The rhizomes, flows and intensities in the pedagogic architecture of the under-graduate “e-learning” course in chemical engineering

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Abstract

The present work intends to analyse the process of construction and implementation of an under-graduate “e-learning” course of Chemical Engineering meant for employees of a Brazilian company located at a petrochemical site. Being the first Brazilian experience of an under-graduate course in the area, it represents an opening of time-space to the up-date of the educational paradigm adopted by PUCRS VIRTUAL, the PUCRS‘ unit responsible for developing the program of “e-learning”. The mentioned paradigm is based on authors such as Deleuze and Guattari, Vygotski, Foucault and Habermas among others. The analysis of deterritorialization and reterritorialization movements produced by the process based on Deleuze and Guattari allow individuals of diverse origins and status to gain access to this virtual reality, as well as to constitute communities, and, furthermore, to socialise it in intercurrent environments. These are the flows and plateau to challenge us on a daily basis, that they are boarded in this work.

1. The scenario

The undergraduate course in Chemical Engineering with emphasis on Petrochemical Operation is a result of a partnership between the company OPP Química SA and the PUCRS (Pontifical Catholic University of Rio Grande do Sul). The main reason for the installation of such a course is to make possible the continuation of the process of professional formation of the employees of the partner company, who work in a changeable turns regimen. As these turns are not fixed, education in a traditional way is not favourable. A disrespect of this reality makes impracticable, in a certain way, the technical qualification and human development of the professionals whom are at this work situation, enormously disqualifying the human promotion and the technological condition of the company.

The experiences on Distance Education (DE), have assumed throughout this application, diversified approaches that vary from the transport and the information acquisition, to approaches centred in the learning of meanings considering a constructivist perspective (Medeiros et al., 2002). In this in case, the education, also in DE, tends to be absorbed not only as a transmission of information, but much more as a facilitation process of the exploration and creation of meanings (Deleuze and Guattari, 1992) through sharing-collaborative actions (Garrison, 1993, apud Gunawardena, 1998; Medeiros et al., 2002).

The course was projected considering basic requirements, viewing the construction of abilities, competencies and attitudes by the students associated to PUCRS proposals, as a catholic and marist entity, as well as a University that aims to reach the borders of knowledge, the critical-reflexives actions of these same borders, beyond an independent and solidary proposal for itself, for the social groups and together with the society. The petrochemical segment also takes for granted the deepening of studies related to processes and operations
used in industries of first, second and third generation of transformation of the products derived from naphtha (Medeiros et al., 2001b).

The pedagogical architecture adopted for the related course makes use of the videoconference and teleconference generation, as well as a 24 hours support by Internet facilities, being that 25% of the presence activities occur with the students in the videoconference room, according to the current Brazilian education law (Medeiros et al, 2001a). Coupled to the use of this hybrid platform, takes place the use of the WebCT (Web Course Tools), a manager and an organiser of learning environments, as well as the open use of the 0800 call free and of dialled conventional lines. The lessons recovery, either or by students presence or by distance was made possible, initially, by videocassette tapes and, currently, by CD-ROM to ones that eventually, were disabled to participate of the videoconferences or to participate of the lessons in the present modality, when these are configured. Moreover, as an opened channel is available in different timetables for advising and monitoring the students by the professors, monitors and tutors.

Considering the people for whom such course was planned, work appears in rotating schedules what prevents them from attending an undergraduate program in fixed schedules, the distance education becoming a possibility of creating spaces, an opening to the multiplicity and the unique of each student, as a part of the construction of an undergraduate course to these workers, who find in DE an education of quality directed to their needs.

The pedagogical project of this course is based on the interactivity, co-operation, cognition, methacognition and the promotion of the autonomy of the involved social actors, in a proposal centred in the learning, and reflection, adjusted by the estimated PUCRS VIRTUAL goals. The course of Chemical Engineering in the distance way, aims to take care of these principles, since the planning moment until the evaluation, managing and feedback, understood as an after-production in the process of the meaning creation.

2. The Rhizome

In our point of view, the e-learning chemical engineering under-graduation is faced as a rhizome, which connects the multiple subjectivity of the social actors (professors, students, monitors, tutors, co-ordinators, team of assessors), their productions, that pressure and modify themselves and their creators, the technological apparatus that challenge all the time these actors on their paradigmatic conceptions. The multiple and heterogeneous connections that are in permanent creation in this rhizome are evident in the interventions of its elements – either being of perceptus order, affections or cognitions. Thus, all these elements in a continuous deterritorialization and reterritorialization process defy each other constituting an unexpected metamorphosis. Therefore any point of the rhizome can be connected to any another and must be, as says Deleuze and Guattari (1995, p.15) when dealing the rhizome principles, connection and heterogeneity, also relating to the semiotics chains of all the nature which deals on states of statutes of things, in a place (or beyond them) producing events and creation processes. However, in this way, the production of one determined teacher pressures and modifies, intervening with the plan of immanence of another one, generating in it a new segmentarity, that can act in such a way for the propagation of a flow, through imitation, as also for the generating opposition of the binarization or even acting as a spring for the conjugation of flows and therefore, generating an invention. Possible new plans and connections emerge, from there keeping the rhizome in a permanent transformation. The comprehension of this course proposals is elementary, in as much as it is a generation of culture of the traditional education system for a virtual culture of learning mediated by the information and communication technologies which demands, from their different and dark side, that acts as a state of daze, that can be equalised to a movement of deterritorialization, which
process implies a coming and going, maybe perpetual, in the clear-confused coexistent search, and being therefore the founder of permanent atualizations, (Deleuze, 1988, p.343). The construction and implantation process of this course constitutes the “foundation of the founding” of the PUCRS VIRTUAL. The updating of the paradigm that operates through this installation process has allowed us to construct realities in a between-time, either facilitating the workers reinclusion in the knowledge society, as restoring processes that contemplate the production of singularities inside teachers, tutors, monitors and students to the creation of multiple spaces of learning. This notion of between-time also is extracted of Deleuze and finds in Beergson its origin when this last one affirms that between two close instants there is always a time that introduces a little of lived, and, in this direction, it is an event, not perpetual, not a time, but a devir (Deleuze, 1992, p.202). An event as such carries in an eventual carrier of new universes constellations of reference (Guattari, 1992, p.30) as much in the construction of subjectivity as in the production of virtuality fields. While a process of creation of a course is a process of singularization, auto-poiethics and that by the production of the deep difference founds the basis, the PUCRS VIRTUAL paradigm. The subjectivities constructions have been instituted from this challenge of a virtual culture creation and, on this, the learning constitution of communities. The creation of this course community of learners of Chemical Engineering pressures, ask, establishes the updating movement, by means of the difference while creation, of the PUCRS VIRTUAL itself.

3. Flows

The conception of this course as a rhizome previously showed assumes the connection of these points through intensive flows and carrying of expressive and interrogative powers in a state of permanent experimentation (Orlandi, apud Alliez, 2001, p.49). According to the guideline in the meetings of the lines moved by the flows configures alliances, constitute demands, disarranges others. It makes that something comes to the top and be put on the set as a guideline issue in the permanent beating of these intensive connections. Being thus, the course was modified by the function of the original demand of a position raised from the group of students, that posted in a public space turns to be discussed in a argumentative way; a consensus emerges as a devir, unstable, open and fluid, ready to constitute a state of the course only understood here as an event, forming a new plateau raised from an uneasiness, but soon also ready for new interventions and other possible plateau that, in time, becomes real in function of molecular demands. These molecular movements are enlarged and cross other molecular segments disturbing the rhizome in a way to modify it, inevitably, forcing its molar movement. Thus, the use of a didactic material in the course environment, on the virtual space, when it was modernised, when it is accessed by the students, and being these affected by this material in the direction (and desire) of the learning production it affects the student in a molecular chain, due to the alteration of the cognitive state, knowledge production developed by him, but also it intervenes in the sprouting of other micro chains, that has origin in his colleagues. These micro-chains pressure the rhizome and provoke a molar movement in the direction of its objective, which are the knowledge production, as a new status that must be configured to accomplish this alteration and to proceed in the continuity of the learning process, now in other platforms. This is a phenomenon that is always present in processes that aim to reach the learning. In this course, identified in the clipping, under consideration, there are at least three great plateau consisting in the movements of constitution and transformed by means of the argument.
3.1. The opening plateau

The first semester of the course was marked by the perplexity of the entrance in a new world. The involved social actors were capsize interpellated for demands which were previously non-existent and potentially/concretely invasive that had modified their routine, even if that demand has been provoked by them. The students - adults that moved away from the school banks for years - the introduction of more hours of activities in their life disorganised familiar, social and personal routines and habits generating tension. The decision to participate in a course in DE contained, in an implicit way, easy expectation that did not materialise, once the requirements to attend the five disciplines concomitantly and obligatorily were huge. Moreover, the demands that were formed of technological domain of working tools had constituted a challenge that not only deterriorilized the students (move them away from their old patterns) but also the professors. It can be spoken here of an acute and dramatical moment from which it became necessary to extract the construtivists/construcionists potentialities to make appear something new that allowed the emergency of a new plan with consistency capable to liberate itself of the problematic determination to open itself for problematic of the possibilities. By means of dialogue and argumentation, as well as the certainty of inclusion of the different, an alternative was constructed that dilated the period of development of disciplines, as well as finished with their development concurrence and strengthened the attendance of the tutors and advising of the professors. It is also important to mention, as it refers to actors/professors, on this plateau, a situation where, due to the planted experiences of the presence course allied to the opening to the unknown and new where one has never passed through, the hypertextuallity has been configured and in an incipient form, in the tracings that were showed. Moreover, the stage of the monitoring of the learning process occurred in a laborious form, what deviated to a certain extent the forces of the professors and their team, in the search for the hypertextuallity directing it to an (almost) manual processing of monitoring. As to the materials, wile they pointed to the migration of was intended in the project of the course, they did not reach the desired platforms.

3.2. The hypertextuallity plateau

From the analysis of the displayed decisions had been previously taken so that another route is undertaken in the direction of the promotion of what was understood, as being better to the groups. Then a software of management, WebCT, started to integrate the environment of the course, what has facilitated the monitoring process, but not only this, as the advising/tutorial understood as a support to the student, was widely proliferated as a view of the communication tools, such as forum and Chat, that had started to integrate the pedagogical architecture of the course. This also came to corroborate in the direction of display more time to the professors to elaborate the materials. In another dimension, the students who were participating of these environments start to act in a sharing way, which is one of the guidelines for the paradigm adopted by PUCRS VIRTUAL.

Alternatives had been created to facilitate the migration of the professors in the direction of constructing more adequate materials to the means and to the ways which were offered, consisting then in workshops where questions as virtuality, potentiality of this environment, hypertext, multimedia, and hypermedia were worked. It is important to detach that this molecular movement, while course of chemical engineering, made to occur a molar movement, while PUCRS VIRTUAL, which started to adopt in the teaching qualification courses in education in the distance, activities focused in hypertext, either under the theoretical aspect as under to the construction of such materials aiming to constitute a skill in those participants, but also passed to adopt another tracing where in its own materials this
character of hypertextuality started to draw itself in a frequent and intense way (Vargas et al., 2002).

The use of cartoons, figures, texts interconnected in hypertexts used as an agent in the learning process amidst to the videoconferences and the interventions that make use of the communication tools as chat and forum, had extended in multiplicity the constituted environment of learning, transforming it. Such mutations also reverberate obviously in the learning carried through by the students, who observe the search on the part of the professors of other platforms of quality, demonstrating a commitment with the course. Thus, feelings of belonging were stronger in the students, commitments with their learning were strengthen, what favours the knowledge production that is one of the objectives of the process. It also constitutes a dimension of this plan of learning production, the use of hypertext, which also results in constitution, the aiding to multiple intelligence, and therefore to the multiple forms of learning, in the direction as Gardner presents it, and also the easiness that the material, in this mutant format lodged in the ned, privileges the multiplicity, in the rhizomatics direction pointed by Deleuze and Guattari but also in the direction that Edgar Morin with the paradigm of the complexity points to us.

3.3. The flexibilization plateau

To accomplish the migratory movements in the search of the flexibilization that has become an emergent necessity, a deeper analysis becomes necessary, in which the sweepings field is not focused, but scrutinised in its diverse nuances and constitution. To this end, attention was not only turned toward the promoters of the learning environment but also and simultaneously to the involved agents as well as the surrounding where the process occurred. Thus, immersed in a transient process between a presental culture and a virtual one a delicate period of training of the process was lived that demanded monitoring/advising and prospecting, aiming itself to promote the success of the learning process. Although the change trend pointed signals of virtualization identified with in the relations pupil-professor, pupil-pupil, as well as pupil-technology and it was evidenced the presence of desirable and necessary dimensions for the effective remote learning by means of interactivity indicative, co-operation and autonomy, observed even in the environment as in the individuals thorough the process, the architecture presented and offered to the pupil did not contemplate spaces of freedom in the formularisation of theirs resume. At this moment the pupil followed a foreseen obligatory curricular series for the accomplishment of the course. This paradox that was presented in the practice of such course, disturbed the agreement one has of a process conducted by the paradigm of Education of the PUCRS VIRTUAL (Herrlein et al, 2001).

In the light of social-technical-political-cultural movements of the contemporaneity, such as the globalisation, the after-modernism, the dilution of borders, the deterritorialization among others boosters of today’s world of, the man of this era is seen immersed in multiple currents of thought, that constantly defy him with relation to the updating, the selection of information, the use of new technologies and the positioning before humanity. Far from distant periods where a chain gave direction to the thought of the time, today, the intricate relation between different lines of thought makes the person guess and be located in order to make more distinguished and multiple choices, receiving and integrating some sources of different origins, carrying through their own provisory and mutant synthesces. The direction of this particularity of positioning is the individual interpretation of each movement as well as the negation of another one, or same part of another one.

Then, the person is faced to a situation where knowledge and actions twist themselves, and thus, a rigid and plastered resume does not match with the reality of today’s students, which sends to him to search of a resume where flexibilizations does appear, and contemplate
the differences to promote learning. As a to-be-formed professional, one does not expect only the skills techniques, but a set of other abilities that include intuition, flexibility, creativity, capacity to work in group and preparation for permanent updating, the conditions in which the formation of this person is done and cannot be in contradiction with these goals.

In this plateau, in which we are inside, freedom spaces had been restored in three main axles: the magnifying of the number of offered disciplines, the school registration for disciplines, the implementation of modulated disciplines to attend the different rhythms and conditions of learning of the participants. While the moment, the CED (chemical engineering by distance) course has only one group, the number of disciplines was extended not only following the regular systematic of implantation of courses that foresees the edition of disciplines as the course goes on.

In general, courses at distance are presented with bigger flexibility, as a possibility of the pupils to elaborate plains of studies according to individual criteria. Moreover, the public who is part of the constitutor group of the demand of this course is a professional group that lives the contingencies of a life space differentiated of that usually constituting the population of the presental courses. The investment demanded for the opening of this course is not justified only in view of this population, but also, other public, beyond the proper constitution of a relative knowledge of the virtual dimension that also extends itself to the presental dimension. In the specific case of the CED, the implications are already felt in the curricular reorganization and the pedagogical project of the actual CE.

Thus, it was necessary that the range of the offered disciplines were extended so as to take care of recovery of the offered disciplines in which the students had not obtained approval, but magnifying the spectre of already offered disciplines in order to make possible the composition of different plans of studies. This magnifying comes on a gradual form, until completing the entire foreseen resume. Thus, it was possible to recover, modify and anticipate the learning, attending the demands and rhythms of the students.

Collaborate with this perspective, the displaying of modulated disciplines presenting them in a complete form and in modules. This display implies the description of actions, as in respect the pedagogical processes, contents, materials and plans as to the processes of learning evaluation and certification of the student. The display of modular disciplines implies on the division of the program content in independent units that can be sequential or not depending on the nature of this content. In each unit a main concept or concepts is/are privileged that justify the insertion of the content in the whole discipline. The mapping of these concepts, the conceptual map, serves on reference for the structure of the units.

Each central concept must be displayed by multiple approaches, as much in the descriptive perspective, as graphical, and numerical, if possible, historical, present in the homepage of the discipline and also in the CD-ROM. Follows this material, a series of self-correction exercises, as well as others which are monitored by the area tutors. The laboratory activities also will also be displayed in CD-ROM, even if the student must do through them presentially. The student realises the activities of evaluation at the moment he feels secure and ok to make them, and to the extend he overcoming the challenges of each stage, he passes to the next one without needing to depend on the other colleagues.

4. The intensities

The students, such as literature points us, were characterised as an adult population, that were moved away from the school spaces and that return to them in those particularities (Moore and Kingsley, 1996). In an analogous way, but not identical, the professors also met themselves in a platform crossed for the deriving perplexity of the insertion in a world in which they did not have the domain, habitual to the teaching condition, implied in the
insertion in a telematic environment of learning. These, however, operate in another flow, centred in the sizing of education for this population, guaranteed the conditions of learning and quality of the actions, interactions, processes of co-operation and necessary mediations to the instauration and updating of the zones of proximal development (Vygotsky, 1984). In the same way, these same professors are centred as students in the insertion in a virtual culture. These deterritorialization processes and construction of new territories that challenge the multiple groups in which they are inserted.

Moreover, students, monitors, tutors and professors, at the light of the challenges considered by Habermas, look for instituting in these learning communities public spaces that really privilege the speaking without coercion, since based and argued, respected the intersubjetivation processes (Habermas, 1999).

Demands of this order have a direct implication in the sensible one. Deleuze (1988, p.356) says: “Everything that goes through and appears is correlative of orders of differences: of level, temperature, pressure, potential, difference of intensity” thus, intensity is the form of differentiation as reason of the sensible one. The intensities, according to the same author, are implied, multiplicity made by anti-symmetrical elements that guide the course of the updating of ideas and determines the case the problems solutions. On this hand, the professors and the students subjectivities are moved from different perspectives, even if crossed by the same challenge that is to penetrate in a virtual universe from which learning relations are move that both interpellate. New concrete agencies are necessary as well as the injunction of new sensitivity that, by affective exploration implies to both in the fulfilling of space, initially empty, but produces new fields of possible.

The impact caused by this new configuration of relations evidently displaced all the implied ones in the process, professors, pupils, monitors, tutors, assessor group, with different intensities and investments of quanta. The learners - students - whom had not succeeded to effect new reterritorializations had finished for abandoning the course. The reasons of this abandonment had followed flows and circumscribed cartography of the specific realities of each lived, since the exit of the company to which they were tied for relative questions with the proper economic processes of a country, said in development, as ours, until the entailed questions with each familiar structure. The reterritorializations effected by the learners, either students, professors, tutors or monitors, say of the differences carried by each person, but not selfish/individual one (Deleuze, 1988, p.395) because they are subordinated of similarity criteria of the perception, in the reflection and in the judgement, but that means a state of involvement that makes the person find reasons that tie him to the experience (Medeiros et al., 2003). It is said here the “potency of wish” nominated in this way by Nietzsche, stimulated for the event that the course can become in the living of each one.

The power of affectation of the course inscribed itself in a singular way in each one involved in the process, faced by ones as part of a possible one that became real in its segmentarity. Although, in this way, what happened to the teachers implied in this process, different situations/singularities/crossings had been configured and proliferating, as infinite series that reverberate in their own constitution as in other segments, as one desire, beside for being infinite in part it does not possess control of their interventions in the different affected plans, appearing emanations that cross and modify, as many molecular extracts as molar of this rhizome.

5. Final Considerations

The process of up-dating the paradigm has allowed us to build realities in a between time, not only by facilitating the re-introduction of workers into the knowledge community, but also by making possible the building of multiple learning spaces in which the production
of singularities of teachers, tutors, monitors and students is contemplated. They are constructions of subjectivity, constituted from the challenge of the creation of a virtual culture and, within, the development of the learning communities.

The students, as we learn in literature, are pointed out as being part of the adult population, in good part distant from learning spaces, but to which tend to return depending on their specific needs. A similar phenomenon occurs with professors. Those, nevertheless, undergo a distinct flow, focused on dimensioning the teaching process to this population, once guaranteed the conditions of apprenticeship and quality of actions, interactions, cooperation processes, all necessary mediations to the establishment and up-dating of proximal development zones. The professors themselves are to be considered students at the insertion into a virtual culture. These are processes of deterritorialization and construction of new territories to challenge the multiple groups in which they are inserted.

References

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