

How Case Studies Methodology embeds with continuity within the millennial Teaching Learning Paradigm

Some reflections In opportunity of the Plenary Session of **WACRA** Congress at Buenos Aires – Argentina, July 6th 2004 and motivated by its main subject: **“Cases as a Component of a Person’s Research”**, presented by:

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Perhaps CS Methodology for Teaching/Learning and to be more audacious for Research when dealing with extremely complex systems as those derived from economy and social sciences could be envisaged as a scientific way to understand and to manage them. Let’s see briefly how Humans have from ancient times faced problems and found their corresponding solutions.

1. Analytically, by using mathematics and logic, getting the “truth, only the truth but the truth”;
2. By numerical computation, approaching to the “truth” as much as possible” throughout convergent processes;
3. Statistically, within the realm of “probabilities”, approaching to a “probabilistic truth” as much as possible;
4. Heuristically, via behavior models and quantitative techniques proper of “systems simulation”, approaching also to a vague and less rigorous “probabilistic truth” as much as possible;
5. “Guessing”, by using new logical mathematical and statistical tools, such as “fuzzy logic”, “artificial neural networks”, Expert Systems, and Chaos Theory”, approaching to a weak, vague and far from rigorous “estimated truth”, as much as possible.

We may assign to each one of these 5 types of solutions, or approaches to, typical types of applications and/or scenarios where they apply as follows:

1. Mathematics and Geometry, Physics (“hard physics”, like for instance., Optics, Mechanics);
2. Engineering, Physics (not so hard physics, like for instance. electricity, electronics), Chemical Reactions;
3. Medicine (Physiological Cycles), Economy (“hard Economy” like the hypothetical scenarios of certain “Economic Laws”), Social Sciences (its “hardest” applications), Thermodynamics and “soft” branches of Physics like Quantum Mechanics;
4. Behavioral Systems, Medicine (Patients and Group of Patients), Business scenarios, Political Sciences, Social Sciences;
5. “Soft” Behavioral Systems, High Complexity Systems in Political, Economical and Sociological scenarios, extremely soft branches of physics like Cosmo genesis.

K Realm versus K' Realm

Note: see Juan Chamero's WSEAS paper ["Towards a New Knowledge Management Paradigm"](#)

We may appreciate that as we go deep leveling upstream, disciplines are less and less precise, softer, and their respective scenarios increasing their degree of complexity. However, as we as humans want to make everything understandable, the real world "as it is" and as we keep track of the best comprehension of it in Knowledge Bases we also need a Knowledge Paradigm that depicts it properly.

We define the K Realm as the one where the formal Human Knowledge is hosted and functions that also could be mentioned as the Establishment Realm. Focusing to the Digitalized Knowledge, K Realm could be imagined as hosted in the Web and it is actually represented by nearly 8,000 million of "pages". From this Virtual Library, the "Authorities" core or the Human Knowledge could be "mapped" pointing to nearly 500,000 documents. Facing and continuously "matching" this realm we have the K' Realm, defined by the Knowledge and Opinions of people connected to the Web, actually nearly 500 million persons.

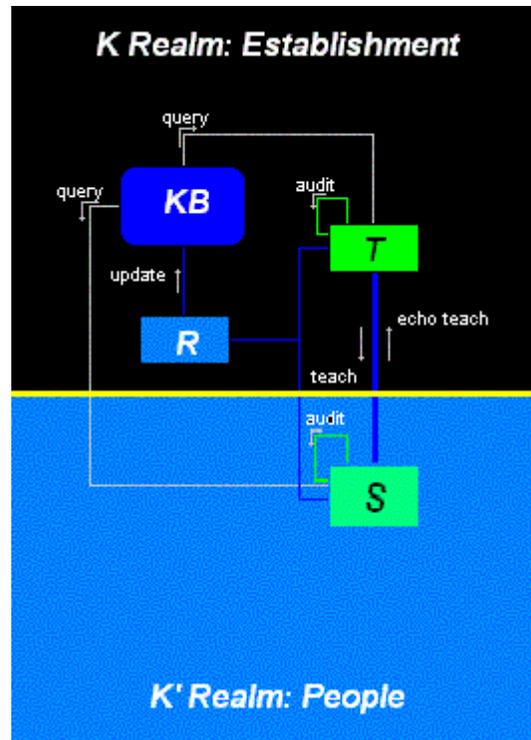
Between K and K' we may imagine a kind of "intellectual e-membrane" that ideally enables the free and spontaneous transfer of information and knowledge between both sides. In this new paradigm "Teachers" are supposed to be in the K Realm when they are in the role of "teaching" meanwhile they could also be in the K' Realm when they are in the role of "learning". On the contrary, people who "learn" meanwhile in the role of "Students" are by de facto in the K' Realm.

In the K Realm we may imagine all the formal knowledge, and the "established" truths, even though the decreed truths, laws, programs, curricula, syllabus, regulations, codes, catalogs, consensual agreements, etc. In the K' Realm is hosted the people's knowledge "as it is", as it looks like, as it behaves at any moment instead. Objects like for instance formal equations $1 + 1 = 2$ reside in the K Realm. The same happens with the approved/consensual solutions under the form of statistics and the entire scientific infrastructure. Ambiguities, personal opinions, individual knowledge, and all the instant "situations" belong to the K' Realm instead.

This paradigm is based on a set of conjectures (that are now in the process of testing in our AI/Lab) such as people in the K' Realm speak and even "think" different from actors in the K Realm. One of these conjectures states that at any moment the "best global approach to the Truth" is in the K' Realm, but probably disperse, sometimes highly diluted, and polluted by noise and ambiguities. As this knowledge is generally "hidden", extremely difficult to perceive and frequently misused by groups of interest, we the People, have arrived to a milestone consensus: that a certain "democratic K" should rule our knowledge as humans. The real thing is that K and K' are continuously matching between them and they could arrive to an ideal state that maximize the human knowledge eternally and evolutionary.

One important fact is that as long as human activities (human activities always "act" in K') are more and more complex K' volume grows exponentially and their K interpretation weakens. Before trying to introduce some tools to manage the human knowledge under this paradigm let's try to see what are the roles of Teaching, Learning and of Research.

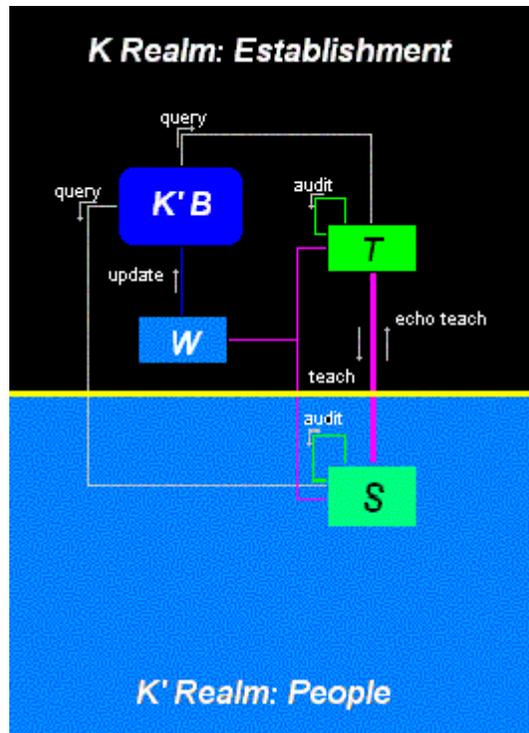
The orthodoxy sustains that Teaching is a formal procedure that resides in the K Realm. Teaching is performed in schools, and in educational institutions, following well defined curricula and syllabus. Concerning the digitalized knowledge Teaching is performed from Educational Websites and Portals to the portion of Cyberspace where People are connected to it. It is a Broadcasting process, a sort of "intelli-out" process, a transfer of information, knowledge, and mastering, unidirectional from Teachers to Students. Ideally we may imagine that T which Stands for Teachers, nurture its operative knowledge from a KB Knowledge Base and then it is individually transformed before being transferred to S which stands for Students as it is depicted in the figure below.



Teaching messages are generally under the form of “lectures”, formal classes. This procedure is millennial and has proved to work well enough. From time to time the Establishment, represented in the K Realm, furnishes scientific outcomes to update the KB through a continuous research (R), which means a continuous search of new truths and/or better truths than existent. That works fine!. The educational science has made significant progresses by auditing continuously both, T and S processes, in a way that from S proceeds a better teaching for T and from T proceeds a better learning for S. This audit may also be extended to R, Research process.

This orthodox process has however some limitations: the exponential complexity of K' processes add so much noise and ambiguity that the teaching-learning cycle could collapse. Let's go back now to the beginning of our reasoning. We were limited by the power of level 5 methodologies and tools when facing systems of high complexity.

What to do then?. Well I've heard in the mentioned Congress of WACRA held in Buenos Aires, Argentina (paradoxically in a “lecture” of a member of its Top Academic Committee) that some “orthodox” educators when referring to the Case Studies Methodology that its application -in cases of high complexity- is better than nothing. Of course there is a quota of nihilism in this expression but perhaps it is in essence an honest comment. It is like trying to understand something of complexity level 2 applying techniques of level 1 and of level 5 applying techniques of level 4, or as it is perhaps the case trying to understand a system of level 5+ using a reasonable sound but not even sufficiently tested new methodology. That is really better than to do nothing!. Take a look to the figure below that try to depict the Case Studies Methodology.



That is the way the relation among T, S and W which stands for *Case Writing* know-how. Well to establish an interesting analogy W should be similar to R. For WACRA people W occupies the same place as R and they sustain that in complex scenarios, like we may find in levels 6 and up whether existent, to write a sound Case Story is equivalent to make some kind of “feasible research”, some *intellectual approach* to a given situation in order to provide students throughout T, specially trained teachers (in Cases Methodology transmission) a practical tool to make “reasonable” sound decisions, without pretending scientific status. Well that’s really better than doing nothing!. All the W cases nurture a library that contributes to enrich the K’B that means the knowledge of K’ Realm hosted in K Realm. Now we are going to intent to go a little further.

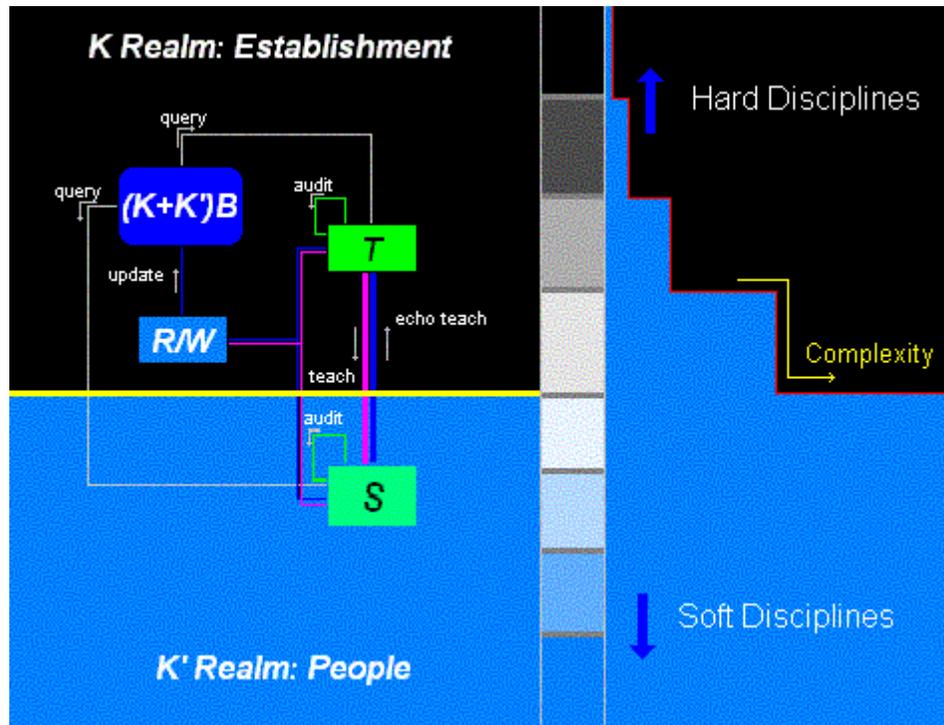
Systems of High Complexity need to be understood, at least better than before. If this high complexity were represented by a huge set of interrelated variables [x1, x2, x3,x1000,.....] we as humans could intent to detect and classify them in a reduced set of meaningful clusters and to focus our attention in some subsets of them considered a priori “strategically crucial”, trying to extract relations that help humans to take decisions, for instance something like this:

When x23 goes up x104 goes down and at the same time x17 remains constant along all possible values of x23 and x104.

Well that’s better than nothing and why not to baptize it as a “trait” of the system under certain circumstances?. Why not to present behaviors like these as case stories?. What happens is that even the most complex systems in despite of its overwhelming complexity have predictable behaviors most of times. We used to say that those systems have some “behavior patterns” that even though we as observers can not know why are they manifested, they manifested!. Some times we even dear to bet that those behaviors are predictable!. Facing the absence of scientific tools it is a sound approach.

Do we need a better approach to the reality?

Concerning systems of high complexity yes we need it. I think that we are in the beginning of the knowledge of the K' Realm and that disciplines like Case Studies should be considered a probed intellectual approach to unveil the behavior of systems of high complexity. Case Studies could be considered as a new approach to cope with systems close to the human being, to the different forms of human intellect, the softer the closer. We imagined the actual state of this art as it is depicted in the figure below



In the left part it is depicted how could co-exist and co-operate orthodox and by cases methodologies nurturing a common $(K + K')$ B Knowledge Base via conventional (R) and non conventional (W) research. At right I intended to show the gradual distinction of the pair ["softness", complexity] applied to human disciplines. Case Studies methodology could be successfully used in very complex and soft disciplines close to the not yet well known aspects of the human being and of its organizations, close to the world of preferences, emotions, intuition, perceptiveness, well a big deal of our lives!. I'm firmly convinced that some behaviors will be predictable and that many outcomes will be "computable matter" but It will only be another shell of an infinite onion: for each shell tame our intellect tames will perceive many new!.

Bibliography and Case Studies Resources

Case Studies in Science and Technology

1. [BDO Programme](#), from Digital Opportunity. Case studies to help give decision makers a clear understanding of how civil society is actually using ICT, information and communications technologies. Around 20 organizations in South Asia, Southern Africa and Central America are profiled, most of them Oneworld partners. Their activities vary from offering wireless communication equipment to tribal nomads and teaching slum children how to use a computer, to training NGOs how to build a website and online broadcasting of radio programs.

2. [Mental Health Case Studies](#), Comprehensive Mental Health Insurance Benefits: Case Studies by U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration Center for Mental Health Services Office of Managed Care.

3. [Case Studies in Mathematics](#), by BCCS the Boston College Case Studies Project. A project supported by FIPSE the [Fund for the Improvement of Post-Secondary Education](#), administered by the [United States Department of Education](#).

4. [Case Studies in Archaeo Physics](#). Shallow Subsurface Geophysical Survey

5. [Case Studies in Mathematical Modeling](#), by the Faculty of Applied Science, University of British Columbia, Canada. It is a 150 Engineering Case Studies Library.

6. [Methodology for Case Studies of Organizational Change](#), by the Educational Technology Laboratory of the University of Delaware. The OECD/CERI ICT Program, ICT and the Quality of Learning, was initiated in 1998 with three major areas: (1) educational software quality in the classroom, (2) public-private ICT partnerships for the marketplace, and (3) research and evaluation of the impact of ICT on schooling and learning. The case studies of organizational impacts proposed here are one major component of Area 3.

7. [Case Studies in Economy](#), The Economics centre of the Learning and Teaching Support Network (LTSN) is one of a network of 24 centers, hosted by universities and colleges across the UK, that promote high quality learning, teaching and assessment practices within their higher education (HE) subject communities.

8. [European Case Clearing House](#), a Catalog of Case Studies for Management Education. It details more than 14,000 items, including case studies, teaching notes and videos. The European Case Clearing House (ECCH) is the largest single source of management case studies in the world. Run by academics for academics.

9. [National Center for Case Studies Teaching in Science](#), from the University at Buffalo. Concerning the latest uses they say: Case studies are stories with an educational message. They have been used as parables and cautionary tales for centuries, yet their formal use in the science classroom is recent. So recent, in fact, that until the early 1990s the case studies literature in science was virtually non-existent. Until that time, faculty had neither taught with cases, written cases, nor seen one. This only began to change as more and more faculty realized the inadequacies of the lecture method and began to seek novel methods of instruction.

Miscellanea

1. [Brief Overview of the Case Studies](#), a RAND Publication dealing with two main types of cases: international collaborations and regional SDI cases (Regional Spatial Data Infrastructure (SDI) Case studies).

2. [Sustainable Living Case Studies](#), from Earthlink.net, by the Mission of Movement for Beloved Community.

3. [Scientific study of Prayer](#). Interest in studying the effects of intercessory prayer has resurfaced since the publication of a landmark study by Randolph Byrd in 1988, which used rigorous scientific methodology. Since then, many other studies have been funded by government agencies at prestigious universities and medical centers ([Krucoff et al., 2001](#); [Kwang et al., 2001](#); [Sicher et al., 1998](#)). Medical acceptance of prayer has grown since studies present their data within the parameters defined by science, but others call it "voodoo science" ([Hales, 2003](#); [National Public Radio, 2003](#)).

4. [Case Studies in Leadership Ethic and Command Central](#), from Air War College, Air University, Maxwell-Gunter AFB, United States. .
5. [Case Studies and Teaching Notes ON HUMAN RESOURCES/INDUSTRIAL RELATIONS](#), from International Labor Organization.
6. [Business Case in Business](#), by businesscases.org, a subsidiary of Limelight Publishing.

Some Literature

Case Studies Basics

1. [Case Studies in Science: A Novel Method of Science Education](#), by Clyde Freeman Herreid. You may find here the basics: Case Studies as a Teaching Technique, How to Write a Case, How to Teach a Case, Pluses and Minuses of The Case Method.
2. [Style Guide for Case and Teaching Notes](#), from HEC Montreal, Canada.
3. [Guide Lines for Writing Teaching Notes](#), from HEC Montreal, Canada.

Articles and Case Studies by Clyde Freeman Herreid

- [Case Studies in Science: A Novel Method of Science Education](#)
- [What is a Case? Bringing to Science Education the Established Teaching Tool of Law and Medicine](#)
- [What Makes a Good Case? Some Basic Rules of Good Storytelling Help Teachers Generate Student Excitement in the Classroom](#)
- [Sorting Potatoes for Miss Bonner: Bringing Order to Case Study Methodology Through a Classification Scheme](#)
- [The Maiden and the Witch: The Crippling Undergraduate Experience](#)
- [Saint Anthony and the Chicken Poop: An Essay on the Power of Storytelling in the Teaching of Science](#)
- [Cooking With Betty Crocker: A Recipe for Case Writing](#)
- [The Way of Flesh: The Art of Writing Readable Cases](#)
- [And All That Jazz: An Essay Extolling the Virtues of Writing Case Teaching Notes](#)
- [Return to Mars: How Not to Teach a Case Study](#)
- [Don't! What Not to Do When Teaching Cases](#)
- [Structured Controversy: A Case Study Strategy](#)
- [Jigsaw: A Case Study Technique Where Students Become Experts](#)
- [The Bee and the Groundhog: Lessons in Cooperative Learning](#)
- [I Never Knew Joe Paterno: An Essay on Teamwork and Love](#)
- [When Justice Peeks: Evaluating Students in Case Study Teaching](#)

Other Case Method Articles

- [Case Studies Across a Science Curriculum](#) by Joseph Bieron and Frank Dinan, Department of Chemistry and Biochemistry, Canisius College in Buffalo, NY.
- [Using Posters in Case Studies: The Scientific Poster as a Teaching Tool](#) by Charles R. Fournier, Mary Bisson and Christopher A. Loretz, Department of Biological Sciences, University at Buffalo.
- [Case-Stimulated Learning within Endocrine Physiology Lectures: An Approach Applicable to Other Disciplines](#) by Marian R. Walters in *Advances in Physiology Education* (AJP: Advan 1999 276: S74-S78).
- [Problems: A Key Factor in PBL](#) by Barbara Duch, Center for Learning Effectiveness, University of Delaware.
- [Problem-Based Learning in Biology with 20 Case Examples](#) and [Critical Thinking in Biology: Case Problems](#), a Guide for Instructors, by Peter Ommundsen.
- [Problem-Based Learning, Especially in the Context of Large Classes](#) from McMaster University's Department of Chemical Engineering, Canada.

- [Problem-Based Learning: A Paradigm Shift or a Passing Fad?](#) by Gwendie Camp, Ph.D., The University of Texas Medical Branch.
- [What We Know About Cooperative Learning at the College Level](#) by David and Roger Johnson.
- [Peer Ratings in Cooperative Learning Teams](#) by Deborah B. Kaufman, Richard M. Felder, Hugh Fuller, North Carolina State University.
- [Commonly Asked Questions about Teaching Collaborative Activities](#) from the Penn State Teacher II: Learning to Teach; Teaching to Learn.
[Exploring Cases On-line with Virtual Environments](#): Article by B. Lindeman, et al., Curry School of Education, University of Virginia.
[Cooperative Learning in Technical Courses](#) by Richard Felder, Department of Chemical Engineering, North Carolina State University, and Rebecca Brent, School of Education, East Carolina University.
- [Using a Formal Collaborative Learning Paradigm for Veterinary Medical Education](#) by W. R. Klemm from the Department of Veterinary Anatomy & Public Health, Texas A&M University, published in the [Journal of Veterinary Medical Education](#), Volume 21, Number 1.

Institutional

1. [WACRA](#), the World Association for Case Method Research and Application
2. [Publications of WACRA](#), a full collection of Case Studies Abstracts provided by the Rensselaer at Hartford Institute.
3. [WACRA Europe](#)

Knowledge Management Related References

1. [Towards a New Digitalized Knowledge Paradigm](#), by Juan Chamero, published in [Scipool.com](#) in English and in [RedCientifica.com](#) in Spanish. A brief of this paper was also published in the [WSEAS TRANSACTIONS ON COMPUTER](#), Issue 5, Volume 3, November 2004, ISSN 1109-2750.
2. [Necessary Skills and Preventions you have to take when dealing with High Tech Projects that breaks Establishments Rules](#), from Juan Chamero, Alejandro de Montmollin and Cristina Velez, AI-Lab from CAECE University from Argentina and Intag Intelligent Agents Internet Corp, presented at the [WACRA](#) Twenty First International Conference, July 2004, Buenos Aires, Argentina.
3. [El Futuro del Ciberespacio: El Espacio Web y la Noosfera](#), by Juan Chamero, by [RedCientifica.com](#).
4. [The "Noosphere" in the Web Space](#), by Juan Chamero, Intelligent Agents Internet Corp.