructed.
- I think it will be necessary in the future to think critically about one topic from multiple perspectives. I think it is necessary to learn the method and process of thinking.
- Through this course, I think I am able to think about things logically through English.

3. Do you think critical thinking should be taught in only in special classes or should be integrated in all or other subjects?

Only in special classes	Integrated in all or other subject classes
8	10

Only in special classes

- It is better to focus on critical thinking only.
- Can be taught in other classes, but to gain the knowledge of critical thinking it self takes time, so I think it would be fine to be focused on one class.
- It's better to be taught in only in special class because I feel like I'm getting to acquire the knowledge.
- This critical thinking class alone is difficult for me, so I don't think that I can keep up with the classes such as sociology and literature lectures since critical thinking require a great deal of thinking energy.
- Maybe classes are getting difficult and I am afraid of not getting catch up if all classes are taught in CT.
- Although critical thinking is requires in all the classes, it is so difficult for me that I sometimes get confused.

And Sometimes I don't know what I am thinking. So in one class, I would like to focus on CT.

- I think that I can apply what I learned in this class to other classes. (2)

Integrated in all or other subject classes

- I think it is very important to "think". So critical thinking can be taught all the classes to practice of "thinking" more.
- Thinking critically is necessary to distinguish between what is truth and what we think truth.
- I think it better to practice critical thinking many times. Then we can come to think by ourselves.
- I think that t critical thinking must be the foundation of the way of thinking when working on various fields of study.
- I can get various perspectives for many other subjects.
- I can acquire the ability to apply the knowledge of CT to other subjects and themes.
- Widen our perspectives and knowledge gradually
- This class is a bit difficult. But I can think and discuss with the other students, which was fun. So, I think CT should be integrated in the other classes as well.
- In Most classes we are very passive. I think we need time and chance to rethink what we are learning in all classes.

4. Was this rotation courses last semester and this semester effective in learning critical thinking?

not necessary	not so much	So so	necessary	Very necessary
0	0	1	12	5

So so

- Different classes has different topic. So I think deepen my thinking with different teachers with different topic.

Necessary

- We can have a wider range of impressions by doing it with different teachers.
- It was effective to rotate because we could learn different things from different perspectives.
- I feel each teacher has different approach and perspectives on teaching CT, so I would like to have CT classes from different teachers.
- By Rotating classes, I feel inspired form different teachers.
- By rotating, I have come to combine the knowledge from different classes and find new questions.
- More chances to find my curiosity.
- Different approaches make me feel to widen my perspectives
- Different arear of study each teacher has deep knowledge so I am happy to have class rotated.(2)
- In the one semester, I can learn with three teachers ,which means three different areas. (2)
- This CT skill is very important to find theme for my graduation thesis.

Very necessary

- In spring semester, we have one teacher in CT class. But Fall semester, teachers work together for CT course and this makes me feel deepen my thinking.
- I can learn different themes in rotation.
- Each teacher has different approach and areas so this gets me inspired. (2)
- Until high school, teachers transmitted knowledge in all classes and we were very passive, which we have learned that we are supposed to be in the class. But though CT class, I learn I can use my brain (mind), which means that I learn I do not have remember the fact (what we are taught) but I have to think about the fact.