Analysing, Sustaining and Piloting Innovation: A "ASPI" Model

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ABSTRACT
This paper proposes a framework, both theoretical and practical, that attempts to provide information and scaffolding mainly to university staff but also to policy makers who currently face the initiative of implementing innovation, in all its forms, in the education system. It aims at helping all the different actors, from university managers to university lecturers, involved in the teaching and learning process to answer the following questions: "How do I analyse, guide, and sustain innovation in Higher Education?", "What kind of information do I need at each stage of the innovation process to make decisions that serve my goals?", "How do I process the data generated?", and "How do I feed the results back into the process?"

Keywords
Sustaining and piloting innovation, Technological and pedagogical innovation, ITC

INTRODUCTION
The issues surrounding institutional innovation and sustainability in higher education are many and varied (Laurillard 2002). Many models and frameworks exist to inform the process of guiding and sustaining innovation at institutional (Savoie-Zajc, 1993; McClusky, 2001 ; Pelletier, 1994 ; Bonami & Garant, 1996 ; Charlier & Peraya, 2003 ; Peraya & Viens, 2003) and individual levels (Reigeluth & Fricks, 1999). Today, innovation is often defined as the introduction of a new Information Communication Technology (ICT) element in the learning and teaching process that brings added value to student learning. This innovation should take place in a context where components, teaching methods, students' approaches to learning, and assessment systems, are aligned (Biggs, 1999).

Higher Education in European countries is still teacher-focused, despite the fact that largely today's students do not derive motivation from the same aspects of studying as previous generations did (Lonka, 1998). A student-focused approach to teaching and learning may influence how students approach learning whereas active learning, allowing independent, autonomous planning, is thought to be typical of effective learning (Harden, 2000; Rolfe & Sanson-Fisher, 2002). Introducing educational technology leads to a rethinking of teaching and learning in higher education. However, education needs transforming with a new mindset and not merely reforming (Harden, 2000). Educators first need training on new approaches to education and then need a strong and continuous administrative and technical support, and so do students. Staff development courses become thus important in transforming teachers' ideas of learning (Laurillard, 2002; Lonka & Bolander, 2002). Next, it becomes essential that teaching, learning and technology be always monitored for high quality.

This paper proposes a framework[1], both theoretical and practical, that attempts to provide information and scaffolding mainly to university staff but also to policy makers who currently face the initiative of implementing innovation, in all its forms, in the education system. It aims at helping all the different actors, from university managers to university lecturers, involved in the teaching and learning process to answer the following questions: "How do I analyse, guide, and sustain innovation in Higher Education?", "What kind of information do I need at each stage of the innovation process to make decisions that serve my goals?", "How do I process the data generated?", and "How do I feed the results back into the process?"

To answer these questions, we have first carried out an analysis of the literature and defined basic concepts (EQUEL, SIG7, 2003-a) in order to provide the working group with a common reference framework. Indeed, given the European composition of the group, it quickly appeared that the different partners had a scientific culture and a theoretical reference framework of their own, as well as extremely different field practices. This preliminary work will have enabled us to propose a state of the art and confront the existing models in order to

1 This reference framework was designed in the context of the Special Group of Interest 7 coordinated by TECFA, and gathering the unit of educational technology (University of Geneva, CH), partners from the CELT (University of Lancaster, UK), from the Department of Learning, Informatics, Management and Ethics (Karolinska Institutet, SE).

build up our own. The reference framework was discussed and adopted by the members of the working group and made up as standardized cards provided to the whole EQUEL community. We then carried out case studies in order to gather information on the model and check if it corresponded to the reality experienced by actors on the field. From this point of view, two projects were thus analyzed in Geneva: on the one hand, the IntersTICES project whose aim is to support the implementation of online courses within the framework of the Swiss Virtual Campus program and, on the other hand, the distance learning master's degree proposed by the Faculty of Protestant Theology at the University of Geneva. Four other projects were analyzed, two in Lancaster, UK, and two in Stockholm, Sweden. A common questionnaire was used to carry out the discussions with the various actors concerned.

In this presentation, we will sketch the main aspects of the ASPI model, which rests on the analysis of three particular axes that we will try to articulate and integrate in a coherent modeling:

a) the "technopedagogical" environments and their various components; we defend the idea that building an environment which integrates technology and pedagogy amounts to developing an innovating environment and, in this sense, no technopedagogical environment can be designed outside the problematic of innovation, and thus, of a dynamics of change;
b) the temporal dimension and the dynamics of any innovation process, as well as the various development stages of such an environment, like teaching engineering, classically identifies them (Gained and Briggs, 1974; Reigeluth, 1983; Rocque and Stolovitch, 1983 or even more recently, as concerns teaching and learning network environments, Parcel up, 2002);
c) the steps pertaining to the sustainment and the piloting of innovation and, of course, the designs of innovation on which they are grounded (in particular Fullan, 1982; Guarantor, Bonamy, 1986; Savoy-Zajc, 1993; Jacquinot, Choplin, 2002).

WHAT IS INNOVATION ?

The concept of innovation is broad and can apply to differing degrees of complexity and depth. However, some general characteristics allowing to grasp its essence emerge from research on innovation as a whole. Innovation can be seen as a change, which applies to a procedure, a tool, or new costumers in order to improve a situation. This betterment can target the improvement of a product, a process (by making it more productive or easier) or else allow to reach new aims or objectives which couldn't have been approached under previous conditions.

Considered as an action, innovation is to be identified as a process much more than a product (Cros, 1996). It is « centrée sur la proposition d'introduction d'une façon volontaire d'une pratique nouvelle au sein d'un établissement scolaire en vue d'une meilleure efficacité dans la réponse à un problème perçu dans l'environnement ou en vue d'une utilisation plus efficiente des ressources 43 » (Guarant, 1996). Innovation is however close to reform in some respects, in particular in its intentionality, but also since it is « une stratégie de changement planifié44 » (Gelinas & Fortin, 1996). For these authors, the role of an external authority is fundamental in the innovation process: « Centrée sur la proposition d'implantation [insertion] par des individus d'un produit novateur provenant d'une expertise externe45 » (Gelinas & Fortin, ibidem).

As Cros (1996) indicates in his definition, innovation is however less related to society stakes than to, let's say, repairing aims, which is for instance confirmed by Le Guen: it is always about « une action intentionnelle développée pour faire face à une difficulté46 » (2002). This way of answering what seems identified as a dysfunction or possibly as a need brings back innovation to a more local context, that of the school establishment where innovation is often born, even if in some cases it can have been generated by a central organization (Guarant, op cit.). The shift operated towards local and contextual situations is even more salient in the writing of De Ketele (2002) who defines innovation as the « surgissement d'un inédit souhaitable ou possible47 », while underlining the relativity of this notion of novelty according to the context and the actors. Made more radical, this vision leads some to maintain that innovation is not transferable, but must be reinvented again and again.

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43 Translation: "centred on the proposal of deliberately introducing a new practice within a school establishment for a better effectiveness in the response to a problem perceived in the environment or for a more efficient use of resources"
44 Translation: "a strategy of planned change"
45 Translation: "Centered on the proposal of implantation [insertion] by individuals of an innovative product stemming from an external expertise"
46 Translation: "an intentional action developed to face a difficulty"
47 Translation: "sudden appearance of a desirable or possible novel entity"

We will thus retain from this brief state of the literature that innovation is a dynamic and complex process of change, which is to last. It develops between tensions and stakes related to two often antagonistic poles: the institutional and the local, each one having its objectives, its motivations and interests, culture, temporalities, and its own constraints. It is understood that, under these conditions, piloting innovation thus means controlling a complex environment. Therefore, the epistemological and methodological choices of the actors in charge of this regulation are essential. Clarifying our model also means clarifying our choices.

GENERAL ECONOMY OF THE MODEL

We will retain from this short discussion that piloting innovation requires: a) the taking into account of an object (the environment) in its complexity; b) the temporal dimension in which the project is grounded and develops ; c) finally, to be grounded on an approach in the center of which are the actors, the negotiation and the making explicit of their practices, and how they make explicit to each other theirs practices.

Within the framework of this presentation, we will develop in a more detailed way the variables[48] relative to the working environment and will only mention the two other axes.

Descriptive model of the technopedagogical environment

We will begin with the descriptive analysis of the technopedagogical "environment" which represents for us the "place", the space where innovation is grounded and develops. We thus postulate that the technopedagogical environment constitutes the innovating environment, which is the subject of piloting. Like any environment (dispositif)[49], it can be defined as an entity, a social place where interactions and co-operation occur and which has its own intentions, material and symbolic behavior and modes of interaction. The economy of an environment - its behavior - determined by the intentions, is grounded on the structured organization of its material, technological and symbolic means, which model, on the basis of their particular characteristics, the social (emotional and relational), cognitive, communicative behaviors of the subjects. (Peraya, 1999 :153).

This definition, though accounting for most of current virtual teaching and learning environments, has recently been the subject of criticism since it did not leave any room to the sustaining and piloting aproach (Jacquinot and Choplin, 2002). The importance held by the descriptive model of the environment in the ASPI model, answers, we hope, to this criticism while giving to the monitoring approach an analysis tool for the innovating environment itself. From a systemic point of view, regulation indeed requires an analysis of the various components of the environment: a modeling of this latter thus allows to identify, in the various components at the various stages of the process, the different aspects which can provide the essential data necessary to decision-making. We identified four general dimensions, four families of variables, defining the innovating environment: a) structural variables; b) “acting” variables related to actors in the environments; c) individual variables; and d) variables related to the field.

Structural variables

Systemic analysis classically proposed a hierarchy of articulated levels of analysis increasing in granularity in order to account for the complexity of the observed phenomena. The theory of innovation stemming from a systemic framework has widely referred to the three following levels of analysis: micro, meso and macro.

These levels can be allocated differently according to authors. For Jacquinot and Choplin (2002), the review of the literature describes the micro-level as referring to the motivational cognitive and emotional aspects of the actors. The meso-level would be that of the social micro, in other words, relations between actors and the standards and values of the implied collectives. The macro-level concerns the social world in which innovation is inserted. According to Viens (2003), the micro-level is that of the training system, the meso-level that of the training institution in which the innovating system is inserted, anf finally, the macro-level relates to the society level at large.

Savoie Zajc (1993), as for her, refers to units of change and identifies four levels of different size: the individual, the group, the institution and culture in its anthropological meaning.

We think that it is preferable to consider that they are three articulated levels of different granularity which can be projected on the reality observed from different points of reference according to the questions raised, the situation being analyzed, etc. It would thus rather be a methodological principle regulating the description and the observation of the studied phenomena.

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48 The definitions of the variables of the model have been completely defined by SIG7 (EQUEL, SIG7, 2003-b)

49 We translate the french word “dispositif” by “environment”, since there is no english equivalent

However, it is possible, as the various case analyses will show, to identify, for example, the following levels: ministery, governmental agencies; different (trans)national organizations & bodies; institutions; faculties; department; unit; single course or course element.

Variables related to actors

These variables concern the actors in the environment who, as already mentioned, hold a central position as, for instance, in the approach led by the IntersTICES group (Come, 2004). However, we will make here an important distinction between the variables which, on the one hand, more directly relate to the function, tasks and roles of actors, and, on the other hand, the individual variables that more directly concern the individuals actively engaged in the project. Indeed, the person can, in many cases, assume several functions and several roles. It is still necessary to specify the difference that we make between the function and the roles. The first term would constitute the strictly professional facet of the actor (what he has to do, his tasks, his specifications), and the second would rather indicate psychosocial and behavioral aspects which concern the place and the position of the actor in the environment. The role is to be "interpreted" according to the actors' individual variables (see below).

Besides, roles and functions might be different in each different context. But what seems to be important is a clear definition and distribution of these roles and functions, the fact that each actor is aware of his role(s), tasks and duties.

Through the various case analyses, we identified the following actors:

learners; teachers/instructors/tutors; administrators; technicians; developers; researchers; educationalists; project managers; change agents.

The individual variables

Whatever the level in which each different actor is located in the environment, whatever his role and functions, various aspects, different individual variables, which constitute and characterize him, must be taken into account.

Each actor has indeed:

- personal characteristics which are classically those taken into account by the sociological identification of the subject: sex, age, level of studies and/or qualifications, etc.
- representations, visions: each actor has values, conceptions, representations, thoughts and beliefs - individual or socially shared by a group or a community to which he belongs and which help him to understand his environment and to act on it. These representations relate to different fields like technology, education, organization, evaluation, etc. which will be clarified below
- competences and resources (including material and economic ones) available to each one to carry out the tasks and the project. One can of course distinguish some sub-categories, also to be found in the literature: recognized, stabilized and shared knowledge, intellectual and manual know-how or skills. Among these competences, the reflexive dimension and the metacognitive competence have an important role.
- attitudes, desires, expectations, motivations, needs, fears: those often depend on the training the person went through, his personal life, and professional projects, etc. The existence or not of a personal project is thus an important factor.
- practices: each one is also characterized by his real practices, by the way in which he achieves his tasks within the framework of his function, develops teaching scenarios, intervenes with learners, etc
- the professional experience of each

Variables related to the fields

As we already mentioned, individual variables most probably determine the interpretation of the role of each actor. They are also closely related to the various fields that make up the professional environment of the actors who indeed have integrated, in connection with each one of these fields, representations, skills and resources, attitudes, real practices and a professional experience.

Then, what are these main fields?:

- pedagogy: epistemological positions, the teaching and learning theories and models, pedagogical currents, approaches and methodologies, the teaching and learning objectives etc

- disciplines: innovation obviously takes place within the framework of a discipline which has its own contents and organization (progression, modularization), its didactics, etc
- technologies: existing and available technologies, their choice, their roles in the working environnement, etc
- mediatization and mediation: these represent, on the one hand, the characteristic aspects of the mediatization of contents and systems (related to training engineering), and, on the other hand, the way in which the characteristics of the technological environments are used as support for the activities and trainings (which concern the analysis of cognitive tools, semiocognitive registers and presentation formats, etc.).
- the organizational: the forms and models related to the organization of training, such as the importance and influence of distance, etc.
- economics: economic constraints and possibilities, needs for the market, etc.
- the policy: design and organizational policies, models of civil society, etc. The secret policy, its own values and ideology.

The temporal dimension

This second axis relates to development and to the deployment of innovation from its emergence to its perpetuation. Teaching engineering and instructional design identified long ago, from a methodological point of view, a series of steps characteristic to the process of design and implementation of a technological environment. Case analyses confirmed the existence of well identified stages: analysis, design, development, implementation, evaluation, integration in the daily practice, maintaining process, and dissemination. It would indeed be possible, as certain authors do, to reduce the process to three major stages, taking innovation as the center of analysis: decision of adoption, implementation and routinization (Depover, 2003). The analysis of the innovating environment depends indeed on each of these stages since the relative importance of certain components and variables, evolves according to each of these stages. For instance: "It is necessary to validate the vision and comprehension of the project at the very stage of analysis of constraints, objectives and conditions of realization of the project, and this, in agreement with the people concerned: learners, teachers, experts of the field, who will see whether certain parts have been forrgotten" (Viens, interview, 01.04).

Beyond these privileged moments, the literature and experience show that many critical events represent invaluable indicators in the dynamics of the project since we know they influence the progression or delay of a task, which they may even ruin. A sustaining and piloting which would strictly follow the standard models of teaching engineering are thus likely to miss some key moments in the dynamics of the project. Sustaining and piloting will thus take into account these two aspects of the temporal dimension: on the one hand, the strict chronology of the stages of development of a project and, on the other hand, the moments that look critical when considered in its dynamics of proper change.

The sustaining and piloting approach

The notion of “sustaining and piloting innovation” and the metaphor to which it is associated are today well established in the literature (in particular Bonami & Garant, 1996; Bouvier, 1998; OFES, 2003; CTIE, Educa CH, 2003). But there exist several ways of monitoring. A survey of the literature makes it possible to define two overall visions of innovation, two approaches aiming at monitoring and supporting it. Each one pertains to different epistemological frameworks. The essential difference is related to the relationship of actors - including researchers and the persons in charge for innovation - and their place in the monitoring process.

The first approach considers monitoring as a regular data collection on the evolving system by researchers/analysts who are neither implied in the project itself nor in its development. The methods pertain to conventional research, and results can be reintroduced in the process so as to redirect its course and correct possible dysfunctions. The second is related to approaches like “research-action-training” and make actors and researchers become partners in a shared process. The aim is to jointly carry out the vocational training of the teachers implied in an innovating project, the development of this same project and research on the experience in progress. It is thus a participative approach that tends to erase the border between the professional environment, the place of work, and the learning of new professional skills. Strategies, on the basis of a training project carried out by Charlier and Charlier (1996: 50), concern: a) the explanation of trainings; b) the explanation of practices; c) the relationship between knowledge and techniques; d) the connection between professional practice and the training object; and e) alternating between theory and practice.

In the first case, the method can be said to be “objectifying” and fits rather well with the definition of the training environment while in the second, the aim is to reintroduce "the active individual in the internal structure of the environment", which is the essential condition to transform the normative ideology of technical rationalization into an "emancipating ideology being at the disposal of human activity" (Linard, 2002: 145). This epistemological positioning questions the traditional categories of objectivity and subjectivity like the dualism of traditional approaches which oppose designers/experts and actors/applicators.

The approach chosen by the ASPI model is directly related to this second orientation. It is thus necessary to define the objectives of such an approach, the modes of action which today seem validated as well by our case studies as by those presented in the literature and, finally, the tools that allow their implementation. We will not tackle here the question of the person in charge for piloting.

The approach integrates, beyond the principles and the methodology of any action-research-training plan (see above), the elements brought by Jacquinot and Choplin (op.cit.) in their criticism of the definition of an evironment. The approach is thus centered on the elaboration of "a common object to negotiate between and with the subjects (social). It leads to question what is at stake, from day to day (dynamic dimension) in the actualization of new practices (innovating dimensions)" (ibidem: 187).

It is therefore a matter of analysing the dynamics of the development of innovation according to a regulation integrating the actors and, in this perspective, the descriptive model of the innovating environment (see above) perfectly allows the collecting of information necessary to the various stages of the process. Moreover, each large family of variables and even each variable can constitute an input liable to allow the standing out, under various salient angles, of the way the environment is perceived. Besides, such an approach aims at making clear with the actors the significance of "better aimed at by innovation" (ibidem: 193). That means what they do gain, but also what they do loose with innovation.

The modes of action to be privileged are those which are recommended by Garant (2000) on the basis of case studies carried out within the framework of university papers: a) proactive rather than reactive sustainment and piloting; b) flexible and evolutionary sustainment and piloting integrating an adhocratic dimension; c) a support for action as well as the providing of the related resources (the case of IntersTICES is exemplary in this respect); d) a better articulation between individual and organisational projects; and e) a reorganization of work in terms of time and places of dialogue. To achieve this, many tools exist which could be validated by practice. The analysis of the comfortable and uncomfortable aspects of the project at each of its stages, the tools dedicated to the verbalization and the making explicit of the practices, the tools of passage, etc, are well-known examples today (Charlier, Peraya: 2003).

CONCLUSION

The ASPI model (*figure below*) thus considers that the sustaining and piloting approach represents an integral part of the innovation system of which it can be considered as the mover insofar that it makes possible the conditions that allow the emergence of innovation.

The ASPI model ensures cohesion in choosing, at each important moment, among different variables, the data which are necessary to the diagnosis and the regulation of the environment as much as the making explicit of the meaning of innovation for the actors. The actors, whatever the level at which they intervene, have therefore, at given times, to analyse again, and if necessary, modify their position, their role within the environment: the actors, related to the environment, working from within and towards its development, are also agents of change, which leads them to adopt a reflexive attitude which in turn puts them in an external position in view of the environment.

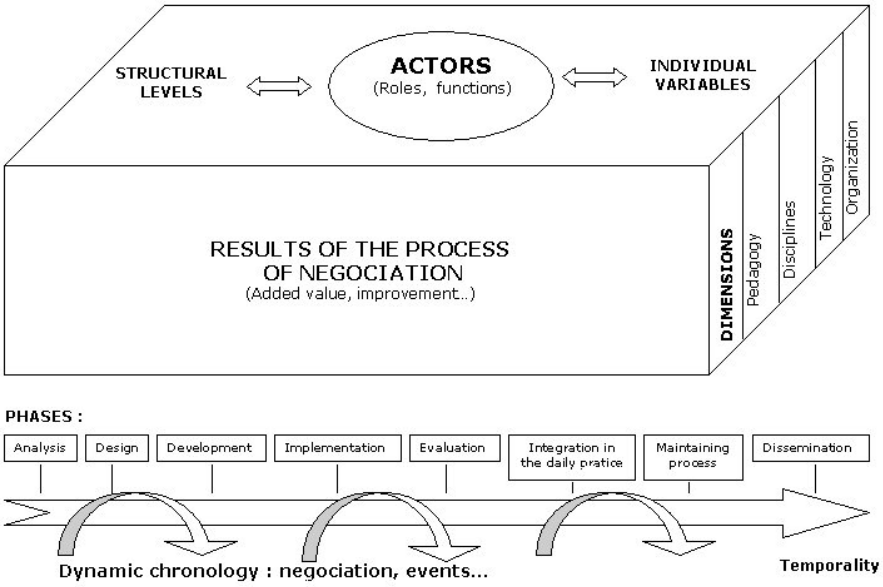

Figure: Analysing, sustaining, and piloting innovation: a "ASPI" model

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