

THE CASE METHOD REVISITED

TOWARDS AND AN INTERDISCIPLINARY APPROACH TO TEACHING AND LEARNING PROCESSES IN THE AGRONOMIC SCIENCES

(Workshop 5)

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ABSTRACT

Although Argentina is one of the main agricultural producing countries in the world, turmoil seems to be endemic in its rural sector. Competitiveness has undergone a tough test in the past years, resisting, without subsidies of any kind, global crisis as well as domestic ones. The sector has not been immune to the successive global threats posed by the Mexican and Asian crisis of the past years. At present, it is trudging through the worst recession in a decade partly caused by Brazil's devaluation which affects agricultural trade. Within this framework of global and local uncertainty, the sector demands from the university a new profile of agronomists. These professionals need to make interdisciplinary connections in order to have more effective interventions to satisfy both internal and external needs. Professionals need to have the knowledge, skills, and attitudes required to foster a sustainable agriculture and rural development. Some of the professional practices may require alliances made *ad intra* the sector, and with the different actors of the productive system. These changes and needs pose major issues to agricultural colleges. In the developing countries, universities are mainly overwhelmed by the iron dilemma of either adopting a productivist perspective to help the rural sector raise the standards of living, or hoisting the environment protectionist flag. The Agricultural College of the University of Buenos Aires (FAUBA) decided to "break the horns of the dilemma" by reconciling both perspectives and choosing a middle way between short term economic imperatives, and a long term environmental protection. In doing so, the FAUBA decided to reform the curriculum of the agronomy program. The curriculum re-structuring was based on three main cross-concepts: **systemic thinking**, **interdisciplinarity**, and **sustainability**, which posed different challenges to the actors involved in it. The faculty had to undergo both epistemological and pedagogical shifts from a positivist view of isolated sciences to an interdisciplinary and even transdisciplinary approach; from teacher-centered actions to student-focused activities, and team-teaching experiences. Thus, in 1998 a **teaching training course** was conducted by an interdisciplinary team of instructors to provide tools for implementing interdisciplinary methodologies. The objective of this paper is three-folded: (a) to present the adaptation made to the Case Methodology as a tool for training teachers in interdisciplinary university methods, (b) to reflect on the teachers' production and beliefs as a result of the teaching training course, and (c) to appraise the impact of the methodology on their teaching activities.

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INTRODUCTION

Although Argentina is one of the main agricultural producing countries in the world, turmoil seems to be endemic in its rural sector. Competitiveness has undergone a tough test in the past years, resisting, without subsidies of any kind, global crisis as well as domestic ones. The sector has not been immune to the successive global threats posed by the Mexican and Asian crisis of the past years. At present, it is trudging through the worst recession in a decade partly caused by Brazil's devaluation which affects agricultural trade. But, apart from external threats, domestic policies designed to exert controls have contributed to these unfavorable conditions. Agricultural product prices have plummeted, unfavorable tax provisions and market prices, and the lack of readily available credit helped worsen the agricultural panorama. The turmoil has spawned a wave of protests, often taking the form of road-blocks and marches. Besides, in Argentina, like in most of the developing countries, farming systems have evolved in different directions showing heterogeneous farming practices. In some areas, there are some patches of intensive farming practices oriented to productivism and, on the other hand, within the same area, there are farming systems that could be considered environmentally friendly.

Within this framework of global and local uncertainty, and heterogeneity, the sector demands from the university a new profile of agronomists. These professionals need to make interdisciplinary connections in order to have more effective interventions to satisfy both internal and external needs. Professionals need to have the knowledge, skills, and attitudes required for a sustainable agricultural and rural development. If a new, productive model is to be installed transcending the local and regional levels, there must be a constant interaction among the different actors. Some of the professional practices may require alliances *ad intra* the sector, and with the different actors of the productive scenario.

Society requires agricultural higher institutions develop a balanced personal and professional development, which may generate practices **both** productive and sustainable. Agronomists should be able to work in interdisciplinary teams and integrate perspectives to approach different situations. They should contribute to diminish unemployment levels, participate in innovative networks with government agencies and private companies, and adapt scientific and technological developments to practical uses.

These changes and needs pose major issues to agricultural colleges. In general, universities in developing countries are overwhelmed by the iron dilemma of either adopting a productivist perspective to help the rural sector raise the standards of living, or hoisting the environment protectionist flag, while encapsulating themselves in an ivory tower.

The Agronomy College of the University of Buenos Aires (FAUBA) decided to "break the horns of the dilemma" by reconciling both perspectives and choosing a middle way between short term economic imperatives, and a long term environmental protection.

In 1995, the FAUBA decided to start a process of a participatory curriculum development. This process involved a complex combination of both institutional and social demands. But not only did the curriculum re-structuring attempt to respond to the

rural scenario , it also tried to address to the extraordinary impact of the change of paradigms in the agronomic and pedagogical sciences.

One decision was to shorten the agronomy program (from 12 to 9 semesters) based on the premise that the training of a “generalist” agronomist is utopic, and that the grade must emphasize more on life-long learning skills than on contents that may soon become obsolete. This was a hard decision to make, since the FAUBA is an institution which has the prestige of training well-rounded generalists, and a strong research tradition deeply rooted in basic research. Although it has been concerned by intensive, high-input production techniques ; this concern has not brought about a systematic way of coping with these problems. More than a gradual change, re-structuring needed a gigantic, qualitative leap.

After a participative, bottom-up process of identifying main internal and external actors, and demands, the college was able to design a new professional profile for the agronomy program. Agronomists should be qualified not only to grasp academic, technical, and practical principles to fit in the new scenario; they should also be aware of the environmental, ecological, and ethical issues; and of the sustainability of the agronomic practices. They should be flexible, proactive, able to construct and “deconstruct” agricultural approaches in a context of local, national, and global uncertainty.

The curriculum re-structuring was based on three main cross-concepts: **systemic thinking, interdisciplinarity, and sustainability**. They all represented a challenge to the actors involved in the process. The shift of the scientific paradigm from a positivist view of isolated sciences to an interdisciplinary -even transdisciplinary- approach, where science is conceived within a constructivist approach, was better said than done. Traditionally, curriculum designs have been based on a high-input intensive agricultural production model, structured into discrete disciplines which tend to focus on large-scale agricultural production systems. As a consequence, the curriculum change implied a new organization of knowledge.

However, this was not only a matter of epistemological debate. Disciplines do not only represent a variety of epistemological approaches. They are mainly organizational entities – departments- with vested interests to protect. Faculty are even rewarded with incentives for discipline-focused research. So the curriculum re-structuring had a direct appeal to the faculty, not only in the epistemological aspects, but also in the political and pedagogical views. Thus, a **teaching training course** was started in 1998 to provide tools for implementing interdisciplinary methodologies in the new curriculum. There was a curriculum “space”-the interdisciplinary workshops (1 to 4)- which was the core of the three principles already mentioned.

Workshop 1 (first term, first year of the program) was a real challenge for implementing the new curriculum.

It is difficult to attempt interdisciplinary approaches in the first courses of a pre-grade program because they require disciplinary competence. Interdisciplinarity should be integrated with disciplinary-focused courses, or else it may represent a haven for low quality work.

Workshop 1 was in the initial stage of the program. The case methodology was chosen as a teaching strategy, since it is halfway between the academic discourse and real life.

With each successive Workshop, the degree of complexity would be expanded to reach full interdisciplinarity, and even transdisciplinarity. A course was organized to train teachers for conducting Workshop 1 with the Case Methodology.

The Case Methodology has been profusely used in post-graduate courses and in extension training activities (Pérez de Carolis 1971, Christensen and Hansen 1987, Ewing 1990, Farina 1997). It mainly consists of dealing with a case taken from real life and solving a question or conflictive situations. Anyhow, it has not been exploited fully in pre-graduate programs, where it has sometimes been used only for illustrating theory, or as a problem-solving technique. The FAUBA decided to adapt this methodology to early confront students with professional skills, and help them develop interdisciplinary approaches, and systemic thinking.

The objective of this paper is three-folded: (a) to present the adaptation made to the Case Methodology as a tool for training teachers in interdisciplinary university methods, (b) to reflect on the teachers' production and beliefs as a result of the teaching training course, and (c) to appraise the impact of the methodology on their teaching activities .

MATERIALS AND METHODS

The Teacher Training Course Overview

The teacher training course was carried out at the FAUBA, in October 1998. We implemented a team-teaching approach, working as an interdisciplinary team of three instructors -a sociologist, an agronomist, and a pedagogical adviser. The course had a duration of 50 hours. Forty teachers, from different departments and disciplines, attended the course. Teachers worked individually and in small groups. There were seven operative groups. The objective of the training program was to learn this methodology as an alternative method which may prove useful for bringing the profile of the agronomist closer to the initial stages of the program of studies.

The case methodology was presented as a **heuristic**, and potentially **interdisciplinary** methodology, which enhances development of student skills in (a) problem detection and solving, (b) evaluation of complex situations, (c) coping with uncertainty, (d) autonomous work, (e) life-long learning, and (f) inter-personal relationships.

The methodology is based on a case taken from reality, captured in one critical stage and written in a narrative, and attractive way.

Case Types: According to extension, cases may be:

- (a) A simple one-page *vignette* stating the conflict, which may be used in a couple of teaching sessions, within a discipline.
- (b) Of intermediate length- two or three pages that may be worked through in 3-5 sessions - which sometimes require an interdisciplinary approach.
- (c) Full, complex, and interdisciplinary cases that could be dealt with in a couple of months, such as "The Fruits of the Green Revolution" (Banchemo *et al*, 1999).

Case Structure: The case materials comprise the case itself – the body or case "*corpus*"- and two main individual and group assignments.

The individual work is a written assignment which has the purpose of analyzing the problem presented in the case. The idea is that students deploy their conceptual frameworks and theories in an effort to understand the case situation.

The group assignment is often an issue linked to the case but based on questions, such as, “What would you do in a similar situation if you were an agronomist?”, which encourages creativity, synthesis, synergism and group negotiation since it has to be discussed in a participative way. Groups present their productions to the rest of the class in a plenary session.

Sometimes, the case is accompanied by annexes, which include additional materials, not readily available.

Case Methodology Adaptation (Plencovich *et al*, 1998)

Teaching and Learning Sequence

The following are the main “events” of the case methodology adaptation. The Team-teaching technique is used throughout the course.

◆ **Course Rationale**

The Rationale of the course (teaching through cases) and objectives are presented to students. Some main ideas are dealt with in order that students develop an operative framework, and know the goals of the methodology.

(a) Cases imply **heuristic**, exploratory work: students have to seek for information in order to analyze it in depth, and avoid the “spoonfeeding” effect. They have to look up for subjects related to issues relevant to the case in different sources: books, journals, Internet files; or ask experts for information (experts may be members of the faculty, farmers, extensionists, etc.)

(b) Cases suppose **interdisciplinary** and **participative** work: the concepts of discipline and interdiscipline are introduced to students.

(c) Learning with cases promotes personal development, increases autonomy, fosters metacognitive strategies, helps communicate more effectively, cultivates curiosity, contributes to cope with ambiguity, and takes students closer to the profession. (Wassermann, 1993).

◆ **Pre-Test:**

A pre-test is taken to students in order to assess if contents, strategies, and skills presented along the course are really learnt in it or have previously been grasped by students through other academic activities.

◆ **Motivational Video:**

The video “The business of paradigms” (Barker, 1990)- based on Thomas Kuhn’s main concepts about paradigms- is projected in order to work on attitudes towards change.

◆ **Case Presentation:**

The Case Materials are handed in. A Gantt diagram is shown with the agenda to be developed throughout the course. The assessment system is presented and discussed.

- ◆ **Individual Assignment:**
Despite the main objective of the course is the group participation, it is essential for students to analyze, look for information, and interpret the case individually before proceeding to synthetic, participative, problem solving, group activities.
- ◆ **Lecture Series :**
A number of lectures related to the case – not more than 3 or 4 - are given by experts in different fields (researchers, professors, farmers, agronomists, etc.). They bridge the gap between expert knowledge and the conceptual frameworks that students must activate.
After the lecture, students may ask the experts questions about the problems presented in the case .
- ◆ **Small group activities:**
After the lectures, students discuss in small groups issues raised by the experts. Topics may require hypothesis formulation, dilemma reconciling, group negotiation, limiting factor identification, etc. Students are assigned to small groups of 5-6 members. The value of the strategy of breaking very large classes (100 or more students) into small groups has been dealt with extensively in the literature (e.g. Davis 1993, Thorley and Gregory 1994). Small groups give students the opportunity to learn from each other and become more involved in their own process of learning (Eisen, 1998).
- ◆ **Participation in group activities:**
Group participation is followed up through self-evaluation, peer evaluation, and teacher evaluation.
- ◆ **Plenary discussion and debate:**
After small group work, each group presents its conclusions to the class.
- ◆ **Tutorship:**
Students may consult the teaching team in office hours previously arranged.
- ◆ **Progress Report:**
It is a self-evaluation report through which students analyze their own pace, difficulties, etc. in solving the individual assignment. The objective is to help students develop metacognitive strategies. In a simple form, students state (a) the level of work accomplished so far, (b) their main difficulties, and (c) sources used to get information (correct quoting is needed).
It is submitted for correction before handing in the individual assignment. Teachers may arrange some tutorship sessions according to students' needs.
- ◆ **Some tools are presented:**
Some tools for participatory and systemic diagnosis of agronomic situations are presented by the teaching team.
- ◆ **The individual assignment is submitted for correction:**
Students hand in their individual work. After having corrected the assignments, teachers clear out mistakes, answer questions, show their own perspectives, and make general comments about the case.

It is important for the students to have a full understanding of the case before they proceed to group activities. They must have a common conceptual platform in order to have a fertile interaction.

◆ **The Group Assignment activities are initiated:**

Students are assigned to a group of 5-6 members, and all groups are given the same assignment for an oral presentation, which has to be delivered to the whole class by the end of the course.

Students interact in group activities in which they have to develop negotiation, and other interactive skills. They have to play the role of agronomists who are confronted with a conflictive situation associated to the case. This situation requires organization of group activities, decision making, professional thinking, etc. After 2-3 weeks of intensive activities during which they consult teachers, experts, etc., they make their presentations. They may use any materials. Teachers monitor the quality of the presentation. Students hand in a guideline which must be approved before the presentation.

◆ **Oral Presentation of the group assignment in a plenary session:**

The different groups present their approaches to the issue. After the presentations, students discuss classwide the different views. There is not a single, unique answer to the controversial situation. The teaching team leads the discussion around the issue. Experienced agronomists may be invited to make some comments about how they would have solved the problem. Strong emphasis is put on integration and interdisciplinary approaches.

◆ **Post Test:**

Students are given the same test taken at the beginning of the course to assess learning progress.

◆ **Evaluation System:**

Students are assessed through individual and oral assignments, and other activities in a continuous way through teacher, self, and peer evaluation.

The course and the teacher performance are also assessed through different instruments.

Teachers were instructed about the adaptation of the case methodology on a “hands-on” approach. They learned about the methodology while experiencing it themselves as “students”. In this way, they were able to reflect on their own insight about the method. During the course, the different groups had to write a case which could be used in their actual teaching. They had to negotiate contents, objectives, etc. as teachers were from different chairs and departments. At the end of the course the groups presented their production to the whole class. Instructors monitored the quality of the cases.

RESULTS AND DISCUSSION

At the training course, teachers had to develop cases dealing with the agronomic sciences, which could be potentially used in their disciplines. They had to integrate in the case the different disciplines represented in the group. By the end of the course they produced seven agronomic cases according to the guidelines given by the instructors. The cases presented can be summarized as follows:

CASE NAME	CHAIRS	SUBJECT
The mysterious case of the strangled seedlings	Forest Production, Edaphology, Ecology, Fertilizers	Diagnosis in a forestry nursery
Productive alternatives for land recovery in the central valley of Tarija	Forages, Forestry production systems, Analytical Chemistry	Ecological and productive deterioration in the central valley of Tarija due to anthropic causes.
Country or Production?	Floriculture, Horticulture, Plant Pathology, Industrial Crops, Chemistry	Diagnosis and proposals of a horticultural operative center
"...and not a single flower".	Milk Industry-Fruticulture-Botany	Kiwi production
" If the integrated pest control advances, the cotton " <i>picudo</i> " will have no chances"	Therapeutics, Zoology, Floriculture	Management alternatives having a low environmental impact to prevent and control pests in the cotton crop.
Nitrogen fertilization of wheat under two tillage systems	Plant Production, Fertilizers, Organic Chemistry	Nitrogen fertilization (diagnosis) in no till systems in the Undulating Pampa
An integrated proposal to increase profitability on a farm located west of the Buenos Aires Province	Beef Cattle - Forages-Agrarian Legislation	Low profitability in a ranch (breeding and fattening)

Cases were written out according to the given structure, and were accompanied by a pedagogical "*dossier*", where teachers stated objectives, target groups, the system and instruments of evaluation, and a calendar of activities. Teachers mainly used the cases as a complement for their courses, not as a full length, unique teaching technique. They had to negotiate the focus discipline around which all the others would be displayed. Epistemologically, they involved systemic approaches and some interdisciplinary perspectives.

Teachers perceptions about the adaptation and suitability of the methodology:

- ◆ Thirty-nine teachers out of forty believed that they would use the methodology the following year in inter - departmental activities.
- ◆ All teachers stated that the course had "opened their minds" and had taken them from a teacher-centered paradigm to a student-focused one.
- ◆ Teachers thought that team-teaching itself might demand too many work sessions previous to the actual teaching to students. They said that interdisciplinary work would find themselves working two jobs simultaneously - one in their department, and the other in the interdisciplinary course.
- ◆ Teachers felt that the course had encouraged them to be more open to join talents and opportunities for mutual growth and exchange.
- ◆ Interdisciplinarity cases were thought to be limited in scope at the first years of the program, commensurate with the students' scientific background which might result in a synthetic approach of the program more than in an interdisciplinary one.

According to teachers, highly competent proficiency in a single discipline is the only acceptable ground for interdisciplinary success.

Teachers beliefs and opinions also suggest that the faculty envisage interdisciplinarity as a spiral process, that has to start early in the program of studies. This would bring the professional profile closer to the initial years of studies and students would have to play the role of professionals. They think that the case methodology presented was a good way to encourage interdisciplinarity. Some teachers suggested the inclusion of field trips in the instructional design as a way to start confronting theory with real world from the start.

Twelve teachers attending the teaching training course in 1998, took part in the carrying out of Workshop 1 in 1999. Six of them will remain two years in the teaching-team and will coach six new teachers to work as instructors in the new team teaching groups.

CONCLUSION

To cross disciplinary boundaries and question prevailing paradigms of intellectual thought is a real challenge. Faculty require a culture that encourages interdisciplinary dialogue which may result in fertile learning and teaching programs. This may even take faculty to interdisciplinary research which should not be thought detrimental of conventional discipline boundaries. The challenge becomes allowing for a restructuring of colleges to reflect a systemic, interdisciplinary, re-organization of knowledge.

In view of the results stemming from this training course, the following actions may be recommended:

- (a) In order to implement the case methodology as a tool for an interdisciplinary approach to agronomic sciences, teachers must be trained in a hands-on course, in which they should experiment interdisciplinary work.
- (b) Training must also take them to participate in discussion on pedagogical paradigm shift concerning teaching evaluation, teachers' and students' roles, etc. The training course should not be devoted exclusively to learning a teaching routine. It should take participants to be alert for dogmatism and closed-mindedness.
- (c) Teachers should work in teams during the training period and throughout the actual implementation of the methodology.
- (d) Teaching teams should write their own cases, tailored to their students' needs and characteristics. Cases should cover a few topics rather than merely touch on many.
- (e) Teachers' experiences in interdisciplinary activities should be discussed in department and inter-department activities.
- (f) There should be a special faculty publication giving accounts about innovative interdisciplinary activities.
- (g) Colleges must encourage interdisciplinary activities and reward teachers participating in them with incentives.

The case methodology is only a step, a small, but very concrete step - towards the ambitious aim: to contribute to develop professional agronomists suited to their time.

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