

Critical Thinking

How critical thinking and argumentation could help in the discussion part of the course CT10A7000 Green IT and Sustainable Computing?

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INTRODUCTION

Critical thinking refers to a large range of intellectual skills including Analyzing, Assessing, Defining, Evaluating, Identifying, Interpreting, Reasoning and Synthesizing. In brief, It is the ability to gather and assess information in a logical, balanced and reflective way to reach conclusion that are justified by reasoned arguments based on the available evidence [1]. Critical thinking is a key skill to have and to develop. It is a valuable skill in all disciplines and professions.

We live in the exciting age where information on any topics is widely and easily accessible, and available on a large scale. It is crucial to be able to evaluate this information and not just to believe what is being said or is being written. Also, it is crucial to be able to think for yourself, think independently when you are confronted with all this information. So you should ask yourself what the facts are, what the evidences are in what is being said or is being written.

At the same time, we are faced with perhaps the most challenging global issues we have ever been faced, including Bio-diversity, Global health, Infectious diseases, Poverty, Urbanization, Growing population, Food security, Water, Energy and Climate change. These global challenges are the perfect setting to practice and understand critical thinking. Indeed, these challenges are complex, often dealing with questions where evidences might be contradictories or incomplete; often dealing with questions where there is no correct, right or wrong answer.

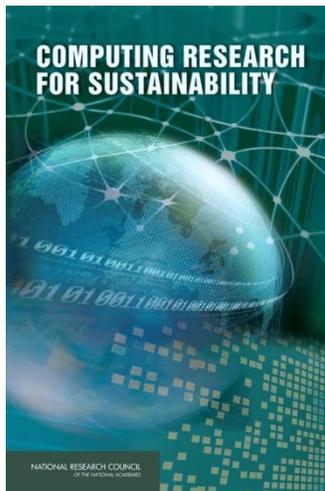
Lappeenranta University of Technology (FI) propose, under the supervision of professor Jari Porras, one course entitled Green IT and Sustainable Computing. The subject is covered through books and scientific articles, following by discussion on different subtopic including IT wastes management, Scarce resources, Carbon footprint, Internet influence, Globalization effects, Modern lifestyle, Home automation and Internet of Things (IoT).

The aim of this paper is to summarize how critical thinking could help in the discussion part of Green IT and Sustainable Computing course. The first part explains the study method setting up for this course, the second part introduces the critical thinking concept and the third part deal with the benefits bring by critical thinking. The outcome will be to understand why critical thinking should to be used in such discussion.

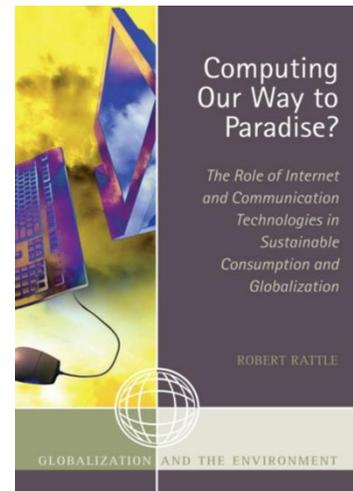
CT10A7000 GREEN IT AND SUSTAINABLE COMPUTING

Green IT and Sustainable Computing [2] is a course proposed at Lappeenranta University of Technologies (LUT), in Finland. This course is driven by Jari Porras, professor of Computer Science at LUT. You can validate 4 ECTS (European Credit Transfer and Accumulation System) for your studies.

The study method set up for this course include an individual preparation and seminars days. The individual preparation consists of reading books – basically two books – about Green IT and Sustainable computing. During the section first semester 2014, we studied two books:



Computing research for sustainability, by I. Millett & L. Estrin (Editors) 2012.



Computing Our Way to Paradise?, by Robert Rattle. 2010.

The seminars days consist of discussions, debates and analysis on subtopic introduced in the books. One student prepares a 10-15min presentation of one chapter, then students exchange their point of views during 30-45min. The professor can guide the discussion and help students to ask themselves questions.

Think about our behavior, discuss about global challenges or analyze the impacts of Information and Communication Technologies (ICTs), while students are almost born with, are difficult tasks and need to be approached with some specific skills. Critical thinking and argumentation introduced in the second part are a good way to improve the debates and encourage further consideration of these different topics.

CRITICAL THINKING

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”[3]. In short, critical thinking is a "disciplined thinking that is clear, rational, open-minded, and informed by evidence"[4]. So, critical thinking is that mode of thinking - about any subject, content or problem - in which the thinker improves the quality of his or her thinking by skillfully interpret information gathered.

Everyone thinks; it is our nature to do so. But much of our thinking, left to itself, is biased, distorted, partial, uninformed or down-right prejudiced. Yet the quality of our life and that of what we do, produce, or create depends precisely on the quality of our thought. Shoddy thinking is costly, both in money and in quality of life. However, a good thinking is a solid base to pushing forward an idea and improves our vision of things.

As a result, a well cultivated critical thinker raises important questions and problems, formulating them clearly and precisely, and gathering and assessing relevant information to reach well-reasoned conclusions and solutions [5]. Also, he is able to communicate effectively with others thinks open mindedly to have different point of views and overcome our native egocentrism and socio-centrism.

Critical thinking is accessible by anyone if we are able to be look further than our egocentrism. When we make a list of arguments in favor of, or against a specific subject, we realize an exercise that falls under critical thinking. If professors teach students to construct and analyze arguments, broadly conceived, they teach students to think critically. Somehow, “critical thinking is argumentative thinking” [6].

In the context of a discussion on a specific topic or subtopics, critical thinking raises the level of the whole debate. Moreover, global issues such as Green IT and Sustainable computing give the perfect setting to practice recognizing and evaluating facts, ideas, opinions and arguments. The following part deals with the potential benefits bring by critical thinking in the course Green IT and Sustainable computing propose at LUT.

CRITICAL THINKING FOR CT10A7000 COURSE

Green IT and Sustainable course aims to understand and to discuss about divers' global topics such as Climate change, Scarce resources or Energy waste, and the place of ICTs through Internet, Smart building or Smart grid. These wide topics are already subjects to many policy debates, scientific researches and common discussions. Consequently, and mainly by the way of Internet and television, students facing a whole stack of numbers, arguments, point of views, clichés and stereotypes.

Students must have their own opinion. "They [students] must have the courage of their convictions. They must discipline themselves, concentrate on the problem, [and] organize their thoughts [...]" [7]. Debates help students to develop courage by requiring them to take a position and defend it against the opposition. "In debate, students [...] will come under attack, and they might be tempted to push the panic button, beat a disorderly retreat, and avoid the confrontation." [7].

Critical thinking must be practiced to be well understood and learned, as many other skills. Green IT and Sustainable course give the opportunity for a broad exchange of experiences from all around the world. From the perspective of learning by doing concept [8], students have the possibility to discuss, explain and argue about their knowledge on sustainability. With critical thinking, "students develop confidence in their materials and passion for their advocacy." [7].

"Critical thinking also benefits others [students] [...]" [9]. In fact, critical thinking rises up the level of the discussions during seminars days. When a student starts talking about a topic with a critical thought, he is able to take into consideration effects on him, the people around him and the world, in the short term and long term. Hence, critical thinking can improve discussion in the seminar part of the course CT10A7000 Green IT and Sustainable Computing.

In the context of exchange students and Erasmus Mundus Mater, critical thinking in debate and presentation times develops social maturity. "The nature of communication and argumentation demands that to be effective, debaters consider the implications of culture, values, and worldview on their approach" [7]. This year, France, Finland, Russia, Spain, Malaysia and Peru were represented. Critical thinking can help to understand and to take into consideration all the different students' point of views in this course.

This analyze is not exhaustive but it give a clear understanding of the capacity for critical thinking to give a new dimension for the discussions in the course CT10A7000 Green IT and Sustainable Computing. Global challenges are our future: the approach, discussions, debates and education around them are crucial because students interested will have to find new solutions and will work to implement them. Critical thinking will bring students open-mindedness for a global view of our world.

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