

'Critical Thinking in the Classroom: A Basic Questions Approach'

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A First Hypothetical Class.

Imagine a classroom in any university; it is the first day in the course on Cognitive Development. All students are already seated when the professor enters, goes to the podium and seats in the professor's chair. The first thing he does, as he has always done in his courses, is to read the attendance list of about 80 students; fifteen minutes later, he begins his lecture.

Professor: 'This is a course about cognitive development. We are going to study several theories and different models. A lot of reading about these theories will be required. You will have to learn all the details about them; names, dates, definitions and things like that. For example, today we are going to talk about Howard Gardner. In the 70's Gardner published a book about the history of cognitive science in which he mentions that.....'

After about 40 minutes of the professor's talking and talking, most of the students look bored and tired. Some are with their eyes closed, possibly daydreaming. Others are writing or scrambling on the notebooks and the more audacious have already pulled out some sports magazines. Very few students are paying attention to the professor's lecture. Suddenly, he stops and says:

Professor: 'Okay, this is it for today. Do you have any questions?'

A long silence in the classroom; nobody seems to have questions.

Professor: 'Are you sure, you don't want to ask anything? Did you understand everything I said?'

Again nobody has any intention to ask questions even if they didn't understand the professor's lecture. However some students move their head as if they had understood the class completely. The professor seems to be a little annoyed by the students' apathy and after some minutes of waiting for the students' questions, he is also disappointed and frustrated.

Professor: 'Okay, if you don't have any questions, that is fine with me. Next class, we will have a quiz on today's lecture. You must study the first three chapters of the book. We are going to have a multiple choice test'.

1. 0. Introduction.

During the last decade, at least, a rapidly increasing number of educators of the most developed countries of the West, have been insisting on the urgency of teaching students how to think by themselves.² At first, this might be a surprising claim; Is there anyone who doubts that thinking is a natural function of any human being?. As far as it is known, everybody thinks just as everybody breaths and nobody is taught how to breath or

think; so what is this all about?. Of course, what the proponents of teaching thinking in schools and universities have in mind is something different; their arguments would be as follows:³

'It is true that for any human being, thinking is as natural as breathing; in this sense, it is correct to say that nobody needs to be taught how to think or breath. However, it is also true that people are as capable of good thinking as they are of bad thinking and many times they even behave as if they were not thinking at all. Take the case of many students as an example. They are, in general, excessively passive, uninterested in learning and apathetic to the great social problems of our times. We invite them to ask questions and they have none; we want to know their opinions and they don't know what to say; we ask them to write an essay about a given topic and they don't know what an essay is, and so on.

It seems all they want, while in university, is to pass exams, make the grade and get a Diploma. For that, they memorize large quantities of information without ever getting a true understanding of what they are learning; no wonder, they forget all that information very soon. It is so disappointing! what is the use of all our efforts to teach them anything?'

For the proponents of teaching thinking in the schools the above situation is no longer bearable because:

'It is a fact, that some societies are already in the post-industrial stage of development, which is characterized by a large production of information in every field of knowledge. It is virtually impossible for anyone to acquire all that information while in schools or colleges, as it was supposed to be the case many years ago. As a result, in our times, people need to know how to think in order to make the best use of the information they have available instead of memorizing it and forgetting it later.

Furthermore, the young generations of our times are easy prey of professional publicists and politicians who use the mass media to manipulate their thoughts in order to make them behave as they want. People are bombarded with information everyday. In television, newspapers and magazines, ideas are presented for everybody to accept.

For example, some say that violence on television is bad for children because they tend to imitate such behaviors; others affirm that no scientific studies have proved that relationship to be true; some politicians want to have moral education in schools while others say that moral education is a family responsibility; economists state that opening the market will provide more jobs for the country but others claim that opening the market will only benefit a very few and so on. In almost all fields of knowledge there are contrasting opinions and people have the difficult problem of deciding which conclusions to accept, which to reject and which to withhold a judgment on. In short, people need to know how to think by themselves and the schools and universities are the best places to foster the development of students' thinking'.

If the former arguments are convincing, and they usually are under the assumptions of advanced western democratic societies in which every individual is supposed to have the freedom to select his way of life, his beliefs and his values; there are still several questions that need to be answered before a professor could do something about it.⁴ This paper addresses two of these questions, namely; what is critical thinking?; and, how can a professor foster the development of students' critical thinking in the classroom?. By doing so, it will hopefully convey, for the Japanese teacher or professor, some of the basic ideas proposed by the already world-

wide movement of educators who want to see critical thinking as one of the main purposes of schooling at all levels.

2. 0. What is Critical Thinking?

Several elements are common in the definitions of critical thinking that different scholars have proposed in the literature about this topic; the most frequent are:

First and foremost, is the idea that critical thinking is closely related to rationalism, that is, the relevance of reasons as basis for beliefs and actions. i. e. An student who is a critical thinker, is one who recognizes the importance and convincing force of reasons that give support to any theory, belief or statement about the world. Instead of accepting passively whatever he listens or reads, he always looks for the good reasons on which a claim is based, so he can make a personal decision about the worth of what is proposed and as a result he can form his own set of beliefs, values and actions.

Furthermore, a critical thinker, knows that every field of human knowledge should have a criteria to judge whether or not a reason is a good reason; and this is because every field of knowledge has its own logic. Thus architects will judge a building by using such criteria as utility, safety and beauty; a lawyer will be using good reasons whenever he can distinguish the legal arguments from illegal ones, and so on.

In addition, whatever the field of knowledge, a critical thinker knows that good reasons are those which meet the time-tested criteria of good reasoning, namely; validity, consistency and objective evidence. By always seeking if good reasons support a given claim, critical thinking usually leads to the conclusion that is most likely to be correct; given the knowledge one has about a given topic.

This last aspect is very important because whenever a critical thinker believes that his knowledge is insufficient, he tends to seek out more information on which to base his judgment, particularly in the case of important decisions. He knows that our inability to suspend judgment, when one doesn't have enough information about an issue is perhaps, the most prevalent aspect of irrationality.

Second, is the notion that critical thinking is not pure rationality but rationality tempered by judgment, that is, reasonableness. To better understand this concept, it will be helpful to identify two kinds of issues that students typically encounter in the schools. The following questions will illustrate the difference: what causes heart attacks?. and should people be required to retire at a certain age?. While the first question demands a correct answer about the causes of heart failure, the second can only be answered in terms of something desirable for the economy or for the people. In other words, the first kind of issue is descriptive while the second is prescriptive. Science as a model of rationality deals mainly with the first kind of issues, but because many aspects of human conduct cannot be dealt with the precision of science, approximations are needed. For this, a student learning to be a critical thinker needs to develop a sense of the appropriate, the equitable and the reasonable even if it is not strictly speaking, a rational thinking⁵.

Third, but the most important characteristic; a critical thinker can be noted by his critical spirit. That is, his attitude, his disposition, his commitment to seek reasons and evidence, to demand justification, to query and investigate unsubstantiated claims. A critical spirit inquires, asks, wonders, looks for meaning and understanding. And above all, a critical spirit is always willing to self-correct his opinions and beliefs under the

light of new evidence or better arguments. In this sense, to be a critical thinker is a way of life whose main purpose is the search for truth.

In short, a definition of critical thinking will refer to one who has a critical spirit to look for rational and reasonable arguments in order to evaluate and decide which conclusions to accept, which to reject, and which to withhold a judgment on.

3. 0. A Basic Questions Approach.

Definitions are fine in order to understand a given concept. However, teachers and professors need more than definitions if they want to foster critical thinking in the classroom. In this paper, the critical questions approach is suggested; that is, here, it is assumed that a critical thinker is the one who has the knowledge, the ability and the desire of using critical questions whenever he needs to assess a claim, evaluate a procedure, or make a judgment about a given information.

It is important to observe that the growing interest in this topic during the last years has produced many other pedagogical alternatives.⁶ But the basic critical questions approach has the advantage of being simply enough for any student to understand and use almost immediately. It is possible that some readers will find this approach to be a mere common sense, but if they do, this might be an strength rather than a weakness; if common sense is to be understood as something practical that makes sense. Yet the power of this alternative resides in the systematic use that professors and students could make of it in the classroom. So let's review the set of suggested critical questions for the students to learn in the classroom.

Reading and listening are two fundamental ways of receiving information in any educational setting.⁷ Thus, whenever a student is reading or listening a statement or a claim, the first question he usually should ask is; what is the issue? what is the topic? what is the question? what is the controversy?. Most of the times, the answer to this question is obvious but a critical thinker doesn't forget that very frequently people discuss without even first having an agreement about what the issue is.

As we saw above, there are usually two main kinds of issues; descriptive and prescriptive. The first issues describe the world as is, was or possibly be. They are usually found in textbooks of every field and lectures in the schools and universities and most of the times the issues can be stated as questions. i. e. what are the main causes of infant mortality in the world?; what has been the rate of unemployment in Japan during the last 5 years?; which party won the last elections?; is this new teaching method better than the old one? and so on. Most of these issues demand objective evidence and consistent explanations as good answers; general opinions might be interesting but cannot be considered seriously until some evidence supports them.

On the other hand, prescriptive issues demand answers that suggest the way the world should or ought to be. That is, they belong to the ethical, moral or religious domains. i.e. Should violence be banned in TV programs?; should religion be taught in schools?; should abortion be legalized?, and so on. These kind of issues can only be answered with reasonable judgments because objective evidence is usually not enough given the ethical and moral aspects involved in them.

Once the issue is identified, the second question a student might ask is, what is the conclusion?. A conclusion is, of course, a statement or set of statements that the writer or speaker wants to be believed. Most of

the times, a conclusion should be supported by other statements; the reasons. Thus, whenever someone claims something to be true or ought to be done and provides no statements to support his claim, that claim is not a conclusion but just an opinion, because he has no offered any basis to believe him.

In other words, the basic structure of inference is; This because of that; where this refers to the conclusion and that to the reasons supporting the conclusion. For example, a given study concludes that 'In the first semester of 1997 Japan had a higher trade surplus rate than in the first semester of 1996' because this year the average figure is 69 percent compared to the 45 percent of last year. Or the news that the Japanese officials are proposing to have a more specific 'moral education program' in the schools because of the recent killings apparently performed by youngsters. At this stage, the important thing for the students is to identify precisely the conclusion and the reasons given in the topic under discussion; later on the reasons will be evaluated to judge how well they support the conclusion.

Therefore, the third question should be, what are the reasons?; why this person wants this to be believed?; on what grounds he is supporting his conclusion?. Of course, there are many kinds of reasons, depending on the kind of issue. When someone is trying to support a descriptive conclusion, the answer to the why question should usually be objective evidence. That is, facts, examples, statistics, results of experiments or data collected by scientific methods. Prescriptive conclusions on the other hand are usually supported more with reasoning than with data.

A very important point needs to be made here. It is well known that many times people use a sort of reversed logic. i. e. they only look for evidence or reasons that can support their already strong held beliefs without any consideration for truth. In other words, they already have a position on a given topic and want to defend it just because it is their position not because it is true.⁸ To avoid this, students must learn that reasons should be first and then conclusions.

Once the topic, the conclusion and the reasons that support the conclusion have been identified, it is natural to ask if the basic concepts are being well understood before students can react fairly to the ideas being presented. In other words, it is necessary to examine the precise meaning of key words and phrases in the argument. It is a very common mistake to assume that the meaning of words is always obvious for everybody. Students have to get into the habit of asking, what do you mean by that?, (moral education, for example); this word is ambiguous, can you clarify it?; there are several meanings for this word, which one are you using?. Of course, it is the writer or the speaker's responsibility to clarify his concepts; if he cannot do it, a critical thinker cannot be asked to react to his ideas.

Another question before students can evaluate a claim, a conclusion or a theory is related to the underlying assumptions and possible conflict of values of the writer or speaker; what assumptions are being made here?. When someone is trying to convince someone else, he will present reasons that are consistent with his position. But hidden ideas may be as important to understand an argument as the ideas that are explained openly. Just to give an example, if someone is asking for government regulations about smoking in public places, he usually assumes that collective responsibility (represented by the government) is more important than individual responsibility. If any student shares this hidden assumption, he will tend to support that claim whether the idea is reasonable or not.

Finally, students are ready to judge the acceptability or worth of the conclusions concerning an issue, the main purpose of critical thinking.

The basic question is, how good is the evidence that supports the conclusion?. There are, of course, many kinds of evidence depending on the topic to be discussed but the most frequently presented in educational settings are: a) Empirical evidence such as data, facts, and reports of experiences and b) Reasoning such as the use of analogies, appeals to authority and so on. Of course, this classification is just for expository purposes; in real situations both are usually intermingled.

3. 1. Empirical evidence.

To judge how good the empirical evidence is, it is best to rely on the characteristics of the scientific method, specially if some kind of data is presented. However, a point of clarification is pertinent here; courses on scientific methods have been part of the curriculum of schools (mainly in higher education) for many years in many countries. But the purpose of these courses is usually to teach students how to do research in their field of knowledge, while here, the purpose is to use the scientific method to teach students how to think critically about scientific theories as those that are usually encountered in the schools. With this purpose in mind, the questions to ask are concerned first with the quality of the data and then the robustness of the conclusions. A list of these questions for the students to ask may include the following:

3. 1. 1. About the Quality of the Data.⁹

Usually conclusions are just generalizations about how a certain population is, was or is going to be. Therefore, critical thinkers have to be very careful about the characteristics of the population that was under study; and for that, he needs to ask: what is the population?; what group of individuals or events is the conclusion referring to?. For example, a recent study want us to believe that “In Japan, salary men spend most the nights of the week drinking in the Hostess Clubs and other similar places as part of their responsibilities to the Company.”. The question here is clearly, what is a salary man?. Most of the times, the answer is that salary man is the equivalent of the white-collar worker in the West, that is, a highly educated administrative employee; but still, is the author talking about the millions of salary men in Japan? No, she is talking about the salary men in the big companies, and further, she is referring to those in the big companies who are in middle to top positions or those that need to host potential clients for the company. It is clear that after inquiring about the population in this study, a rather smaller segment of the population called ‘salary men’ was under study.

Once we have a better idea of the population under study, the next question a critical thinker should ask is; How good is the sample? This is because most the times, studies are performed with only a part of the whole population. Therefore if generalizations are to be made about a given population based on the study of a sample of that population, a critical thinker should inquire about the quality of the sample. Three main criteria are usually suggested if the sample is to be representative of the population: Size, extensiveness and randomness.

It is clear that the size of the sample depends largely on the size of the population and its characteristics but as a rule of thumb, the bigger the sample the better. As for the extensiveness, a sample should reflect all the characteristics of the population, i.e. the study on salary men of big corporations should include salary men of different kinds of big companies such as; manufacturing, financing, trade and services. But perhaps the

most important feature of any sample is randomness, that is, the unbiased way members of the population are selected for the study.

A very important comment should be made here. It is a fact, that many times it is difficult to have a big sample, which reflects the population and which has been selected at random. This is true specially in social science studies. For example, the study about salary men included only those who attended one Hostess Club in Tokyo during the four months of the researcher's observation. This sample is clearly very small, probably not representative of the population and worst, not randomly selected. Therefore while reading this kind of studies one may ask, what is the usefulness of this research project?. Given the nature of the issue and the probably limited resources of the researcher, it is possible the researcher didn't have any other option; that is fine, but the point is that a critical thinker should be aware of these kinds of limitations and be careful not to over generalize about the conclusions.

Now, the critical questions will be focused to the ways the information was gathered, that is; how the data was collected?. The point to remember here is that scientific studies should provide objective data and if possible, data obtained under controlled conditions. Interviews, surveys and anecdotal evidence, for example, are very sensitive to these criteria because of the many built-in biases that they have, such as:

Biased wording (an small change in the words used in questions can have a major impact on the way they are answered), biased context (an answer provided by a salary man in the hostess club may differ significantly from an answer provided by the same man in his office), halo effects (if a person has one salient good trait, his other characteristics are likely to be judged as better than they really are), the primacy error (for example, if someone is in a bad mood at the moment of the interview, this might affect the researcher's impression of him) and some other biases. Again the important thing is to be aware of these limitations to avoid unwarranted conclusions.

Related to how the data was collected is the question of the instruments used in the study. The common criteria to use are; validity and reliability. Therefore the question to ask is; are the instruments valid and reliable?. An instrument is valid if it measures what it is intended to measure and reliable if similar results are obtained in different occasions. For example, the principals' reports of students complains could be used to measure bullying in Japanese high schools but this reports might not be valid because there are some students that certainly don't go to the principal's office whenever they are molested by others. Again, even biased data can be informative but an student learning to think critically should know the biases in order not to be unduly persuaded by the findings.

3. 1. 2. About the Robustness of the Conclusions.

So far, the questions an student should ask, have been focused on how well evidence supports factual claims. The purpose has been to avoid general statements based on insufficient evidence or low quality data; that is, rash generalizations. But even if generalizations are compatible with good evidence, there is still more to inquire, specially if the use of the evidence is for discovering causes.

A frequent difficulty in using empirical evidence to prove that something causes something else is the problem of rival hypothesis. Is there any rival hypothesis that could explain the results?. Of course, this question might be answered only by those who are familiar with the topic. However, it has been shown that there are

some common errors that create rival hypotheses. To put these frequent mistakes in questions, the critical thinking student could ask:

1) Is the researcher finding what he wants to find?. At first, this might seem a very strange question to ask but the fact of the matter is that unfortunately there is a very strong tendency of researchers to look into the data that best suits their hypothesis sometimes even ignoring the evidence that don't support their ideas. A case in point is illustrated by Linus Pauling, a novel prize-winner, who persisted in his belief that massive doses of vitamin C were a cure-all for everything from the common cold to cancer long after contradictory evidence had been obtained.

2) Are the subjects of this research inclined to please the researcher?. Another strange question but just as scientists have expectations about the results so the subjects have certain expectations about how are they supposed to act the project; in other words, sometimes subjects want to please the during researcher by answering what he is expecting.

3) On what basis is the researcher interpreting an statistical correlation as cause and effect?. Every researcher knows that a correlation between two factors don't necessarily imply a causal relation because many other unknown factors can be linked to the results of a given experiment but again, if the researcher is interested in showing that his new teaching method is more effective than the old one, he is prone to forget it and to claim a causal relationship. If we are interested in the red color, we will certainly find many red things all over.

4) Is there any regression effects on the data?. This kind of rival hypothesis refers to the chance fluctuations that appear in many human phenomena. i.e. mood fluctuations. If someone is very depressed today, it is likely that tomorrow he will be less depressed. The same happens with performance fluctuations; after long vacations students forget many of the things they learned but some weeks later, they remember much of what has been forgotten.

3. 2. Reasoning.

Good evidence is important to support a claim, theory or statement. But good evidence is usually not enough; good reasoning is also required. And the fact of the matter is that people in general and researchers in particular make many reasoning mistakes, sometimes consciously and many others unconsciously. Or to say it in Sutherland's words, "There are many inherent defects in the way people think". Let's review some of the most common reasoning errors for the students to be aware of:

1) Is there any Ad-hoc clauses in the conclusion? If someone has a conclusion that is threatened by any inconvenient fact which it is incapable of explaining, he should abandon the conclusion and find another one that could explain the new fact; that would be the correct way to proceed. However, it is frequently the case that people prefer to add an ad-hoc clause to still keep their original conclusion, but this move is not always acceptable because adding several ad-hoc clauses will certainly undermine the power of the conclusion. For example, a politician who during his campaign claimed that his economic policies would benefit the people and later finds out that studies show exactly opposite effects. He might be tempted to claim that this is so because the good effects of his policies will be seen only after several years; which is probably, an ad-hoc clause.

2) Is there any 'black and white' conclusion?. This kind of thinking consists in classifying every particular case of a given topic as an example of one of two extremes when in fact there is a range of possibilities in the middle. It is the kind of conclusion exemplified by the expression: 'If you are not with me, you are against me' which most of the time is a false dichotomy.

3) Is there any emotional language in the conclusion? Often arguments are made to arouse emotions of the reader or listener and in this way try to convince him instead of doing it with conclusions based on good reasons. For example, those who support anti-abortion policies might say that the others are 'brutal killers'.

4) Is there any 'research has shown that...' expression in the conclusion? This kind of expression is typically used to persuade the reader or listener that what the writer or speaker is saying can be supported by empirical evidence gathered by former scientific research. However some times this can be deceptive. A student learning to be a critical thinker should not accept this kind of expressions unless the writer or speaker gives enough information about such a research.

5) Is there appeal to authority in the conclusion? This is perhaps one of the most prevalent mistakes that students make while reading or listening someone else arguments; to accept statements as true simply because an authority in the field has claimed that they are true. The thing to remember here is that experts also make mistakes just as anybody else. And that we should believe an expert's statement because he has shown knowledge and good reasons to believe him not just because he is an expert.

6) Is there any appeal to consensus in the conclusion? This is also a common move of persuaders; to say that something is true simply because there is a general agreement that something is true. Statements are true or false depending on whether or not they match with how the world is or was; truth doesn't depend of how many people believe it or not.

There are many other critical questions to be learned and used by students in the classroom and hopefully in their everyday life, but to make this paper short, I will stop here and leave the rest of the paper for some comments about the classroom environment which is more suitable for the fostering of the students' critical thinking; I am sure the reader already has a feeling of what is the spirit of the basic questions approach.

4. 0. The Classroom Environment.

Another way of understanding what the proponents of critical thinking in the schools and in universities have in mind, is to notice the difference between the following two pedagogical paradigms: 1. The purpose of education is to teach students the finished end products of science in order for them to learn solutions or 2. The purpose of education is to teach students the methods of inquiry which allow them to investigate the cognitive problems by themselves.

In other words, paraphrasing the old Chinese saying; 'To give students a fish or teaching them fishing'. Those who support the first approach would usually take for granted the following statements:

The purpose of education is the transmission of knowledge from teachers to students.

Knowledge is information produced by science and as such it is unchangeable, unambiguous and unequivocal.

Textbooks contain knowledge in disciplines that are mutually exclusive and together are exhaustive of the world to be known.

The best way for students to acquire knowledge is by absorbing information; the more information they acquire the best educated they become.

The authority of teachers is unquestionable because they know and students don't.

In contrast, the proponents of fostering critical thinking will support statements like these:

The purpose of education is the achievement of understanding and good judgment by students with the guide of the teacher.

Knowledge, as a result of scientific activity, is dynamic, changeable and sometimes ambiguous and equivocal.

Knowledge is everywhere not only in textbooks and disciplines usually overlap when considering complex problems.

The best way for students to learn in the classroom is by developing their critical and creative thinking in a teacher-guided community of inquiry.

Teachers are fallible and because of this, they are not authoritative but flexible and willing to accept their errors. Furthermore teachers recognize the importance of the students' own knowledges as stepping stones for new learnings.

From the above sketch of the two pedagogical paradigms, it should be clear that the proponents of fostering critical thinking want a classroom environment in which students have an active role in the process of learning. Thus, while in the first paradigm teachers lecture and do most of the talking and sometimes ask questions for students to answer; in the second paradigm, students and teachers deliberate intensively, question each other, build on one another's ideas, challenge one another to supply reasons for opinions, assist each other in drawing inferences from what has been said and seek to identify one another's assumptions. In short, the fostering of critical thinking in the classroom is the outcome of the works of communities of inquiry in which the critical spirit of the students finds a proper soil to grow.

A Second Hypothetical Class.

Scenario: A classroom in a given university. First day of class in the course on Cognitive Development. All students are already seated when the professor enters and takes a long look at the students without saying a word. Slowly the students stop talking until silence is all over; everybody seems to be expecting 'the air to move'.

Professor: 'Can machines think?'

All of the students look at each other, probably thinking, what is this?; is this a way to start a course?; is

this a trick?; what is he trying to do?. But after several long minutes, someone raises her hand.

Professor: 'Yes, go ahead, take the floor!'

Student A: 'I believe that machines cannot think and will never do! Only humans can think!'. Some students move their head in sign of approval.

Professor: 'Can you please tell us why you think so?'

Student A: 'Uhhh, because machines are machines and humans are humans!'. Another student at the back anxiously moves his hand and says:

Student B: 'It is obvious that machines are machines and humans are humans, but just saying that, it doesn't sound like a reason!. In my opinion, some machines like computers can think because they can solve mathematical problems, formulas, theorems and so on. And given that thinking is required to solve problems, it follows that some machines, as computers, can think. Furthermore, I read the other day that Japanese scientists are working in the design of a big computer that will think like a real human, it will be called The Brain'.

Student C: 'Well, but that is exactly the problem! No matter how advanced a computer can be, it will always be designed and programmed by a human being and because of this, they will never do something different. Therefore I believe that computers will never think like us'.

Student D: 'I don't agree because some computers can be programmed at the beginning but afterwards they do program themselves; they are called 'expert systems'. I believe it is the same with humans; when we are born our brain is blank and it gets first programmed by our parents who teach us a given language and ways of thinking about all sorts of things. Later on, teachers also program our brain to think, our friends also do it and so on until we die'.

Student E: 'Yes, she is right!. Computers can think but can they think creatively?'

Student B: 'What do you mean?'

Student E: 'Well, I wonder if computers can solve problems in a novel and surprising way'.

Student F: 'Yes, they can!. My father plays chess with a computer and the computer makes its moves in different ways all the time. He says that the computer has an instruction to act on the basis of a random number choice and in this way, its chess moves are unpredictable, surprising and some times very creative. It often beats my father'.

Professor: 'Okay, students! Let's forget about computers for today. After all, they are only a bunch of plastic and wires. But how about animals? Animals are made of meat, just as we are. For example, can dogs think?'

Student C: 'Well, my dog Fido thinks because he can understand almost everything I say to him. All I have to do is training him'.

Student A: 'Again, the same problem. I think that animals like computers can recognize signals in order to answer them but that is not thinking'.

Student B: 'But if you say that computers and animals can recognize signals and answer to them, that is what I call thinking!. If you don't agree, then you have to define what thinking is'.

Professor: 'Okay, okay, It seems like we are now right in the point in which we need to define thinking, don't we?'

Student C: 'Yes, It will help if first we find out what thinking is. Although it is very strange to realize that everybody thinks and yet, everybody seems to have a different idea of what thinking is! That is weird!'

Professor: 'Well, that is exactly what this class is all about! In this course about cognitive development, we are going to be engaged in a series of group dialogs (organized discussions) about thinking from a number of disciplines as diverse as Philosophy, Psychology, Anthropology, Neuro-physiology, Linguistics and Artificial Intelligence. Our aim will be to reach a better understanding of what thinking is and in the process, I hope, we will also learn how to improve our own thinking. Are you ready to start? I am going to give you another problem for you to think and bring some ideas next class, okay? This is the problem:

Suppose that Sato has been in Kyoto and in Tokyo, and I ask him to think about Tokyo. He closes his eyes and visualizes the Kamo river just as he saw it flowing through the city. Well, the problem is that the Kamo river flows through Kyoto, not Tokyo. Therefore, we could say: 'Sato thinks he is thinking about Tokyo but actually he is thinking about Kyoto'. Why can we say so? Think about it and bring some arguments for the next class. See you, and good luck!'

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- 1 A visiting scholar at the Research Center for Higher Education of Kyoto University under a grant from the Japan Foundation, 1997.
- 2 The Critical Thinking Movement originated in U.S. and England during the 70's and gained momentum in the 80's. Some Latin American and African countries have joined the movement as well as some Asian countries like Taiwan and Singapore.
- 3 The following arguments should be considered as a synthesis of various authors ideas rather than quotations of a single scholar.
- 4 As usual, when an interesting idea permeates the educational field many teachers and professors get excited but don't know what to do and how do to do it. The purpose of this paper is to make a contribution

in that sense.

- 5 M. Lipman makes a very interesting relationship between rationalism and knowledge and reasonableness and wisdom.
- 6 The basic questions approached is based on a proposal by Browne and Keeley, but other alternatives are due to R. Feuerstein, M. Lipman, D. Perkins.
- 7 As a matter of fact, the four communication abilities are fostered with this approach, namely: reading, writing, speaking and listening.
- 8 This is what R. Paul calls “The weak-sense critical thinking”. That is, using critical thinking to defend our own ideas.
- 9 Although the following questions assume the collection of quantitative data, they are also applicable to the collection of qualitative information. In other words, qualitative research doesn't mean the collection of data in a flabby, amorphous, arbitrary and unstructured way.