An approximation to a genealogical perspective of curriculum

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Abstract
Genealogical analysis about a high education curriculum is shown. A historical Foucauldian (1979) glance supports the data collection about the curriculum experiences in the Geology Major from the University of Guerrero, México over 20 years. The curriculum re-design in that situation was done against the curriculum orthodoxy, curriculum processes always were originated by professors, the orthodox procedures were ignored. However, students’ formation had good results. Critical curriculum (De Alba, 1991, 2007; Pinar, 2000 and 2011, 2017) allowed me to identify and to register as well as to characterize those artisan processes for the continuous modification of contents. The research over this experience helped to create an intermediate level theory: the conceptual and scientific didactical structure through a methodology of the grounded theory (Strauss y Corbin, 2002).

Keywords: Genealogy; Critical curriculum; High education

Introduction
Usually, curriculum designing is done from a linear perspective, that is, activities for curriculum designing only consider the here and now, these hardly ever take into account the curriculum history. The history of a particular curriculum determines the curriculum functioning at the present. However, the design tasks of the curriculum are constrained to give hurried responses to current social demands, especially economic demands. These demands come from the production sector and its demands depend on market forces. The kind of re-design that is usually carried out has been recognized as an instrumental curriculum (Autio, 2017, p. 1).

The curriculum redesign does not consider school and its curriculum as a social being, thus it doesn't either consider the individual that is educated by the school and that curriculum. The way in which professors have carried out the curriculum application, how students have learned and what results they have reached, the problems that the school has dealt with, they are circumstances that must be researched and documented. The changes that have been made to curriculum contents, objectives, activities, and methodologies must be registered at the same time they are carried out. Unfortunately, the curriculum history isn't considered during the curriculum design. The times elapsed between each curriculum design and institutional administrative urgency carry curriculum changes hurriedly and decontextualized.

The methodological topology that combines the present, horizontality, with the intellectual history of past, verticality, is one of the keys to overcoming the
presentist understanding that we experience now and which the methodologies of mainstream empirical social sciences support in their preference of survey over theory (Autio, 2017, p. 4).

This paper expresses a reflection about a genealogical approach to a curriculum, and how it allowed me to construct a theoretical approximation.

I was a curriculum evaluator from 1985 until 2012 in a high education institution in Mexico. That experience allowed me to observe how the curriculum designing practices were carried out.

Curriculum evaluation in that institution took many years because there was a lot of tension between professors. Notwithstanding this, the curriculum results over time allowed graduates to finish successfully and they could be hired. Then I had this question: Why were graduates successful if the curriculum had not been modified in several years?

I supposed the curriculum was modified daily according to the circumstances of each professor, class and time. So, I defined as the research objective to identify the practices to make changes in the curriculum.

I registered the school tensions and I analyzed them later. The findings that I made became the way to a grounded theory (Strauss & Corbin, 2002, p. 21). That theory was named Didactic Scientific Conceptual Structure. At the same time, I took the Foucauldian genealogical theory as a general theory (Sauto, et al., 2005, p. 34) to underpin the interpretation of social reality. The articulation of both theories is discussed in this text.

A theoretical perspective

About The Genealogy

I understand the genealogy as a Foucauldian theory but also as a methodology to read into history. Michel Foucault proposes his theory about genealogy in the second part of his academic life.

Michel Foucault, in his book Nietzsche, genealogy, history (1971) provides us with the necessary ad hoc pretext to analyze a concrete practice: genealogy, understood as a historical reflection which turns to the past in search of the untold, the discontinuities and ruptures, based on identifying the conditions of emergence and precedence of an event, it makes possible to identify the happenings thanks to which it has arisen (1979, pp. 11-12).

The precedence -says Foucault-…. means to perceive accidents, the tiniest deviations- or on the opposite the full returns- the errors, the failure in appreciation, the bad calculations which have produced that which exists and it’s valid…; it means to discover that the truth and being are not at all in the root of what we know and what we are, but rather in the exteriority of accident… (1979, p. 13).

The permanent confrontation and the respective alliances can be understood as emergence, as… “the point of emergence [of the formative project and its central ideas, always in motion]… the singular law of appearance… the staging of the forces; it’s their irruption, it’s rather this scene in which are distributed ones in front of the others, ones over the others: it’s the space that allocates them and opens up in front of them, the void through which threats and words are exchanged” (Foucault, 1979, p.16).
About the curriculum

There are three models of curriculum design (Escudero, 1999, pp. 99-119): technical-type curriculum, practical and deliberative curriculum and critical and postmodern curriculum. I have built a critical perspective. This document conceptualizes the ways of doing the curriculum in Mexican higher education. From a theoretical-methodological framework of a qualitative nature, with a theoretical positioning from the logic of articulation (Laclau & Mouffe, 1988), the discourses about the curriculum are recognized as an object of study. Our methodological perspective recovers genealogically the common places of the processes of curricular change, that is to say, the curriculum forms, the curricular speeches and the tensions that position them. The tensions in these discourses are stated: the tendency of the evaluating State, the absence of a formative project in the social imaginary, the neglect of educational contents and the abandonment of teachers by the educational political system (Angulo, 2017).

The genealogical recuperation is combined with Pinar’s idea about complicated conversation (Pinar, 2017), in this case, the conversation is made about the relationship between the past of a specific curriculum and its present.

About the curriculum notion, there are three curriculum design models: technical model, practical and deliberative model and critical model (Escudero, 1999). The technical model priorities are the standardization, the efficiency, and accountability. The practical and deliberative model proposes a curriculum design based on professors' collegiate discussion. The critical model gives a response to an instrumental rationality, William Pinar points out that the mission of Currere theory is to deconstruct political conservatism and its educational replica: standardization, routinization, standardized tests, efficiency, accountability (in Zhang Hua, 2017, p. 189).

I take Alicia de Alba’s conceptualization (1991, 2007), she says that curriculum is a synthesis of cultural elements; it is also a political and educational project that requires deliberate directionality. The project is built, if and only if, tensions between groups are identified, alliances and agreements are set and the same project is recognized as a power dispositive.

Methodology

Our methodology has a qualitative character, it took both the historical and genealogical perspective and the discourse analysis in curriculum documents. The first perspective was done by the identification of the emergency surface, the tensions, and antagonisms in the relations between professors of the group that is analyzed. The second perspective was done by the reading and analyses of documents based on Foucault’s archive notion.

The collection of documents required the identification of those written between 1985 and 2005. The documents should have discussed the curricular issue of the Geology major into Earth Sciences School.

The analyses of documents were done from grounded theory by open codification (Strauss & Corbin, 2002), the conceptualizations, categories and their elements were detected based on the hypothesis: There were several curriculum practices arisen from both the teaching experience as well as the institutional circumstances.
The categories detected were: the scholar project, the artisan processes to modify the curriculum, the continuous modification of contents. These categories allowed me to construct an intermediate level theory: The conceptual, scientific and didactical structure.

**Results**

**Genealogy of a Curriculum**

The past of the higher education institute, the Academic Unity of Earth Science (Unidad Académica de las Ciencias de la Tierra, UACT) of the Autonomous University of Guerrero (Universidad Autónoma de Guerrero, UAGro) is the framework to understand this genealogy. This academic entity appeared as a result of the negotiations between the former (1981-1982) Dean Rosalio Wences Reza and the geologist Maria Fernanda Campa Uranga with the intention of catering to one of the lines of action (impact and social improvement of the university in the community) of the Project Universidad Pueblo. The project of the Geology School in the university would allow to promote the knowledge of natural resources in the state of Guerrero and it would trigger major productive activities such as the mining industry. This intention was slowed down due to the fact that in 1982 the process of neoliberalization of the country was initiated among others- the following sale and privatization of mining companies. A fact produced by this situation which shows how the intentionality of the major in geology was deterred since 1990- and even today- with several generations of graduate students, most of them work outside the state. In the decade (2003-2013) some of them were already working in the State of Guerrero due to the proliferation of transnational mining companies. This means, in a certain way, that the original intentionality of the project was sidetracked. Foucault pointed out the accident itself, the tiniest deviations and the exteriority of the accident (1979).

The UACT was born based on three main ideas- which today would be categorized as generic competencies- formation of general geologists, field experts and discipline for research. The three lines should be developed by means of binding teaching and investigation, all the teachers should have grants for projects and get students involved in them; all of them would improve by pursuing postgraduate degrees, and along with the students they would give and take class in the field (with fewer classes in a classroom) and they would publish their findings in a shared authorship. The dream remained alive for a long time, but it provoked among lecturers a series of split-ups in diverse groups that initially strove to study postgraduate school abroad and later on strove for divergent formative projects. These splits have gone on since 1985 and have meant the composition and recomposition of groups in antagonistic positions. Confrontations and alliances can be understood as emergence (Foucault, 1979). These confrontations are the ones that somehow, have acted as an engine for growth giving a boost to diverse projects, whether they’re academic, political or formative. One of them was the evaluation of curriculum project.

From practice to theory or how curricular orthodoxy did not work

In 1987 the Regional School of Earth Science (now UACT) of the Autonomous University of Guerrero planned to do an assessment of the
curriculum for the major in geology, which had been in progress for a year and a half, considering that its first graduate class would be the one of 1990. The appreciation then, now I know that it was a naive one, was: there is enough time to prepare the curricular assessment. They appealed then to the schemes of technical type (Escudero, 1999) in order to create a scheme of their own –please notice here- their concern came from a procedural perspective, therefore, the result was a work scheme: assessment of the performance of the study plan (including the programs), assessment and monitoring of graduates (though there weren’t any at the time), diagnose of professional practices of geology, socioeconomic diagnose of the work field of the geologist and assessment of the teaching-learning processes.

When the proposal was presented to the teachers’ board, there were some vague indications, the two principal ones: this can’t be done until the first generation of students finishes and it must be done according to the school project. The assessment of curriculum was done until the time period between 2003 and 2005. The “new” study plan was published -and legitimized by the University Council- until 2007. The previous plan was in effect for 22 years.

Throughout the time the curricular practice described above was active, the criteria for assessment was modified, on several occasions, to finally after 22 years, create a “new” study plan. What happened? What concrete events and conditions fostered this long process?

Certain beliefs about the curricula shattered (Mansilla & Beltrán, 2013), more specifically the ideas about having to wait for the first generation of students to assess the curriculum or, the fact that the methodologies for the assessment, design, and redesign of the curriculum could be applied “firmly”. In this aspect, the conviction of having to create ad hoc strategies for each curricular practice arose. The first question was: What´s the basis to create them? In search of it, they appealed to theory, considering it as a tool for the questioning and understanding of reality, as Foucault says,

Understanding theory as a toolbox means: - that it is not a matter of building a system but an instrument, a logic that is specific to power relations and the struggles that are committed around them; - that this search can only be done little by little, based on a reflection (necessarily historical in some of its dimensions) about given situations (Foucault, 1985, p. 85).

The sheer number of negative responses to proceed with the curricular assessment and the following redesign found their origin in the compelling circumstances that have to be resolved in a school starting from scratch while having a clear formative project at the same time. This idea constantly reappeared in everyday situations: follow and defend the formative project. And here we have one of the essential elements for the articulation of teaching practice, research, and curricular practice: The project.

From a curricular perspective the formative project goes beyond the curriculum itself, the project is shaped first based on a conception of the man and the professional, of the school and its social role, of the teacher and his formative role, of science and its triggering function for social, productive and scientific development. The formative project is the link that brings individuals together, articulates school, academic, administrative, teaching practices, and those of social impact. The project will have to bring directionality to the curriculum. In the
situation described, the theoretical conceptualization of the formative project allowed to understand the drawbacks to be modified – in orthodox terms – in the existing curriculum. Here it was necessary to refer to Alicia De Alba’s (1991) premises about the directionality of the curriculum, this is understood as the appropriation of a political educational project about university formation.

Having understood the importance of the formative project, among the countless negative responses to do the assessment and redesign, a constant struggle of groups of interest was identified in the school. Again it was necessary to appeal to theory to explain the relationships and movements of the groups. Following Bourdieu (1997) led to understanding the social academic space as a terrain for struggle and tension in favor of accumulating academic, cultural and even economic capital whether it was personal or for group projects; based on the theory established by Laclau & Mouffe (1988) the relationships between groups were assumed to be antagonistic – and at the same time – constitutive for the formative project, this antagonism acted as the engine that took the project to its constitution and its expression was noticeable in the first graduating classes of the school. With the contribution of De Alba (1991) the dynamic of pacts and alliances between groups to move forward in the development of the project was clarified.

The dynamic previously described resulted in the apparent immobility of the curriculum. This situation led to investigating if certainly the plan and the study programs hadn’t changed (Angulo, 1993). The results were striking, the original study programs had been either substantially modified or completely changed, and some subjects had been moved to their original position in the sequences that appeared in the curriculum map. At this point the graduates had already started to succeed as field geologists, therefore, if the professors modified the curriculum in a nonsystematic way, why were the graduates succeeding in the work field? The initial hypothesis led to considering that the nonsystematic modification of the curriculum was producing positive results. This peculiar way of proceeding led to the investigation of the processes which teachers of the school were carrying out. The results allowed to detect the ways in which professors used to change the content of the programs, ways that were called artisan processes (Angulo, 2006). That name was assigned based on the premise established by Ricardo Sanchez Puentes † (1989-2010) about the artisan processes that the researcher followed, only that they were resignified considering the professor-researcher as the subject.

The artisan processes identified were combined in order to go on with a curricular practice for the redesign of the curriculum which was named Continuous modification of contents (Angulo, 2007). The conceptualization of this practice was based on the premises by Ulf P. Lundgren (1992) about the dynamic implied in the transfer of scientific, professional, social and cultural knowledge to the educational institution, which is called Representation. The conception that resulted included three moments of such dynamic: decontextualization (of reality), recontextualization (in school disciplines) and reformulation (in the classroom). These moments carry an important fragmentation of scientific knowledge and reality.

Once the processes have been identified and the continuous modification dynamic was determined, again, the curricular reformulation happened, but the
request was quite different to what any person in charge of the curriculum would have expected. The changes to the programs are already made, now let’s justify them theoretically! A difficult task, to justify a process of curricular change, it was outside of all the established canons. It was here that it was decided to formalize the investigation about a curricular process as a source for its reformulations. The orientation questions were: why are the graduates successful in the professional field if the curricular changes are not systematic? The starting hypothesis was that professors updated the curriculum correctly based on their teaching experience and their expertise as researchers in geology. This line of investigation implied a follow up on a doctoral research, and later on of a project granted by the National Council of Science and Technology (Conacyt). The fundamental finding was the predominant tendency in the way of thinking shared among professors who continuously modified the curriculum. This way, their way of thinking was expressed through academic and pedagogical discourse and historically it was constituted based on their disciplinary knowledge, which is, specialized knowledge along with their knowledge of pedagogical common sense. The conception of this situation was based on three elements of analysis. The notion of discourse established by Laclau & Mouffe (1987) and De Alba (2007), the notion of social representation according to the premises of Moscovici (1993) and Jodelet (1993), and the heuristic tool of the UV proposed by Novak and Gowin (1988).

The results of the investigation previously described allowed to generate the thesis of the Scientific Didactic Conceptual Structure (SDCS - ECCD in Spanish) (Angulo, 2003, 2007) which was conceived as a trend in thinking as well as a discourse and social representation exclusive to professors- geologist investigators. The ECCD is used by geologist professors as the criteria for the continuous updating of the contents and the modification of the curriculum.

Between 2007 and 2012, one of the groups that formed the field of forces of the institution decided to apply the thesis of the SDCS for the improvement of the teaching practice, given the recognition that students, in spite of being required in the work field, still showed a lot of deficiencies. An interdisciplinary and interinstitutional research granted by Conacyt was organized (82475) in order to inquire about the conceptual scientific structures for professors and students, among professors it was done regarding their use for the modification of contents and among students, it was done regarding their domain of the discipline. The results permitted to formulate and publish a book containing both results of the investigation as well as diverse teaching strategies to improve learning among students (Angulo, 2012).

The Conceptual Scientific and Didactical Structure

The Scientific and Didactical Conceptual Structure (SDCS) is a way of thinking, it is used as a criterion in the modification of educative contents. The SDCS is built by university professors.

The SDCS has two components: scientific knowledge and pedagogical considerations. Both components have an interrelation, and they are employed in the selection and organization of contents and their teaching.

The SDCS is a social fact produced in a particular group, it is a mental representation. “…to represent is to visualize [something] in the mind, in the
conscience" (Jodelet, 1993) through symbols or signs. Representation of SDCS works automatically, when the professor used it, he does it without thinking consciously of the structure. The professor does not recognize the structure as an organized scheme, and he does not know that he used the SDCS as selection criteria.

Theory of social representations (Moscovici & Jodelet, 1993) allows us to understand the SDCS as a theoretical model. This model evidences interrelation between scientific disciplines and pedagogy (Jodelet, 2000, p. 11), on the other hand, it assumes the possibility of an “….encounter between different ways of thinking…” (Jodelet, 2000, p. 13).

Social representations (SR) (Jodelet, 1993) are mental images about objects (a) they have sets of meanings (b) and are defined from components of representation (c). At the same time, these elements imply systems of reference (d) that allow the interpretation of reality as well as to give a sense to it (e). SR are categories (f) to classify information, they constitute theories (g) that produce a specific way to comprehend the reality (h). This specific way of comprehension allows us to socially take a stand (i). SR has a kind of social knowledge (j).

When we apply these elements of the SCDS to geology teaching or to teaching researching, we can show some examples

a. Mental images about objects, for example: a sequence of stones and its location on the Cartesian plane;

b. Meanings of geological objects are constructed through field observation. And these observations are defined from the components of the structure (SDCS);

c. Components of SDCS are the scientific knowledge of geology and the practical knowledge of pedagogy;

d. Systems of reference (SR) of geology professors derive from its field of knowledge: Nature Sciences (geology and geophysics) and Human Sciences (pedagogy) and Practical Sciences (engineering);

e. The sense of university education in geology is established for institutional purposes as theoretical and political positions of academic groups. About these positions in geology, the hegemonic vision comes from the Tectonic plates theory;

f. SR works as categories in geology.

The curriculum categories detected in researching

Next, "the content" as an analysis category is discussed. First, I did a simple concept of educational contents. I explained contents as a specialized way of knowledge over reality. Second, I worked with the representation as a process by means of which it carries through the transformation of social knowledge in the educational content. Third, I developed the artisan process conception as a series of activities carefully strung together. These activities are prepared by the professors to content modification. Fourth, I built the concept of artisan process for activities that were done in order to change contents. In the fifth place, I drew up a Methodology for contents modification which supports itself in the analysis of artisan process.
Contents

The educational contents are components of scholar discourse, that is, they are components of the current trend of thought regarding student formation. The formation of higher education always points towards a kind of professional. Therefore, the contents are chosen for this kind of professional.

I understand the contents as a "set of cultural ways and knowledge which have been chosen to be part of diverse curricular areas. These areas include discreet facts, elements of diverse nature as facts, concepts, conceptual systems, procedures and even values" (Coll, 1991, pp. 60-138).

The contents are an expression of knowledge and a way to see the reality; they are a partial and fragmented way of reality. This expression is fragmented because it only shows a part of reality, and it is partly because it only involves a quick look of reality, that is, to have only a point of view. For instance, the content "tectonic plate" shows the knowledge that exists on the reality "Earth". But it is only "a quick look of reality", the point of view of Plate Tectonics Theory, without a doubt, there are others looks over this question.

Contents are also specialized knowledge on reality because they are born in the sciences and in professional practice. A restricted language is used to conceptualize the reality. For instance, the content "stone" is specialized because it refers to the "rock", which is built scientifically.

The fragmented knowledge has double fragmentation. First, the knowledge is fragmented by the science that studies it, and second, it is fragmented by a professor that selects the knowledge among all the scientific knowledge as a consequence of what he considers is relevant for teaching. In this sense, the contents are a way of specialized knowledge of didactical expression.

The organization of contents that the professor does has a different structure from the one of science that originates them because when the professor selects and reorganizes the contents, he considers the recognition of students’ learning structure as well as the knowledge that they already have.

The didactical organization of contents considers the structure of learning. The disposition of contents requires a descendent sequence that presents first, the more general concepts, and second, the intermediate concepts and specific concepts.

In its didactical expression, the contents are organized, ranked and pointed towards educational aims.

The organization involves the distribution of the contents in periods of time, subjects and themes according to the educational aim. The organization considers answering the question: Where should the contents of the educational trajectory be?

The hierarchy gives an educational meaning to contents and it settles extension and deep levels. It answers the next questions: What is it that is useful? How long is it possible that the contents are learned? All of the educational contents entail an extension and deep level. For instance, all of the professors assume that the content "number" of elementary school is radically distinct to the content "number" of the university.

The contents focus entails to apply them to the concrete cases of the profession and it attends to the question: How can the contents be applied? For
example, the chemist’s education at the university level (educational aim) has
diverse specialization options (laboratory technician, biologist chemist,
geochemist, etc.). The organization, the hierarchy and the focus of contents vary
whatever the case may be. Inside first year the subject “general chemistry” is an
obligatory content for all of the students of every option mentioned before;
meanwhile, the geochemistry is placed towards the end of the career, that is, the
courses change in extension and depth.

Finally, the contents are knowledge selected in detriment of omitted
knowledge. In this sense, the educational contents are legitimized knowledge,
generally by an institutional political group.

The representation process

The representation process is integrated by three parts: a) taking out the
contents of context (out-contextualize); b) placing the contents in another context
(re-contextualize); and, c) recreating the contents (re-formulation).

The representation process consists of taking the social knowledge or work
context to educational context. When the social knowledge is taken to
educational context, that knowledge becomes content. For instance, the parent
knowledge of child education or, the human development of a researcher.

A. Out-contextualization involves:
1. The identification of a subject to study in a natural or social environment.
   For instance, learning and teaching process;
2. The search of knowledge concerning the subject to study in scientific
   sources;
3. Identification and analyses of scientific sources and selection of those
   sources that are considered pertinent, likewise the elimination of not
   pertinent sources. Identification, analyses, and elimination are determined
   by explicit aims of the educational process which are placed in the
   educational subject;
4. The teacher’s culture. For instance, the professors have a specific high
   education, they belong –or not- to the scientific group, they are militants –or
   not- of a political party, they have a family life, etc;
5. The background of the subject determines, in some way, the kind of
   selection-elimination of contents that the subject does. An expert
   researcher –we would suppose- is able to identify the nodal knowledge of
   the scientific area and, therefore, he does not omit any substantive element
to studying the knowledge and understanding of the matter; it would be the
contrary in a new researcher or somebody that is not specialized in the
area of knowledge. The knowledge about an object has fragmented both
cases.

The out-contextualization involves a subject who talks and thinks from
scientific discourse, has doubts about the utility of knowledge from the scientific
discipline and is concerned about making safe the understanding of the discipline
structure, the principles, the concepts, the purposes and the methods.

B. Re-contextualization entails the handling of the selected knowledge to
re-organize it in the educational context, that is, considering: the school
purposes, the curriculum structure, the importance and balance of the matters as
well as the teaching, etc. The re-contextualized knowledge necessarily is re-shaped because it changes its orientation and meaning. Now, this knowledge is in an educational and multidisciplinary context. In the re-contextualization, the knowledge is thought and spoken from the teaching discourse or, in any case, from the planning discourse. The pertinence of knowledge will be evaluated according to the previous, simultaneous or successive knowledge that a student has learned. This stage involves a second fragmentation of knowledge. This is the moment when knowledge changes its status and becomes content. I suppose that within this change is raising a transformation of epistemic nature of knowledge. This knowledge finishes its role as “interpretation of reality” and it turns into a “re-interpretation of reality” and an interpretation of knowledge.

C. Reformulation is carried out by preparing the contents for teaching. Here the knowledge is filtered by the professor’s technical ability to make a teaching device, the available time, etc. This third stage entails, as well as the fragmentation of knowledge, which is manipulated, thought and speech from the scholar’s discourse.

From the point of view of Lundgren (1991), the Representation process is placed in the Planning-Drawing up Stage of curriculum, and, according to current methodological canons, it is only made in a new revision-evaluation process of the curriculum. This conceptualization, therefore, does not cover the modifications made in periods indicated by the institutions. I have precisely named those modifications: Continuous modification or adaptation of contents. So far, the adaptation of contents is an ignored part of the representation process. I assume it as an articulation with representation process: Out-contextualization-Recontextualization-Reformulation (ORR), but it differs from those stages because the modification or adaptation is placed in a distinct moment. That is, ORR is made in the curriculum planning and revision, and it has as an outcome the curricular institutional contents. The continuous modification, in another way, is carried out daily in classroom work, without having institutional processes of curricular revision and modification; it has as the outcome the modification of institutional contents.

The articulation among ORR and the continuous adaptation is conditioned by a) scientific discipline of the researcher, for example, mathematics. b) The characteristics of researcher: (i) grade, for instance, a Ph.D. an Italian University; (ii) researcher specialization, like physics mathematical; (iii) theoretical point of view of the researcher, like didactical situations theory; (iv) The experiences in research, i.e. algebraic teaching process. c) The scholar project and its focal point; and, d) the professor is teaching experience which does the contents reformulation.

The continuous modification is configured by the interchange between knowledge and content. The selection of new knowledge and the elimination of obsolete knowledge determine continuous modification.

The continuous adaptation process is intuitive, it is not written at any place and, however, many professors carry it out. From my point of view, these professors had been successful because they are researchers and they assume a collective scholar project.
The researchers keep in contact with the most updated knowledge and this allows them to do correct modifications of contents. That’s why I consider difficult that a professor, who is not a researcher, can correctly do modifications to the contents. This activity is also influenced by a scholar project, if this has been adopted, since the scholar project is towards a kind of formation.

Finally, the contents modification is empirically carried out by the artisan processes.

**Artisan processes**

The expression “artisan processes” refers to the empirical set of skills of the teacher more than a rustic characteristic or a pejorative adjective.

The artisan processes notion is built beginning from the conception of “researcher occupation” that is proposed by Sánchez (1995). He understands the “researcher occupation” as “…the set of activities and attitudes non expressed but they are in operation, during the scientific production process…the researcher frequently carries them out without noticing these basic activities, without which the scientific activity is not possible. In this sense, plot and warping of researcher occupation point out to a kind of raw material, nonvisible. It is, for that matter, the hidden link or nervous system of numerous activities and tasks of scientific work” (Sánchez, 1993). I suppose there is a similar structure in the teacher occupation. This scholar does research and teaching, therefore he has a mixed occupation: the scholar-researcher.

The activities and attitudes that are “non expressed but are in operation” show simple operations that as a whole make complicated processes that the scholar-researcher masters and, sometimes, only he as an expert, knows

The field of empirical skills has been frequently forgotten by education researchers, they tend more to do theory than to theorize the practice. On the matter Lijnse (1995) argues that the researchers don’t touch the school world, they ignore that the scholars daily carry out activities that, if they were systematized, they would be able to constitute a valuable methodology help, additionally, the systematization of such activities will lead to the theorization mentioned. Our artisan processes talk about these activities.

The artisan processes are skills for daily modification of contents in the teaching process. The scholar very intuitively uses this skills and he elaborates ingenious answers to contextual needs as a) scientific knowledge transformation, for example in geology, when a new age is assigned to a stone and, with it, it changes the previous interpretations, then it’s necessary to incorporate new contents; b) professional demands, for example, when the tablet is introduced to teach, the universities have to introduce learning to manipulate such device; c) the needs and characteristics of learning, for example, when a group of students didn’t learn to clear mathematical formulas and it is necessary for a new course, the scholar of this course must initiate with this topic before teaching the topics of a new course.

The artisan processes are used without an order, but they are perfectly identifiable for who uses them. Since these processes have generated a solution to practice problem.
Constantly, the professors rearrange contents from their didactical experience along the way to teach a course, as well as they lean on the scientific knowledge that they are incorporating.

The professor designs a studies program or he works on a program that was assigned to him, but in both cases, he puts under test the studies program and he takes several readings of it. The scholar reformulates the studies program from these readings.

The reformulation is carried out by the confrontation between contents and classes presentations or exercises, contents and examinations results, contents and evaluations or contents and other colleagues’ programs that are similar or equal. For example, confrontation of current studies programs with previous studies programs or with classes presentations, or with learning results, book indexes, or research results.

The confrontation is usually carried out to find lack of contents in the studies program which results in the insertion of new contents. Once the professor has decided a reformulation, he organizes the contents in a list, he reviews and orders the contents in agreement with the subject objectives and with the possibilities of the school, the students and himself. The consequence of that process is the next: a. some contents have changed its place into the subject; b. some contents have been eliminated; c. some contents have been moved to other subjects; or, d. some contents have been incorporated into the subject.

The reformulation or confrontation of contents is done by interchange, reordering, elimination or incorporation. The repetition of contents or their reorientation, the identification of new contents or the obsolete contents, are the causes of confrontation or reformulation of contents. The new scientific knowledge that is learned by professor also causes the confrontation and reformulation of contents.

As a wrap-up

There are really a few conclusions to be pointed out, the first one and maybe the most important one due to its historical importance is that the modifications in the curricula should be made based on the investigation of the different expressions of the curriculum: curricular practice and the official, experienced and hidden curricula. This finds its justification in the fact that each curriculum has a different context and so it responds –as well- to different demands.

Now, the second consideration, if the curricular contexts are necessarily different and so are the contextual demands, then the binding element must be the knowledge that gives life to it, more specifically the scientific disciplines it feeds on. The knowledge they contribute with must be the guarantee to promote a university students’ formation which leads them to rigorously reflect on the world they have to live in as well as giving responses to diverse demands with responsibility.

In third place, considering the vertiginous times and their growing complexity, it’s necessary to keep the curriculum up to date, primarily in relation to scientific and technological advances, and as a consequence, in its capacity to provide social responses to social demands. For this reason, a constant element
in curriculum development must be the continuous modification of the contents and consequently, the continuous curriculum updating.

The last point to consider is that this vision about curriculum development will only be possible if the professors are cultivated on pedagogy and they are erudite of their disciplines.

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