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Learner Support in Online Learning Environments

Chrysta Pélissier

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Foreword

It is with great pleasure that I have accepted the honor of opening the present volume with the following few words. The common research interests that the author and I have shared for a long time have led us to develop an intellectual proximity and to collaborate around academic projects, often in connection with an educational question that seems essential in the current socio-educational context: that of the assistance in digital learning systems.

As a need that transcends the compartmentalization between disciplines, the issue of assistance – also known as "support" in certain scientific communities – has always aroused the researchers' curiosity and stimulated their pedagogical-academic endeavors. From Socrates's maieutics, to Comenius's epistemological and pedagogical principles, through the forms of cooperation that support Freinet's essentially humanist approach, the purpose has always been more or less the same: to develop, implement, test and deploy educational means to promote the development of learning autonomy. However, since the advent of digital technology, the democratization of online training has resulted in more complex training spaces, and has led the researchers' community to consider the assistance concept from different angles. For example, if it is now technically possible to manage the "informal spaces" between training time, to individualize the training pathway or even to consider various forms of mediation, many educational questions are, in fact, still pending: what are the skills required to ensure the tutor's new roles in the mediated learning systems? In what

way(s) can we redistribute these roles? Which methods can we consider to intervene effectively with learners?

To feed the reflection on the (broad) issue of digital assistance, it is in the more specific disciplinary fields of educational sciences and digital humanities that Chrysta Pélissier chose to widen her research and develop her own epistemological positioning, that she also had the opportunity to present and defend during her professional HDR thesis, in June 2017.

The chosen articulation follows a double dichotomy: temporal, on the one hand, with a focus on current/future epistemological, pedagogical and methodological challenges; a dichotomy relative to the beneficiaries of the assistance, with a distinction between assisting needs of learners' with various profiles (high school students, prisoners, MOOC users, students in initial training, to name only a few) and forms of digital assistance that could in the future simplify some of the teaching, research and administration tasks which are the responsibilities of the teacher-researcher.

The fields of application of the assistance models presented in the book are numerous; the complexity and variety of the scientific devices which have been solicited to respond to the users' diverse needs in terms of assistance are reflected in the invocation of a multitude of methodologies, concepts and other theoretical references which – like Lev Vygotsky's zone of proximal development concept – are sometimes revisited. The application benefits are achieved, for their part, through a wide variety of data, devices and productions that support semi-systematically the theoretical considerations that are addressed.

From a more personal perspective, I would say that through the dynamics of this book, Chrysta Pélissier has a dual purpose: on the one hand, to highlight the vigor and richness of research aimed – from a design perspective of tutoring forms – to compensate for the impossibility to predict *a priori* the learners' difficulties, needs and work strategies in digital teaching-learning systems; on the other hand, through the sharing of reflections, analyses and feedback, to advance academic thinking in the ever-changing field of digital humanities and, thus, to contribute to the stabilization of the scientific scope of this same disciplinary field.

In the end, by making it possible to apprehend – both from a practical and theoretical point of view – the current and projected issues inherent to the concept of assistance in digital devices, this book can be read profitably by any reader interested in educational issues, whether they are (apprentices-) researchers, trainers, teachers or policy makers.

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Introduction

I.1. Context of reflection

Since 2007, France has been eighth in the world in its number of researchers and third in the European Union (behind Germany and the United Kingdom)[1]. In 2011, it awarded[2] 11,500 doctoral degrees[3] (Harfi 2013), while globally, in 2008, this number was 393,700 (*idem*, p. 9). Commencing their scientific training with a master's degree (research, professional, or undifferentiated[4]), many[5] apply for further education. The number of doctoral students has increased by 2% between 2002–2003 and 2012–2013, and the discipline distribution among registrants has been stable since the beginning of the 2000s: 45% in sciences; 34% in literature,

1 According to the 2014 report on the state of scientific employment in France: "L'état de l'emploi scientifique en France", written by the Directorate General of Higher Education and Research & the Directorate General of Research and Innovation, http://cache.media.enseignementsup-recherche.gouv.fr/file/Personnels_ens._sup_et_chercheurs/20/1/rapport_emploi_ scientifique_2014_382201.pdf.

2 These figures are not easy to find and vary by source. Concerning the doctoral students and doctorates awarded, there are two data sources: SISE (Système d'information sur les étudiants – French student information system) and Siredo. The first one is carried out via "computer" enrollments and only concerns universities (not taking into account the doctorates awarded by engineering schools). The other one is linked to the monitoring of doctoral schools. SISE therefore underestimates the actual number, but it may be that the monitoring of doctoral schools is not perfect either.

3 And the number of doctoral students was 65,000 the same year.

4 Training offering preparation for the research and professional path.

5 The number of enrollments in the second year (research, professional or undifferentiated master) was 152,474 in 2012–2013. This number seems to have stabilized since 2010–2011.

languages and human sciences; and 19% in law, economics and AES[6]. Thus, if we compare the number of researchers to the active population, France, with 8.8 researchers per thousand active in 2011, is behind Japan (10.0‰) and the United States (9.1‰) but ahead of Portugal (8.5‰), the United Kingdom (8.3‰), Germany (7.9‰), Spain (5.7‰) and Italy (4.3‰).

Today, the French institutional desire is to most fully train its 25,000 doctoral students/year[7] and to link the research carried out in laboratories with training (initial, continued), the general public (in a perspective of knowledge dissemination) and all the other interested sectors[8]. In order to accomplish this, it relies on a rapidly expanding dynamic in humanities and social sciences (HSS): digital humanities. These digital humanities are at the intersection of computer science and arts, literature, and HSS. Characterized by the convergence of the so-called scientific (production and dissemination of knowledge), educational (didactic transposition integrating the interpretation of knowledge produced and written in scientific articles), and instructional design (presentation and dissemination of this knowledge gained through IT applications/environments) activities, digital humanities are at once a field of research, teaching and engineering.

In particular, as a research field, digital humanities, which already has a long history (Berra 2015; Doueihi 2011; Doueihi 2013; Sinatra and Vitali-Rosali 2014), lead the people involved in the scientific world to question the research methodologies, the actual and potential uses of technological tools, as well as the (innovative) practices allowing the development and sharing of results, offering new educational content (informational and/or didactic and/or scientific and/or technological content) to the training world (among others). This research field can be apprehended both as a human and scientific dynamic. On the one hand, it suggests a resurgence for researchers wishing to examine their own approaches by questioning their research

6 Economic and social administration.

7 According to the StraNES (Stratégie nationale de l'enseignement supérieur – French national strategy for higher education) project, let's build the France of tomorrow, act for equality, give a future to young people, http://www.enseignementsup-recherche.gouv.fr/cid76975/la-strategie-nationale-de-l-enseignement-superieur-stranes.html.

8 "The 2014 report on the state of scientific employment of the Ministry of Higher Education and Research reveals the strong growth of the sector in France, which has increased by 22% since 2001. Most jobs are concentrated in the private sector." *Le Figaro.fr*, published on January 15, 2005, http://etudiant.lefigaro.fr/stage-emploi/actu/detail/article/la-france-au-8e-rang-mondial-en-nombre-de-chercheurs-10581/.

methodologies from the point of view of computer science contribution. On the other hand, these humanities constitute a pretext to make progress in several issues, by soliciting, in particular, collaborations between researchers from different disciplines. The issue of multidisciplinarity in digital humanities is today essential and pluralist: plurality of disciplinary approaches, diversity of views on the same research topic, on the same question, or even on a scientific approach in order to build a global vision of a targeted phenomenon or a set of phenomena that seem to be similar or related. Multidisciplinarity is considered fruitful on principle; however, it is difficult to implement. It was, in some projects and for some participants, the basis of a fragmentation where each approach was more or less separated from the others. This approach, which up to this point seemed to cause confusion in the roles of each of the participants in the overall approach and fuel identity insecurity, is currently being implemented, by digital humanities, in the coherence and respect of a certain continuity of social scientific practices (Hooland *et al*. 2016).

Following on from this, where the computer tool participates in and encourages the evolution of research practices, especially in the methods of data collection, analysis, presentation and dissemination of results, the first objective of this convergence is to facilitate scientific work in areas that have yet to be investigated, or in the same area but in a different way: taking into account new indicators (more explicit, more massive, more precise and/or more targeted) and/or new, more appropriate means that make it possible to interpret them (quantitatively and qualitatively). The second objective is to re-question certain monodisciplinary models/concepts which are historically present in literature. These models/concepts are brought up to date with digital technology, reconfigured according to new components and/or situational participants. Finally, the third objective of this convergence is to be able to foresee and initiate changes which are taking place in (and on) a society where the people involved in the scientific world are constantly solicited by a dematerialization (digitization) policy, and connected to others through their work in databases that interact with each other.

I.2. Research training: a rapidly changing field

Research training, proposed in France by doctoral schools, supports the training and the future of each doctoral student by responding to the needs of

PhD supervision[9] regarding both specific disciplinary skills and a scientific culture going beyond the strict scope of the dissertation.

This training "is part of a rapidly changing university research landscape: new conceptions in the production of knowledge, the transmission of acquired knowledge; the need for new digital skills and editorial know-how, the need for the dissemination and development of doctoral research during the curriculum, the internationalization of research networks, taken into account starting from the design of the doctoral project, orientation prospects and professional insertion, etc."[10].

Under these circumstances, the institutions are no longer only questioning the scientific knowledge and practices which must be the subject of a transmission; they are also led to consider ways to support these future researchers in the development of the digital skills necessary for the advancement and development of their research results, as well as the development of their scientific approach.

The objective of the book is not to question the different practices implemented in these doctoral programs but, firstly, to question the place digital tools[11] occupy today and could occupy tomorrow in the activities carried out by apprentices and experienced researchers, and secondly, to contribute to the provision of means to these people in order to allow them to question their personal practices, in such a way as to consider "getting assistance" from digital resources/solutions made available to them. Digital

9 Dissertation supervision: decree of May 25, 2016 laying down the national framework of training and the methods leading to the awarding of the national doctoral diploma. *Article 13 – An individual monitoring committee of the doctoral student ensures the proper conduct of the curriculum based on the doctorate charter and the training agreement. It evaluates, in an interview with the doctoral student, the conditions of his/her training and the progress of his/her research. It formulates recommendations and sends a report of the interview to the director of the doctoral school, the doctoral student and the dissertation supervisor. In particular, it ensures the prevention of any form of conflict, discrimination or harassment. The methods of composition, organization and functioning of this committee are determined by the council of the doctoral school. The members of this committee do not participate in the direction of the doctoral student's work.*

10 Extract from the "Livret du doctorant", Inalco doctoral school, http://www.inalco.fr/sites/default/files/asset/document/livret_doctorant_16-17.pdf.

11 Also designated by instruments (Loizon and Mayen 2015).

technology thus supports[12] "fragmented"[13] activities (Fave-Bonnet 1998), to which we will have the opportunity to return.

I.3. Content of the book

In this book, you will not find any sociological data referring to the place of digital technology (Boullier 2016) in today's society[14], nor a presentation of methods of the existence of social links entangled with techniques (Dagiral and Martin 2017). Our desire is to open a debate focused on the role that digital technology can play in the university research landscape in HSS today. More particularly, we contemplate the assistance that different digital resources (Develotte and Pothier 2004) can provide in the realization of the scientific activities conducted. Thus, in light of the various possibilities offered by technologies in the 21st Century, our contribution aims to implement work on the identification of the needs of disciplinary, inter-disciplinary, individual and collective "assistance", oriented toward the success of the professional projects of each future doctoral student and experienced researcher, as well as the definition and the role of (present and future) digital resources that could respond to these needs in the near future.

Of course, each researcher/apprentice-researcher is different. It therefore seems *a priori* difficult to propose a finite and identical set of target activities and digital resources of assistance for all. In fact, it is not possible, in the framework of this book in any case, to take into account all the parameters which participate in the choice of the implementation of digital research assistance. Among them, we can mention the diversity of activities carried out throughout a career (several affiliate institutions, several

12 Composed of a research, teaching and administrative activity described in Article 3 of the Decree of June 6, 1984 at the lecturer-researcher level.

13 Composed of a research, teaching and administrative activity described in Article 3 of the Decree of June 6, 1984.

14 "La société a besoin aujourd'hui de chercheurs aptes à comprendre ces mutations, à les anticiper, à les expliquer grâce à leur formation et à leur bagage intellectuel. Et c'est là que l'on pourrait parler d'humanités numériques." ("Society today needs researchers able to understand these changes, to anticipate them, to explain them through their training and their intellectual background. And that is where we could talk about digital humanities.") In *Les humanités numériques: une nouvelle discipline universitaire*, Suzanne Dumouchel: http://dhiha.hypotheses.org/1539.

disciplines, research laboratories): the disciplinary research habits, the knowledge of the digital world, the initial training experience, the monodisciplinary or multidisciplinary practices, etc. This is the reason for which we have made the choice to present, based on different results of research conducted over the last 15 years, a methodological approach aimed at facilitating the reflection of each scientific participant on his/her own activities, supported (or not) by the use of digital technology.

Regarding the solicited tools, you will, again, not find a detailed presentation of each of them (when they exist) in this book, but rather examples which illustrate the methods of proposed approaches. The aim is to enable the readers to better understand the reflection methods implemented around the digital assistance concept, so as to enable them to implement a reflective approach themselves on their activities, to integrate them into a professional practice, or even to create their own digital assistance. Thus, we have made the choice to present only a few resources which are related to the scientist's activity in the field of language sciences, to which our work belongs. We do not provide an exhaustive list but rather examples which illustrate the principles governing the assistance process in which the digital resource is involved. That's it! The word “assistance process” makes its appearance. In particular, it will be presented in the first part of the book.

Finally, we note that this book was written based on the results of our work and our personal experiences as participants wishing to assist and be assisted on a daily basis by digital resources. Other reflections on the assistance concept in a scientific context, for a wider audience and/or in reference to other disciplines, can be proposed in the coming years and fuel the debates. In the meantime, our ambition is perhaps to give a “breath of hope” to researchers, giving a glimpse of the days when, for example, the temporal organization of the different tasks incumbent upon them will be alleviated through the implementation of digital assistance adapted and adaptable to each one, which they will have selected to assist doctoral students or to assist themselves (to better plan their actions, in a way that is more oriented toward a chosen professional strategy, while taking into account personal but also situational, political and institutional factors). Thus, a greater place will perhaps be left to creativity in the research projects initiated by researchers, which will be better supported in data processing and interpretation, and questioned by work from other disciplines. The objective is to facilitate the researchers’ daily work (Leclercq 2006), while

seeking to achieve new investigations or to implement new, not yet imagined methodologies.

Thus, like Bruno Latour and Steve Woolgar (2008) in their book entitled *La Vie d'un laboratoire*, we present a perception of "this strange world" (Latour and Woolgar 2008, p. 15) that is scientific research, an activity which remains very poorly known and which we apprehend by the potential of the assistance offered through digital technology. The challenge of such a work is to facilitate the production of scientific knowledge, to participate in the changes in existing professional practices, as well as to pool the works carried out and to articulate them in a manner which will make it possible to advance science.

I.4. To whom is this book addressed?

First of all, this book is aimed at researchers in education and language sciences. By its definition in the systemic context, assistance is presented as a fully-fledged, complex, multifaceted entity, which can be difficult to identify by the different forms it can take. Scientists will find in this book theoretical references (e.g. Vygotsky's zone of proximal development approach; Bruner's support) for questioning assistance as it is implemented in a training context (initial and continued), for conducting personal reflections on their own uses, and finally, perhaps for questioning the content of the doctoral programs.

In addition, this book is aimed at young researchers (master or doctorate), who must integrate, as soon as possible in their careers, a reflective approach to their personal professional projects, as well as the different ways to implement it. In this book, by definition of the proposed digital assistance, we give to apprentices-researchers avenues to question the reasons that push them to use certain digital resources and not others, to implement deviations of use of available resources, as well as ways of developing their professional digital skills. Concerning this last point, the objective is to make the reader aware of the importance of the place that this digital assistance can take in the framework of a skills assessment in preparation for professional integration[15] or a presentation of a career path.

15 We align with the approach advocated by the French Confederation of Young Researchers (*Confédération des Jeunes Chercheurs* – CJC) and the National Association of Doctors

We then enlighten the stakeholders from the industrial world on the digital resources that they could consider designing and developing in the near future. In fact, at the end of this book we present an action researcher model. This model makes it possible to question the participants about their activities, their needs and the contributions of digital resources that they are likely to use or to consider using. It constitutes a means of characterizing current digital resources as well as those that have not yet been designed, in order to respond to real and explicit needs. In addition, throughout this book, some existing digital resources are presented, others are described as being able to be adapted to the world of research, while others still have to be imagined, for example by involving 2D, 3D graphic art, virtual reality or augmented reality, a promising innovation.

With regard to doctoral training, we initiate a methodological reflection, through the action researcher model, on the multiple dimensions of the research profession in HSS envisaged by some of the doctoral students, that goes beyond training sessions related to the academic field in the use of office and communication tools (with social networks, for example). Based on the role given to the digital resources in the assistance provided to the researcher (as a person giving and receiving assistance), along with their functions and their places in the professionalization process, we offer the means to implement a reflection method that can be integrated into a personal reflective approach facilitating professional integration.

I.5. Document structure

The first part of this book is devoted to the context of our reflection, namely digital humanities, and to the definition of the digital assistance concept. In Chapter 1, we describe digital humanities as a research field that we reposition in the history of disciplines. We also discuss the current issues in this field for Humanities and Social Sciences, its fields of action, and establish interaction as essential to its development. In Chapter 2, we propose a break from the common understanding of the word "assistance" and we provide the outline of the "digital assistance" concept. We first

(*Association nationale des docteurs* – AND), which, through the proposed training, focuses on the implementation of a research work, the professional development as a researcher, and the construction of his/her professional project. *Le Doctorat à la loupe*, no.12, published on April 3, 2014, http://cjc.jeunes-chercheurs.org/doctorat-a-la-loupe/fiches/FicheDoctoratALaLoupe-12.pdf.

define it based on the different trends in education psychology spanning throughout the centuries. We then describe this concept as a process, a cycle; each stage is described, illustrated by specific examples from research, and produces a result.

The second part addresses the question of digital assistance in a scientific context. It consists of three chapters. In the first chapter (Chapter 3), the researchers' work context and their daily activities are described. Based on these activities, the digital resources which are integrated into the digital assistance process are presented in their contributions. In the next chapter (Chapter 4), the researchers' professionalization concept is questioned. This leads us to define the implementation of a new concept, the scientific scenario, through which the researchers consider their activities supported by digital technology, which is put in a professional activity that integrates into a professionalization process. Finally, in Chapter 5, the last chapter, we discuss the manner in which digital technology can support the researchers' cognitive activity and even increase it through its contributions to meet identified needs within the framework of repetitive tasks and connections that can be implemented.

Throughout this book, the assistance provided by digital technology is questioned: in the pedagogy context (first part), and then in the researchers' professionalization context (second part). The objective is to give the reader the possibility to implement a personal reflective approach on the uses of the digital tools which are available today and on their needs of support that can be expressed and filled tomorrow with the help of digital technology.

PART 1

Definition of Assistance in the Digital Humanities Field

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Introduction to Part 1

Digital Humanities can be apprehended, according to Domenget, Bonaccorsi and Carayol (2016) as "a new research field" (Four 2013), a transdiscipline[1] (Le Deuff 2014; Davidson 2010) integrated not into a "unified field" but rather into "a mosaic of convergent practices"[2]. They are defined (Welger-Barboza 2012; Svensson 2012; Dacos and Mounier 2014), as a very broad research field, the source of heuristic methods, devices and perspectives related to digital technology in the Humanities and Social Sciences field (Dacos 2011). A major shift is predicted (Carayol and Morandi 2016), offering an "HSS renewal movement"[3] (Dacos 2011) to which we associate our reflection.

For us, digital humanities offer a fertile ground for participants' initiatives involved in HSS research. Methodological and reflective approaches (Laubé *et al*. 2014) can help raise awareness of the participants' research for actual and potential contributions of digital technology and can be a source of proposals in the design of new technical solutions which will be able to participate in the progress and diversity of their research, as well as to a certain ease of realization of daily activities. These approaches are

1 "Transdiscipline", "interdiscipline" and "multidiscipline" reason as "words without any real meaning" aimed at the meeting of researchers, engineers and practitioners from, on the one hand, computer sciences, and on the other hand, HSS (such as history, geography, literature, sociology, archeology, language sciences, education sciences, information and communication sciences, etc.).
2 IRCOM is an HSS Research Infrastructure Consortium of the CORPUS-IR department. Its administrative lead is the Universal Linguistics and Typology Federation (Fédération typologie et universaux linguistiques) (FR 2559). It references more than 50 Francophone reference corpora.
3 Symbolized by the *Digital Humanities* manifest in 2011.

also relevant in the implementation of a process of anticipation of the researchers' actions and professional evolution. They play an educational role. They support the individuals in a personal intellectual activity of comprehension of what is behind their professional development, but also in their own uses of digital resources dedicated to the research profession. The objectives are to facilitate the understanding of today's world and to anticipate the world of tomorrow in its changes related to a certain scientific competitiveness and a constant development of digital technology.

Thus, in this first part, we present digital humanities as a rapidly expanding field[4], which gives rise to many epistemological debates: there are many books discussing its (ancient[5]) origins, its nature and its denominations over the centuries (Berra 2015). More particularly, we present these humanities as a field that has been engaging, for several years, two historically well separated disciplines whose interaction remains to be structured. The objective of this disciplinary merger is to set new lines of thought, to identify new research objects in fields of action specific to these humanities. The challenge is to be able to breathe new life into HSS research, in both collective and individual dynamics.

4 As evidenced by the multi-annual Horizon 2020 project funding program of the European Commission. It includes digital humanities among the preferred disciplines.

5 Initially known in the English-speaking world as *humanities computing*, the discipline was renamed as *digital humanities* (Fourmentraux 2012; Le Deuff 2014).

1

Digital Humanities Context

Technological changes at the information production, communication and mediation level (Barbot and Lancian 2003) affect the economic and social life of all people, and in particular of the researcher. At the same time, these changes are transforming his/her practices: we can cite, as an example, the access to scientific knowledge facilitated by the use of databases, the presentation of this knowledge to the community through digital media as well as to the public student and "any public"[1], according to different formats (audio, audiovisual or graphic). These changes integrate into a development approach already initiated several years ago. Even if digital humanities are rooted in a movement in favor of the dissemination, sharing and development of the scholarly knowledge produced by scientific communities, they want to play a role and incite the use and development of HSS digital tools, online/offline, as well as to motivate questions around their definition: do digital humanities constitute a new discipline? And/or a methodology for HSS? Both?

With this in mind, we describe in this chapter the reasons which, today, lead the HSS to "be structured", or rather to "evolve" with the computer science field. We then present the different lines of thought which structure the current debate on digital humanities (training, innovation related to teaching and research, transliteracy development[2]), as well as the questions that these lines raise in the academic context. Next, we present the three

1 Term borrowed from Alain Thousand concerning MOOCs. It is not a question of proposing media of knowledge to the "general public" but rather to "any public", that is to "different publics".

2 The ability to read, write and interact through a variety of platforms, tools and means of communication.

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fields of actions which make up the activities related to this field and to which our research results, presented later in the book, are joined. Finally, we describe the digital resources which, over the years, have contributed to the evolution of scientific practices in humanities and social sciences (HSS).

1.1. Knowledge in humanities and social sciences should be structured through interaction

Developing knowledge, along with the epistemological question of the construction of this knowledge, has always been the goal of scientific research. In the field of language sciences, we can cite, for example, Ferdinand de Saussure, the founder of linguistics. He rejects the primacy of the ontological existence of objects of knowledge for the benefit of their construction in and through scientific practice: "it is the point of view that creates the object" (Saussure 1916). From a completely different perspective, Michel Foucault, who intended to identify "changes that occur in general in the field of history" and more specifically "in the field of history of knowledge" (Foucault 1969, p. 25), defended the idea that discourses are not simple representations of things but "of practices which systematically form the objects of which they speak" (*ibid*., pp. 65–67). These objects are thus developed through discourses, exchanges and divergences between the participants who formulate their individual, but also collective, points of view (associated with communities and/or theoretical trends).

However, historically, in "the discipline of knowledge" which dates back to the 18th Century (Foucault 1997), the world of academic research is organized in "fields" (Bourdieu 1992). Until the middle of the 20th Century, each of these fields, such as sciences, history, arts, literature, law and management, identified its own objects of study, drew on its methodologies and disseminated its knowledge according to its own specific methods and scientific protocols of communication. Thus, knowledge and know-how were produced and disseminated to closed communities, to which the researcher, author of his/her publications, belonged. This structuring by fields is translated over the years in the representations of stereotypes, still present today: on the one hand, we have the so-called "exact" sciences, also called "hard sciences" or simply "sciences", and on the other hand, the HSS, also called "soft sciences".

We had to wait for the research conducted in the 1990s in the sociology of sciences to be able to consider "science as a system of exchanges" (Vinck 1995) between different networks formed by laboratories, research teams, inter-university projects, partner institutions, etc. The use of digital technologies in these networks has promoted the development of new methods of scientific work, in consortia, in larger communities and in collaboration between participants who are not all researchers (technicians, engineers, industrialists, for example). These methods generated geographic mergers, groups and exchanges of research practices between "hard" and "soft" sciences, constituting this "third culture" (Brockman 1995), *Digital Humanities* (Berry 2012; Latour 2010). Through this third culture, we are witnesses of the development of perspectives from different horizons (HSS and computer science, among others) which were previously separated, to open up a "community of interests" between researchers (Booker *et al*. 1997) belonging to laboratories[3] that integrate individuals from different disciplinary fields.

These new practices tend to disrupt scientists' activities in HSS. They reveal new needs that are fulfilled in some cases by the work of a technician or an engineer (audiovisual or computer scientist). They also participate in data collection, in the search of particular components/phenomena in the framework of a qualitative and/or quantitative analysis, as well as in the dissemination of the results on computer media (a website, for example). Today, with the arrival of the political and institutional "wave" associated with digital humanities, this effort of the union of two communities (HSS and computer science) and of research practices is fully realized. It opens not a plotted, but a very real path on an exchange effort, agreement on research protocols, mixed methodologies, broader scientific communication methods and still unidentified theoretical frameworks. Today, these unions are essential for the survival of certain disciplines in HSS that must organize and interact with other actors, other disciplines in order to continue to exist. Knowledge is no longer seen as a possession of the subject, in an internalist view of cognition; rather, it is designed in a localized and distributed social construction (Goffman 1961; 1988; Suchman 1987; Hutchins 1995). With this approach in mind, knowledge is an "embodied and socio-technically

3 A laboratory is defined by Latour and Woolgar (2008) as "a literary inscription system, whose goal is to sometimes convince that a statement is a fact" (p. 91). "[...] A fact is recognized as such when it loses all its temporal attributes and integrates into a vast body of knowledge advanced by others" (p. 92).

registered practice" or "mind-body-thing practice" (Amin and Cohendet 2004). It is both an object and a process, resulting from an interpretative practice which is "increased" by computer applications and Internet architectures designed as objects embedded in the action, in which the individual researcher, actor of his/her thoughts and activities, is a participant, sometimes despite him/herself, in two communities (HSS and computer science) through the use of digital resources that are imposed/proposed by his/her hierarchical authorities. New approaches for the production of bi-disciplinary scientific knowledge gradually take hold, offering the possibility of comparison with those previously implemented.

Through the development of digital humanities, the challenge is therefore to initiate more markedly this distributed social construction which goes beyond disciplines, by examining and questioning the consequences related to increased interpretative practices. Accordingly, we believe that French academic research does not yet sufficiently measure the issues of the presence of digital technology in all of the activities conducted (activities of production, access and dissemination of knowledge). In particular, HSS suffer from a very marked disciplinarization, coupled with the persistence of a too strong individualization of the researcher. Scientific HSS research still remains compartmentalized and does not benefit enough from exchanges with other researchers from neighboring disciplines. We believe that the arrival of digital humanities and the possibilities offered by digital technology will make the disciplinary mentalities in HSS evolve and that relations will be created to investigate objects of research which have every interest to be investigated from different, but also joint, perspectives.

For example, the work on the use of social networks can be considered in different ways by research in language sciences (interaction analysis), in computer science (automatic analysis of traces left by Internet users), or even in sociology (human behavior studies). This is complementary research on the same object, which the researcher does not necessarily always take into account in his/her own approach. One reason lies in the habits of a community which claims to be disciplinary, that is centered on theoretical frameworks sufficiently complex in their historical foundations. A second reason is related to the ignorance of the existence of the work from other disciplines, but also to the difficulties of access to articles (even with the help of digital technology). A third reason is associated with the difficulty in reading this work. University training is currently carried out through models

implemented (even at doctoral program level) according to a persistently too disciplinary approach.

Thus, an opening of research effort beyond the borders of restricted communities is possible. Digital humanities constitute a pretext but also a vector of energy, of which HSS researchers must take hold in order to open up new research approaches and new scientific issues[4]. Such a decompartmentalization, at the disciplinary and individual level, would allow a better circulation of knowledge, identification and treatment of emerging issues, offering a new generation of researchers the opportunity to join a larger and innovative community in its plural theoretical frameworks. These changes are currently transmitted by an institutional desire, through three lines of thought.

1.2. Lines of thought

Thought on digital humanities is mainly organized around three areas:

1) training in digital humanities. This training is widely discussed in the world of Higher Education and Research[5]. Its objective is to develop the students' ability to access a detailed understanding of the strategic, social, cultural and professional issues of the changes in practices with the help of digital technology. "This question [of training] is central, because it is through the implementation of real curriculum that we will be able to elevate digital humanities from what can be perceived as an 'individual pet cause' to a more established position in the institutional landscape" (Berra and Clavaud 2012, p. 41);

2) the emergence of innovations related to teaching and research. From the point of view of education, digital humanities support the democratization of access to educational content and encourage self-learning activities, as evidenced by the proliferation of MOOCs (in France since 2014[6]) and the massive use of Internet users (teachers and/or learners) of tutorials/various documents made available on the web. Regarding research, the issue is to help unlock complex problems calling for the implementation

4 These multidisciplinary approaches in HSS are supported by European calls for projects or by the National Research Agency.

5 Many master's programs now incorporate the term "digital humanities" in their title.

6 With the France Université Numérique ministerial project/platform.

of multidisciplinary approaches, both comprehensive in its approach and analytical in the different points of view analyzed;

3) the development of the transliteracy concept. This concept is understood as an acculturation to digital technology, an ability to interact in a connected world in order to transform the information that is made available into knowledge integrated by the individual and implemented during his/her own activities. This acculturation is a change which leads us to reconsider educational and scientific practices, to step out of the usual framework in order to move toward new spaces of education (schools that are connected, virtual, etc.) and research (conferences that are inverted, remote, with a virtual presence, etc.), oriented toward the abolition of spatial (examples: *learning labs*, *learning center, fablabs*, etc.) and temporal boundaries (remote or hybrid collaborative devices, integrating synchronous and/or asynchronous communication tools), making way for training and research situations that are less compartmentalized from a disciplinary and geographical point of view.

These different lines of thought question the contributions of digital technology in the social and university context[7] regarding:

1) the emergence of new professions (e.g. disciplinary scientific digital publishing), which are not yet considered in the training currently being offered and which call for the implementation of a dual training course (HSS curriculum and computer science curriculum);

2) the process of presentation, sharing, dissemination of knowledge. Even if we see more and more video recordings on the web (examples: conferences, round tables, etc.), scholarly knowledge is still widely presented and disseminated through textual productions, which are thus shared with a particular community that knows where to find/locate these productions (e.g. specialized journals) and reinvests them in its own work, according to well-established citation methods (APA format, for example). Today, other scientific research presentation methods must be taken into consideration with the use of, for example, 3D, virtual reality and augmented reality. These technologies can reflect different research results and illustrate differently the methodologies implemented to obtain them. These

7 How do these humanities modify knowledge and disciplines? Should we design training courses in digital humanities? What knowledge and skills should we develop? How should we transmit them? With what objectives? With what critical contribution?

productions would complement written articles, would be published and disseminated both on the same publication circuits and on new channels, reaching new communities that are aware of these presentation methods. For the dissemination of this knowledge on new media, changes have to be considered and new citation format standards of these documents have to be initiated: for example, how can we cite in a video the text of the corresponding article or comment on the scientist's gesture in a virtual reality application;

3) the researcher's personal development, whether he/she is a beginner or experienced. On the one hand, the scientist is constantly asked by his/her institutions to use digital tools (developed by the supervisory institutions). On the other hand, he/she is asked to implement a proven methodology for the development of an innovative work, responding to institutional demands for excellence and important socio-economic needs. The question of the contribution of the digital technology for the individual, actor of his/her own activities, is posed. The challenge is to respond to both growing institutional requirements and personal motivating expectations.

1.3. Fields of actions

Today, digital humanities are opening up the debate on the identification of the professional needs of HSS scientists, which up to this point were disciplinarily "compartmentalized". In fact, as we discussed at the beginning of this part, each discipline was characterized by its research questions, its methodologies, its forms of results and its methods of sharing knowledge with different members of the same community. With the arrival of digital humanities, the HSS researchers' needs are opening up to more transparency and a larger illustration of complementarity in the obtained results, in the work methods which, for some, are pooled together and, for others, tested. All of these initiatives are related to the three fields of actions offered by digital humanities.

On an initial level, the term "field" is understood in the sense of "a space of a certain extent and more or less clearly delimited, in which a known activity takes place"[8]. In this space, the "known activities" carried out by the researcher are considered in regards to the place given to digital technology.

8 Excerpt from TLFi (*Trésor de la langue française informatisé* – Digitized Treasury of the French Language).

Not easily quantifiable, not very qualifiable and specific to each actor, these activities correspond to the daily actions executed, assisted by computer tools, such as, for example, the exercise of note taking during the reading of a book/article, supported by a text editor, or the update of a bibliography aided by a reference management software.

Second, the field corresponds to a national and international, institutional and associative decision[9] (ADHO[10]) to build structures dedicated to the support of scientific research. These institutions wish to open research to new work perspectives.

In the European context, and more particularly as an example in the field of language sciences, we mention the ERIC[11] CLARIN[12] consortium. An ERIC is a type of international legal entity established by the European Commission in 2009. Its members are governments or intergovernmental organizations. Currently, 14 members and one observer constitute the ERIC CLARIN consortium, which specializes in linguistic resources. This consortium counts 13 countries at present (France is not currently on the list). It aims to provide HSS researchers easy and sustainable access to digital language data (written, spoken, audiovisual or multimodal) as well as tools to discover, explore, exploit, annotate, analyze or combine these data. There is also the ERIC DARIAH[13] consortium. In this consortium, each member country (currently 17) provides its productions, its knowledge, its skills, and in return benefits from the productions and knowledge offered by other countries. The objective is to establish a network of actors, expertises and computer services, which are sustainable and transferable to other disciplines. These two ERIC participate in the PARTHENOS[14] program,

9 Acting as a "tent" (Melissa Terras), ADHO (Alliance of Digital Humanities Organizations) brings together different associations. It includes a set of associations dealing with digital humanities.

10 Alliance of Digital Humanities Organizations: "global umbrella", it is a coordinating association of other associations, such as the ALLC, the SCHN, the ACH, the aaDH, the Japanese Association for Digital Humanities, as well as Centernet, which represent the centers of digital humanities. ADHO can be perceived as the UN of digital humanities.

11 European Research Infrastructure Consortium. URL: https://translate.google.fr/ translate?hl=fr&sl=en&u=http://clarin.eu/&prev=search.

12 Common Language Resources and Technology Infrastructure. URL: https://www.clarin.eu.

13 Digital Research Infrastructure for the Arts and Humanities. URL: https://www. dariah.eu.

14 Pooling Activities, Resources and Tools for Heritage E-research Networking, Optimization and Synergies, http://www.parthenos-project.eu.

recognized in the framework of the H2020[15] program. This program strives to offer a thematic cluster to the two European infrastructures (CLARIN and DARIAH): PARTHENOS aims to focus on different life cycles of digital data in the HSS disciplines, to offer a policy of data access, interoperability, archiving and reuse of these data.

At the French national level, three sets of infrastructure are distinguished. We first have international organizations (IO). They aim to open up the thinking on the tools and devices within the framework of large international agreements. These organizations are legally based on intergovernmental conventions which specify the financial protocol, the objectives of the organization, the requirements for membership, the operating bodies and the contribution methods of the member states.

Next, we find the very large research infrastructures (TGIR[16]). TGIRs, translated concretely by means of several LOLF[17] actions, bring together the instruments that are the subject of international or European partnerships. Researchers from all disciplines (astronomy, biology, physics, chemistry, human and social sciences, earth sciences, etc.) thus have access to the most efficient equipment in a very high-level international scientific environment: telescopes, accelerators for high-energy physics, sources of neutrons and synchrotron radiation, lasers and intense magnetic fields, means of high-speed computing, etc.

More particularly, created by the union[18] of the Adonis Very Large Equipment and the IR-corpus, the Huma-Num (Digital Humanities) TGIR[19]

15 The European program Horizon 2020 which brings together the funding of the European Union in the field of research and innovation, and is structured around three major priorities: scientific excellence, industrial leadership and societal challenges. The kick-off was given on December 16, 2013, by Geneviève Fioraso, Minister of Higher Education and Research and came into force on January 1, 2014 in France. URL: http://www.horizon 2020.gouv.fr/cid75832/la-france-donne-coup-envoi-programme-europeen-horizon-2020.html.

16 Very large infrastructures in digital humanities: http://www.cnrs.fr/fr/recherche/tgir/presentation.htm.

17 Organic law on financial laws.

18 On March 1, 2013.

19 The Huma-Num TGIR is supported by the 3598 Mixed Services Unit (Unité Mixte de Services), which associates the CNRS, the Aix-Marseille University and the Condorcet Campus.

aims to facilitate the digital turning point of HSS. It strives to develop a human (a collaboration based on a network of partners) and a technological (perennial digital services) device, the purpose of which is to support the different stages of creation, monitoring and dissemination of digital data. In addition to the Huma-Num TGIR, we can also mention the PROGEDO (Production and Data Management) TGIR. The mission of this second TGIR is to develop the culture of data, to raise the level of national structuring of research communities by deploying a development strategy between research organizations, large establishments and universities, as well as to strengthen the position of France in the European Research Area. With this in mind, PROGEDO organizes the support for the collection, documentation, preservation and dissemination of the data necessary for HSS research. It also participates in the implementation of devices with secure access to its data. In view of its objectives, this TGIR is a gateway to European infrastructures and international devices for the researcher.

Finally, also at the French national level, we find Research Infrastructures (IR). They correspond, for example, to the networks of infrastructures pooling either human resources or research equipment. They have a centralized, identified and effective governance[20]. We can name the OpenEdition IR (Open Electronic Edition in HSS) and the RnMSH IR (Réseau national Maison des Sciences de l'Homme – National Network, House of the Sciences of Man). The OpenEdition IR designs new digital scientific publishing methods (open access) with online tools of exploitation, appropriation and collaboration. This effort allows for a better circulation of knowledge in addition to an improvement of the impact of multidisciplinary research projects and results for local and national socio-economic actors. The RnMSH IR is currently composed of 23 Houses of the Sciences of Man (Maisons des Sciences de l'Homme), located throughout France. Their objective as infrastructures is, in particular, to implement different platforms[21] in order to accommodate linguistic data in digital format.

20 See the list of IRs: http://www.cnrs.fr/fr/recherche/tgir/ir.htm.

21 Spatio (spatialized data), Scripto (recorded data), Visio (audiovisual corpus), Cognito (for cognitive sciences), and Data (quantitative data corpus) platforms, supplemented by the Fundit.fr platform (Internet portal consolidating the calls for bids relating to mobility and research funding at European and international levels).

Lastly, digital humanities challenge the "service grids"[22]. These grids offer technical solutions of long-term hosting, dissemination, processing and archiving of projects of corpora, digitized sources and indexed resources that are the subject of sophisticated documentary enrichment (metadata supported by specialized thesauri, for example). In particular, six services are provided by Huma-Num TGIR:

– storage services[23]. These storage tools are accessible through Web interfaces or via file transfer protocols. They offer features of access, folder structuring, exchanges and file sharing;

– processing services. At each stage of a project, Huma-Num offers an IT solution adapted to the needs of transformations or analyses of digital data: software for processing, visualization, encoding, setting up databases, etc. With the help of these services, the researcher can "extract and annotate serial or textual data, calculate or annotate multimedia, audiovisual, 3D, cartographic data, etc."[24];

– distribution services[25]. They bring together a set of tools allowing online data publication. This service promotes open access to data, databases and metadata. It is part of a framework that promotes the controlled reuse of data produced by others, in particular by raising awareness of distribution licenses (Creative Commons, Etalab, etc.) in communities;

– exposition services[26]. Huma-Num implements a data exposition service called NAKALA[27] which offers, on the one hand, access services to the data themselves, and on the other hand, metadata presentation services;

– description services offered by ISIDORE[28]. It is a service that collects, enriches and offers descriptions and a unified access to digital documents and data (more than 800 data and metadata sources). It is the largest scientific Opendata project in France. It offers access to more than three million digital documents through an adjustable research platform which

22 Evolution of the Huma-Num service grids, created and launched in 2009: http://humanum.hypotheses.org/tag/grille-de-services.
23 http://www.huma-num.fr/services-et-outils/stocker.
24 http://www.huma-num.fr/services-et-outils/traiter.
25 http://www.huma-num.fr/services-et-outils/diffuser.
26 http://www.huma-num.fr/services-et-outils/exposer.
27 https://www.nakala.fr.
28 http://www.rechercheisidore.fr/apropos.

federates access to digital data of HSS research while linking data by means of multilingual enrichments;

– archiving service[29]. Huma-Num supports data producers throughout the archiving process, and creates the link between scientific communities and CINES[30]. It helps data producers in choosing a data format and designing, in a standardized form, the descriptive data (metadata) which are essential to their entry into the CINES archiving system.

Through these grids, we want to implement resources and more widely shared solutions, faced with redundant needs of digital data cycle management. These services are useful in several communities as well as several disciplines and provide ideas of practices to other researchers. These practices are then questioned and tested. Some are validated in their scientific contributions, while others are tested and then abandoned.

Thus, digital humanities, through the first field of action, are interested in the researchers' practices according to a rising approach, in that the objective is to apprise and categorize the actual activities. The other two provide infrastructures that the researcher can solicit and services that he/she can use in his/her individual and collective activities. We are here in a top-down approach, where organization proposals are implemented and digital resources suggested. This provision of digital resources is not new. Over the years, according to the different phases that form the history of digital humanities, several resources have already been proposed.

1.4. Digital resources at the heart of digital humanities

Digital humanities, as they are historically described in the literature, give the impression of an inventory, a list of actions carried out in different, separated contexts that are produced over the years. This is not the case. We are very much in the presence of a continuum of activities carried out in the same direction of creation and development of a merger between HSS and computer science, responding to an increasingly more defined need.

29 http://www.huma-num.fr/services-et-outils/archiver.

30 Centre informatique national de l'enseignement supérieur – French National Information Center for Higher Education.

Currently, we are in a third phase, or rather a third period (Citton 2015), which unites HSS and digital technology.

The first period (1949–1980), known as *Literary and Linguistic Computing*, focuses mainly on the development of quantitative models (index creation, frequency calculation, lexicometry, etc.). An example of a digital resource that dates back to this period is Frantext[31]. It is a database of more than 4,000 texts[32], available online, by subscription, which range from the beginning of the 16th to the beginning of the 21st Century, in addition to several texts from the 13th Century. This resource offers to the researcher the possibility to conduct quantitative synchronic and/or diachronic research in HSS. It also offers the possibility to select and consult a list of texts through bibliographical criteria (titles, authors, dates/periods, literary genres), to specifically search for a word or an expression in a text or a set of texts, to conduct tallies (frequency calculations) on the use of words by decades as well as searches of co-occurrences (use of two words close to one another) from graphic words or lemmas[33].

This digital resource eases data collection activities, which can be complex in some cases due to the difficult access of some texts and/or the number and the diversity of the texts[34] necessary for the researcher's study.

The second period (1980–1994), called *Computing Humanities*, began in the 1980s. It created a unifying process between digital technology and HSS through the implementation of formal frameworks (standards and classifications of heterogeneous data). One of the most important projects of this period is TEI (*Text Encoding Initiative*)[35]:

31 The base of Frantext texts proposed by ATILF, Nancy 2 University (http://www.frantext.fr). But others are also interesting, such as the *Base de français médiéval* or even the *Corpus de la littérature médiévale de Garnier.*

32 4,746 references, 285,923,119 words, from the 10th to the 21st Century.

33 All forms of a same verb, a same adjective or a same noun, for example.

34 Frantext consists of mainly literary works, but also contains historical, political, philosophical and scientific works.

35 General presentation: http://www.tei.fr/presentation/; markup proposals: http:// www.tei-c.org/index.xml; TEI Lite: code to exchange: an introduction to the final TEI Edition revised for TEI P5, http://www.tei-c.org/release/doc/tei-p5-exemplars/ html/tei_lite_fr.doc.html.

> "TEI has therefore taken the form of a unique, encyclopaedic model, of representation of the signifying elements of a text." (Burnard 2012)[36]

It is an initiative instituted by an international academic community. Its objective is to define recommendations for the encoding of textual documents in XML[37]. Launched in 1987, this initiative aimed to establish interoperability between the texts of linguists, historians, literati, philologists and even archaeologists. Through the markup language of the document and its structuring[38], the objective is to facilitate the sharing, dissemination and archiving of texts. Each text is thus described in its structure: nesting of paragraphs and verses in addition to the different exchanges between interlocutors that form the text.

This standardization plays an important role in the construction of a common culture of research in HSS. It marks a willingness to engage in a sharing of texts beyond the discipline and the nature of the scientific work carried out on these documents.

Finally, since 1995, we have entered the *Digital Humanities* period. This most recent period is characterized by the arrival of a set of practices and multidisciplinary scientific issues related to the dissemination of research results in connection with the deployment of the web and, more particularly, of social media (blogs, wikis, social networks, etc.). *Digital Humanities* interrogates in particular the dissemination methods of scientific productions. The objective is to provide transparency to the activities conducted, to the processes of progress of works/projects produced and the

36 Paragraph 41, http://books.openedition.org/oep/242?lang=fr.

37 eXtensible Markup Language. XML provides a simple way to represent structured data as a linear stream of characters, and to mark specific parts of this stream with "tags" appointed to indicate a structural function or elements of semantics.

38 "MOOC Ville Durable: être acteur du changement": xMOOC, offered by Laurent Vassallo and myself, from January to March 2014, University of Montpellier-IUT in Beziers. The exchanges between the different MOOC participants in the discussion forums were structured (TEI-XML), constituting a corpus made available to everyone in the framework of the ORTOLANG project (Outils et ressources pour un traitement optimisé de la langue – Tools and resources for optimized language processing), an equipment of excellence validated in the framework of future investments. One of the objectives of this project is to collect the corpora currently available in the different humanities laboratories and to make them available to everyone (researchers and non-researchers). These corpora are available: https://www.ortolang.fr/market/corpora.

reflections of the participants involved. For example, research logs are defined as a tool of scientific information open to the entire HSS community. These logs are a place to present ideas, field data, difficulties encountered and questions that make up an ongoing research project. They are defined as journals of research in construction, in the process of being completed, a kind of *work in progress*. These logs can be individual or collective. They present information in connection with the seminar of a research team, a laboratory or even a scientific association, for example. It is also a place to announce future scientific events/activities, a list of publications (related to the project), a personal and/or academic *curriculum vitae*[39]. As this is a space of freedom where everyone can free themselves from the conventional publication intermediaries (book or journal publishers), these research logs offer the means to control publishing (frequency and content). It thus presents a new form of writing, with neither temporal nor scientific constraints (date, writing standards, content evaluation by a peer, etc.).

The research log, as it has been originally defined by its designers, has the role of disseminating the research activity of a scientist or someone associated with a project in the process of being completed. This dissemination promotes exchanges between actors from the private world and the public world, students as well as everyone interested in the topic addressed. With this in mind, the log offers the possibility to these readers to be able to submit comments and thus enter into interaction with the actors of the presented research.

Thus, the research log is unique in that it plays a part in the support of the sharing of ideas related to the advancement of research results that we want to be collective and open to a wider, multidisciplinary audience. It is a space for collective thought, where the researcher can submit his/her ideas-intuitions and hypotheses, so as to generate discussion with other actors, but also with him/herself:

> "The scientific blog appears as 'a maieutics, a birth of the thought': the posts are a first stage in the construction of

39 Research logs are notebooks of teachers-researchers, theses, seminars, ANR research groups, associations, excavations, libraries, books, journals: https://enthese.hypotheses.org/769.

> research, they can serve as foundations for more elaborate work: communications, publications, parts of the thesis…"[40].

In this last phase of digital humanities, through the research logs which are proposed, willingness to implement an approach that is more reflective than productive is embraced. In fact, in the first two phases, the proposed resources aimed to provide means to the researcher to carry out analyses supported by digital technology and to standardize them with the objective of sharing the collected and produced data. Through research logs, the desire is to show/illustrate a personal and/or collective process in construction, so as to develop it in real time, in the same way as the fulfilled work. This leaves a trace of the process followed, specific to each person as well as to the group, which is integrated into a (not always conscious) strategy. Its first two phases were lacking, but the researcher can benefit from it today.

These three fields of actions should not be considered as independent fields. We should not regard them as separate from each other, but rather as complementary, linked by a scientific need (field 1), identified, collected and disseminated by institutional structures (field 2), and giving rise to responses formulated in the form of a service grid (field 3) by research organizations. Thus, in these fields of actions, where the researcher sees (especially in the latter) frameworks which are imposed on him/her as well as new procedural and technological constraints (a national and international approach), we see, on the one hand, a way to question digital technology in its daily and long-term contributions (field 1), and on the other hand, the possibility to bring to light the needs which have not yet been satisfied (field 3).

1.5. Conclusion: digital assistance in the fields of action

This first chapter aspired to present the context of our reflection, namely that of digital humanities. First, we described them as an area which is aligned with a historical continuity moving toward multidisciplinary scientific practices (HSS and computer science). Second, they were presented as opening up the institutional debate on training needs in the face of new professions, the emergence of possible innovations in the context of teaching and research, aimed at facilitating the production and appropriation

40 Research logs are presented in: http://enthese.hypotheses.org/1519#_ftn10.

of scholarly knowledge in addition to the development of an acculturation to digital technology, to cope with the expectations of academics and citizens. Third, digital humanities were described as taking shape around three fields of action: the field of observation of the researcher's activity, the institutional field where infrastructures are implemented to build networks and facilitate national/international collaborations, and finally the field of digital services (service grid). This last field is not new. As it is presented in the fourth part of this chapter, it refers to the production, the dissemination of digital resources and the standards which have marked the history of HSS for more than 50 years. In fact, since the first phase of digital humanities (*Literary and Linguistic Computing*), several resources which aim to categorize and share data as well as diversify studies in HSS (qualitative and quantitative approaches) have been proposed and disseminated to the largest number possible.

In keeping with this approach and considering the promotion of the integration of changes associated with the use of digital technology in scientific practices, which appear to be essential to the evolution of HSS research, we propose, in the next chapter, a definition of the concept of digital assistance. This definition, based on our research results, is a continuation of the different activities already carried out and discussed in the framework of different fields of actions. In fact, we first consider the notion of digital assistance as a means to observe and then categorize the activities carried out by the researcher. The objective is to understand the reasons behind the choice or non-choice of digital technology in practices. Secondly, we consider the concept of assistance which aims to question the way in which digital technology can participate in the creation, maintenance and/or development of international networks, as well as the sharing of experiences, data and knowledge formulated. We wish to propose an approach which allows the implementation of sustainable means of dissemination of the collective actions carried out in the networks, as well as the data they convey. Finally, beyond the "service grids" proposed at a national level, our objective is to provide a method which characterizes the contribution (measured and defined) of the old service grids to the researcher-user, and which opens up new proposals. The idea here is to provide methods aimed at the specification of the proposed services and to identify new ones.

2

Digital Assistance Concept

In this chapter, we present the digital assistance concept. It is a question of breaking from the common understanding of this assistance concept and of outlining its contours as a subject of research (Guillot *et al.* 2013).

From a lexicographic point of view, the Trésor de la langue française informatisé (The Digitized Treasury of the French Language – TLFi) proposes two entries for "assistance"[1]. The first one, "assistance – a feminine noun", is associated with the definition (outside of specific domains): "action of assisting someone, support that one offers, moral support or material aid that one provides". The lexicographers highlight here the presence of aids dedicated to the action of support from a moral and material perspective. In the second entry, "assistance – a noun", the TLFi gives the definition: "a person who assists, helps or replaces someone in a job, a function, and who is most often a subordinate". In this second definition, we find synonyms of the verb "help", through those who we need to assist, to support or to replace in professional situations, where a person is in a position of superiority.

In Larousse[2], two definitions (still outside specific domains) are proposed. The first presents assistance as the "action of assisting someone, giving him/her momentary assistance; back-up, support". Again, assistance is presented as an action but, unlike the TLFi, this dictionary provides temporal information: assistance is seen as "momentary assistance", which does not extend in time, which is a one-time action. In the second definition,

1 From the Latin word *ad-juvo*: assist, help someone, support something. Other information on the etymology and history of the word "assistance" is presented in the TLFi.
2 http://www.larousse.fr/dictionnaires/francais – consulted on January 11, 2017.

Learner Support in Online Learning Environments,
First Edition. Chrysta Pélissier.

lexicographers emphasize the type of support provided, especially the people concerned: “financial aid, grant, given to certain social categories (disabled, elderly, etc.), to certain industries or enterprises.”

These different definitions present assistance from various angles: the first one from the TLFi places assistance in the nature of its inputs; the second one in its situational context. The first one from LAROUSSE describes it in its temporality; the second one by the type of individuals solicited. This underlines the difficulty of defining the concept behind a term that is so common and integrated into our language habits.

From another perspective, the design and reception of assistance in the context of teaching by an assisting individual are complex processes (Alhadeff-Jones 2008). Its study cannot be defined as a juxtaposition of compartmentalized and reductive viewpoints that only consider a single aspect isolated from the others, developed in the framework of a single scientific discipline. Thus, there is no assistance-specific disciplinary theoretical framework which takes into account the complexity of this concept. It must be questioned in a collective manner, with a view to providing solutions in the framework of a design, production, use and evaluation process.

We define assistance in a systemic approach (Bangoo 2006; Lerbet 1984; Lerbet 1997; De Rosnay 1975).

Even if this approach “does not yet occupy, in education, the often preponderant place it can have in other disciplines such as, for example, cognition sciences” (Lerbet 1997, p. 5), it is an approach integrated into the field of the use of digital technology in training (Demaizière and Dubuisson 1992), where several disciplines find their place: pedagogy/didactic, cognitive/social psychology, linguistics, information and communication, etc., each shedding a particular light which leads to complementarity, not to theoretical exclusion (Lahire 2001). We also comprehend this concept in its environment and its relationship with other components, whether digital or not (Mangenot 2000). In fact, assistance is defined as being implemented in a situation, influenced by constraints (imposed or proposed), according to a process of maintaining consistency mechanisms, which the different people involved must face (changes, modifications, developments of the situation and their perceptions).

Incorporating some elements of these definitions, we provide in the following pages a comprehensive and analytical view of the digital assistance concept. From a comprehensive point of view, we first describe assistance in the framework of some major trends in educational psychology, within which this concept does not appear as a component identified as such. At an analytical level, we present this concept within several theoretical frameworks associated with the different stages that characterize assistance as a process, in its design cycle.

2.1. Definition of assistance in a few major trends in educational psychology

From a historical point of view, over the past four decades, the theoretical trends of learning in psychology have come one after the other, without necessarily giving a particular place to assistance. This can be explained by the fact that these trends examine the individual as such, in his/her construction and/or his/her situational interactions. The object of questioning is the person and not his/her action or actions. However, for each of these trends, we can specify the role of assistance and its implementation for the assisted individual.

The behaviorist approach defines learning as a process of behavior modification through the establishment and strengthening of associations between stimuli and responses. In this context, assistance, in the sense of support of the resolution of a particular problem encountered by the learner, is neither heard, nor present in the system (Skinner 1968). However, if we consider the teaching approach as a learning assistance approach, assistance is defined as centered on the targeted disciplinary content (objectives to achieve), and takes the form of *feedback* (return on responses) identical for all learners, regardless of the question asked and the answer given.

The constructivist approach underlines the learner's active role in the construction of his/her knowledge (epistemic subject), through the implementation of cognitive processes (mental operations) from his/her perceptions and his/her previous personal experience. Constructivism postulates that we learn through activity, by constructing personal objects, as it is advanced by Papert (1981). This construction takes the form:

– of a process of integration of new knowledge into old knowledge. Giordan (1998) speaks more specifically of the transition from one network

to another more relevant network. Assistance is, in this process, a triggering factor of network change. It allows a new configuration of knowledge, by updating mental structures integrated into the learning procedure. In keeping this in mind, research made it possible to specify support aids in the form of educational profiles (Garanderie 1980; Ginon and Jean-Daubias 2012) and/or learning styles (Bousbia 2011);

– of a motivated construction (Perrenoud 1993). It is a matter of giving meaning to the action required of the learner in relation to his/her professional as well as personal goals, such as his/her desires or passions. Assistance, in this case, is a motivating component (Lieury and Fenouillet 2013) which is intended to remind the learner of the objective and the reasons underlying his/her efforts.

In social constructivist theories (Vygotsky 1985; Bandura 1986), trainers propose educational methods based on cooperation, so that learners can construct their knowledge together. In this approach, it is through interacting, through coordinating his/her conception of reality with that of others, that the individual masters new concepts (Sweden 1990) and achieves learning. Socio-cognitive conflict is often the starting point of learning, and the social interactions of an experienced learner contribute to his/her development through a construction effect (Bruner 1983). In this approach, assistance takes the form of exchanges between the different people involved in the system, who can assist or support one another, according to a chosen communication protocol. In that case, assistance is the bearer of disciplinary or methodological knowledge, allowing both the advancement of the collective project and the construction of knowledge of each individual.

Cognitivist theories (Piaget 1967) take into account the learner's cognitive development, that is the mental processes that relate to memory, language, reasoning, intelligence, problem solving, decision making, perception or even the attention which relate to the learning process. From a cognitivist point of view, what is happening in a learner's mind is just as important as what he/she expresses through his/her interactions. The challenge is to formalize the cognitive functions involved (mental images, representations and stages of development, prior conceptions), and then to encourage the implementation and evaluation of these cognitive functions through assistance (McGilly 1994). These theories do not address assistance as an object that is part of the learning process (Meirieu 1989), but as a component of the context, which requires special processing on the part of

the recipient. This processing is carried out according to faculties of memory which involve an organization of information and the use of strategies to manage/process this information.

Regarding situated cognition theories (Suchman 1987), they focus on the physical (place), social (interactions between people) and material environment of the individual (Grison 2002). Contextual factors (external representations) and mutual intelligibility production mechanisms are essential in understanding the situation. These factors should therefore be taken into account in the learning process and the knowledge constructed to meet the requirements of the situation is not easily transferable. Assistance, in this context, is the bearer of information on this environment. It also influences the procedure, which can be followed by the assisted individual.

Finally, distributed cognition theories (Hutchins 1995) place a strong emphasis on individuals' social component. Derived from cognitive sciences, cognitive anthropology and social sciences, these theories suggest that, in order to understand human cognition, we must consider it as a socio-techno-cultural phenomenon. Cognitive activity consists of mental representations, social structures, culture, individuals and tools. Defining assistance in these theories is like asking how technology can be put to the benefit of the people involved in a both flexible (system flexibility to account for the diversity and variability of the human element) and adaptive (to compensate for the inability to predict *a priori* all requirements and strategies of individuals) framework, in workspaces which are characterized primarily by a collective participation within remote communities.

The individual is questioned in his/her entirety in all of these approaches. Assistance does not appear as a response to a problem explicitly/implicitly raised by a subject. It is not defined in its digital version, because the IT aspects were not introduced by the original creators of these trends. Nevertheless, in each of the theoretical trends proposed as an example, the role of the identified assistance is different. It is implemented in a specific way, as summarized in Figure 2.1.

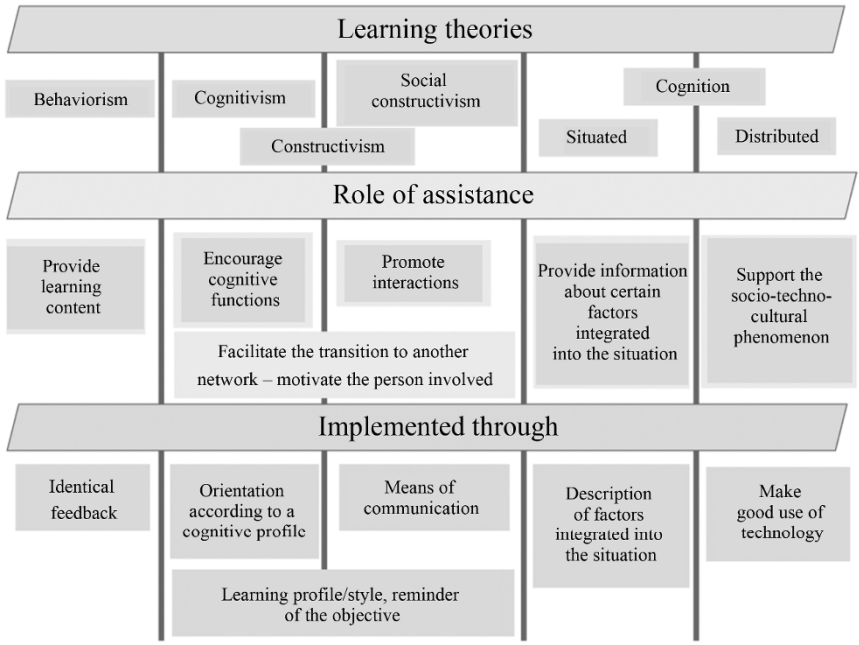

Figure 2.1. *Definition of assistance through a few different trends in educational psychology (adapted by Nkambou, 2012)*

Figure 2.1 shows assistance in a diversity of implementations. We group them according to three major types. First, assistance is a response to an action. This response takes the form of feedback in the behaviorist approach and the use of a means of communication in the social constructivist framework (Martinez 1989). Next, assistance is developed/formed through learning styles/profiles proposed by the cognitivist and constructivist approach. It also makes use of the contributions of technology proposed in the situated cognition framework. Finally, assistance takes into account, during its design and its evaluation, factors integrated into the situation as part of the situated cognition approach.

Here we find three of the four stages that make up the cycle of assistance presented in the following section: the response to an action/need, the processing/design methods considered, and its assessment from the different environmental factors integrated into the situation.

2.2. Assistance as a cycle

Digital assistance is defined as a process, a cycle. The concept of a cycle for describing the assistance process is not new. Karabenick and Newman (2009) have already addressed the request for assistance (Puustinen 2010) as a multi-stage process for the assisted individual: detection of a difficulty, determination of the need for assistance, decision to ask for assistance (or not), choice of the type of assistance sought, choice of expert, actual request for assistance, obtaining assistance, processing of the assistance obtained. The authors do not present this process as linear, but as a set of stages appearing at a given moment and allowing the person involved to advance in the activity associated with his/her request.

Our point of view is not that of a person asking for assistance, but that of the assistant who was led to construct the assistance. It follows a cycle, a set of stages from the design up to the archiving or dissemination of the assistance produced. In this assistant-specific cycle, assistance is defined as following four major stages (Pélissier 2014). Each of these stages is characterized by a twofold scientific/instructional design orientation:

1) birth of assistance/needs analysis;

2) processing/design of assistance;

3) utility/assessment of assistance;

4) accessibility/assistance future.

Assistance is presented, on the one hand, as a set of research questions, and on the other hand, as a reflection on the practical and applicative field. Through these pairs, at each stage, a place is given to scientific results and technical achievements which implement these results in a production which is made available to the people involved in the situation of assistance.

According to this cycle, the first stage of assistance is the birth. It corresponds to the triggering factor and appears either in the form of a reception of a request for assistance or in the form of a situation analysis. From the assisted person's point of view, the request for assistance is characterized by different phases (Nelson-Le Gall 1981; 1985) from the designer's point of view, it takes the form of a received and interpretable message. Situation analysis is carried out by the designer of the assistance from one or several components of which he/she is aware, based on

indicators that are specific to him/her (e.g. one or several difficulties detected or likely to be encountered by the assisted person).

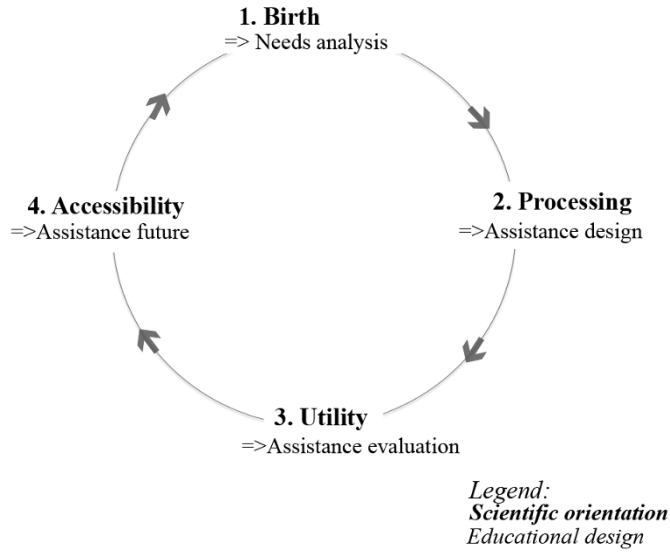

Figure 2.2. *Assistance cycle (extract from Pélissier 2014, p. 45)*

At the engineering level, the birth of the assistance corresponds to a needs analysis of future assisted individuals. This analysis is carried out based on explicit requests for assistance (in oral and/or written format), and/or an interpretation of different interactions, of traces (Djouad *et al*. 2009) left by future assisted people on a computer system (emails, forums, etc.).

In the second stage, the processing of the assistance aims to identify the knowledge concerned by the production of assistance. From a scientific point of view, this processing can be studied:

– according to the data integrated into this processing: for example, knowledge of the field taught in the training context, pedagogical approaches which have been selected or even representations that the designer of the assistance may have of the recipient;

– as a process that can be divided into three lower-level processes: (1) the process of understanding the request for assistance, (2) the process of identification of data related to the representation of the individual who

requires assistance and the problem raised, (3) the process of formulation of the assistance implemented from the arrangement of this data. It is also interesting to question the organization of these different processes according to the designer of the assistance, that is according to inter-individual and intra-individual differences.

In educational design, assistance is the result, that is the product, of the design. This product can be characterized by a configuration of "knowledge/implementation" pairs. "Knowledge" is the disciplinary or transversal knowledge to be transmitted by the assistance and chosen by the designer. "Implementation" corresponds to the way in which this knowledge is formulated (message of a text, graphic, typography of some elements, etc.) in the assistance produced.

Concerning the third stage, it is a matter of allowing the designer to evaluate the assistance that he has provided. In this stage, we find scientific questions regarding the strategies implemented by the designer in order to establish the link between the information provided by the assistance that he/she developed and the request formulated, as well as the relationship between the assistance and the hypotheses made by its designer, concerning the problem which, according to him/her, is at the origin of this request. This evaluation process is organized around several lower-level processes:

– to identify and perceive "knowledge/implementation" pairs which are present in the assistance formulated (for example, in an email and/or a website provided as assistance);

– to isolate "knowledge" from "implemented" aspects. The designer of the assistance, when offering assistance, must identify, in a set of information, those that appear to him/her to be relevant in order to support the assisted person in his/her approach to problem solving. The designer must also question the implementation of this knowledge in order to facilitate the reading and interpretation of this assistance. For example, he must identify the most appropriate way of presenting certain targeted knowledge (in oral, written, or graphic format). The objective is to indicate to the assisted person, through the use of (form and localization) formats, the knowledge which will best guide him/her in understanding the assistance;

– to make assumptions about the usefulness of "knowledge/ implementation" pairs in the framework of the need mentioned in the request for assistance or the observations carried out. In this third stage, the designer

constructs, based on the assistance he/she has just proposed, a new representation of this knowledge of the assistance recipient. This representation is to be constructed based on the pairs he/she has just developed and put at the disposal of the assisted person in the assistance produced as well as on the consequences linked to the reception of his/her assistance.

From an educational design point of view, assistance evaluation is at the level of the contribution of this assistance in the resolution of the original problem/need. It is a matter of reflection, on the one hand, of the different possible responses to each of the formulated requests for assistance, and on the other hand, of the different consequences related to each of the provided assistances. These consequences can be related to the development of personal knowledge or skills, to a strategic vision of this development in the medium or long term.

Finally, concerning the fourth and last stage, assistance is examined in its future. The questions focus on the reasons related, on the one hand, to the archiving of assistance, and on the other hand, to their changes of status (proactive to reactive and vice versa). In regard to archiving, reactive assistance usually disappears after having been provided to the assisted person, while proactive assistance is maintained and, in some cases, updated, from one usage session to another. We can then examine the reasons associated with such a choice: to examine the problems which might arise in the implementation of the indexing and then the categorization of the different reactive assistances produced, or even during the archiving of the different versions of the proactive assistances depending, for example, on the factors triggering an update and/or the components of the assistance affected by the changes. Apropos the change of status, no scientific work has, for the moment, examined the conditions of transition from one status to another. Everything happens as if the designer of the assistance made choices without examining them after having provided them, neither in their status (without a transition from reactive assistance to proactive assistance), nor in their contribution. However, two requests for assistance are never identical. Intra-individual and extra-individual differences are present, and can particulize the assistance design process. Similarly, for the same request, different formulations of assistance are possible. However, only one is generally offered by the assistant. It would be interesting to conduct a study on the different assistances that could be provided for the same request: the variation factors would then be identified.

From an engineering point of view, we lack the perspective to evaluate the assistance produced. In fact, a very small number of field studies related to the monitoring of the reactive assistance produced have been conducted. It is as if the assistance designed and distributed to one or more individuals was inevitably advantageous to them. A number of questions on the use of such assistance and on the reasons associated with the difficulties of its evaluation deserve to be examined. These studies would provide the assistant with the possibility to examine his/her understanding of the need for assistance (formulated or observed), on the content and form of the assistance that he/she proposes, as well as on the adjustment methods he/she could implement, in the course of the assistance he/she provides.

Through this cycle, assistance is defined as a complex entity that can be understood in a comprehensive manner. However, by studying each of these stages, we observe that we lack methodological data to comprehend this process in detail. Thus, later in this book, for each of the stages that make up the cycle of assistance, we set up a theoretical reference framework and illustrate our debates with examples and results of the conducted studies.

2.3. Assistance as a response to a need

2.3.1. *Theoretical framework: concept of support and request for assistance*

The work on support initiated by Bruner (1983) in developmental psychology is based on studies by Vygotsky (1986). They are part of the constructivist perspective which places the child at the center of learning, which is defined as an active process. The interest of support lies in the fact of having identified formats[3], or regular and ritualized exchange forms, in which support is part of establishing an interaction, or even a collaboration, between the adult and the child. For Bruner, it is through the appropriation of these formats that the child ultimately reaches a problem-solving autonomy. "Support appears as a constituent process of assistance" (Duthoit 2014, p. 45), a process that is inherent to learning which describes actions in which an expert (adult or teacher) assists a novice (child or learner).

3 These formats are also designated by "conventional and intersubjective social behaviors through which meaning is transmitted" (Arditty and Vasseur 1999, p. 9).

Bruner's studies on the concept of support also focus on the requests that the child makes to the adult. In fact, the analysis of this request is particularly important for the author: support can only exist if the request is explicit. It is the triggering factor of assistance. Bruner distinguishes, in particular, three types of requests:

– a request to obtain an object that the adult has in his/her hands;

– an invitation when the child wishes the adult to participate in a game with him/her;

– a request to carry out an activity for which the child does not have all the required skills.

The assistance concept that we develop falls within the third category. The child becomes aware of his/her difficulty(ies) during an activity, and then, according to a formulation which is suitable for him/her, he/she requests assistance from the helper/person of reference (parent/teacher). However, the contexts addressed by Bruner's studies did not take digital technology into account. Not all aids proposed in training meet an explicit learner's request and the request does not necessarily precede the design of an aid, which can be proposed based on observations of the situation of the activities carried out by the people involved.

Regarding the feedback associated with a request for assistance, six different support functions have been identified by Bruner (1983) in a one-to-one context (child/parent), where the child cannot carry out the task requested alone:

– enrollment, which consists of, for the individual assistant, engaging and maintaining the child's interest in the task at hand;

– orientation, which aims to ensure that the child does not lose sight of the intended goal;

– reduction of degrees of freedom, which consists of, in particular, a simplification of the task, in order to facilitate its resolution;

– focus of the child's attention on the parameters of the task which are relevant to its fulfillment;

– frustration control, in which the objective is to de-dramatize the difficulties encountered;

– demonstration which gives the example, a model to follow.

Even if the context studied by Bruner does not integrate digital technology, these six functions offer us the possibility to characterize certain aids, as they are proposed today.

Thus, later in this book, we present four digital aids that we then characterize based on the six functions identified by Bruner. This approach will allow us, in the conclusion, to define support functions for digital assistance.

2.3.2. *Example of assistance for a reflective activity*

Present in many professional fields (Balas-Chanel 2012), such as the health, social, educational (Perrenoud 2004) or technical world, reflective practice is not a spontaneous activity. It is a matter of an individual reflecting on his/her personal and/or professional activities. Applied to teacher training, this practice consists of learning by and in action (Schön 1993). The objective is to be trained through the analysis of his/her own practice, in addition to academic knowledge.

The aim of this approach is the improvement of a professional (more effective) practice, the development of critical observation capabilities. It is developed based on identified indicators, hypothetical explications of differences (for example, between the estimated and the real), the perception of the expected results for institutional validation (quality of service rendered) or an improvement of self-confidence (faced with requirements, professional recognition by peers/institutions, or for career advancement).

This reflective activity has been questioned in its possibility to be supported by different aids, particularly regarding the professional behavior of a teacher (Couturier 2000). Here is an example.

RESULTS OF RESEARCH WORK.–

Situation studied: the issue of teacher training is crucial. Training courses are regularly adjusted, extended and reorganized, and training content is regularly reviewed and specified in ministerial provisions. In this context, teacher training through reflective practice (Perrenoud 1998) is paramount. It participates particularly in the development of the capabilities of each person to arm oneself and adapt to the new field practice configurations.

Objective: the objective of this research is to provide assistance to teacher training (Demailly 1987) for the analysis of best practices, accessible to tutors, to tutors of tutors in addition to student teachers. This assistance took the form of a tool consistent with the provisions and configurable according to the different disciplines and different school frameworks (primary, secondary, higher).

Methodology: the study carried out is based on an ethnographic approach. After having identified the common elements of the "school genre", the work has enabled the identification of areas of variation and of adjustment in the teacher's action, in the attempt, in a third stage, to understand the reasons in two ways: 1) by observing students' activity in response to this teaching act, and 2) by comparing the observations with what the teachers concerned say during video self-confrontation interviews of their teaching session.

Scientific results: a model of professional gestures (Bucheton 2009) aimed at the specification of the teacher's professional gestures at the beginning of class, in a classroom, has been proposed. The teacher's gestures are analyzed based on five macro-concerns (knowledge, management, support, atmosphere and linking), and moderated by indicators of nature and strength. Nature corresponds to the category given to each macro-concern and strength is an estimate of the influence associated with this category at a given time.

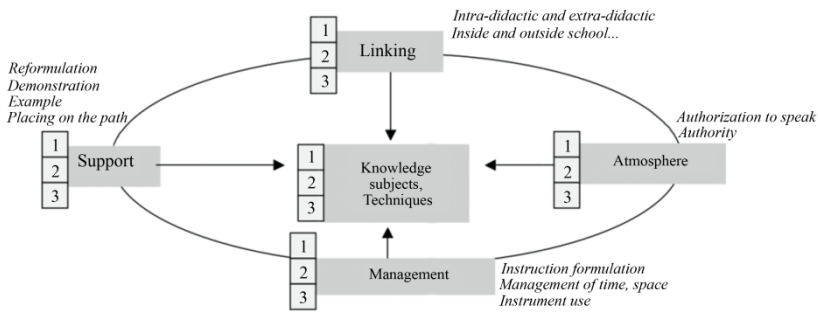

Figure 2.3. *Multi-agenda of macro-concerns (extract from Brudermann and Pélissier 2008, p. 25)*

Engineering results: this model of professional gestures was implemented in a digital resource of assistance in the analysis of teaching situations. In

the following example (see Figure 2.4), a French course is presented in the form of an audiovisual recording. On the left part of the screen, it is supported by an analysis carried out based on the model of professional gestures.

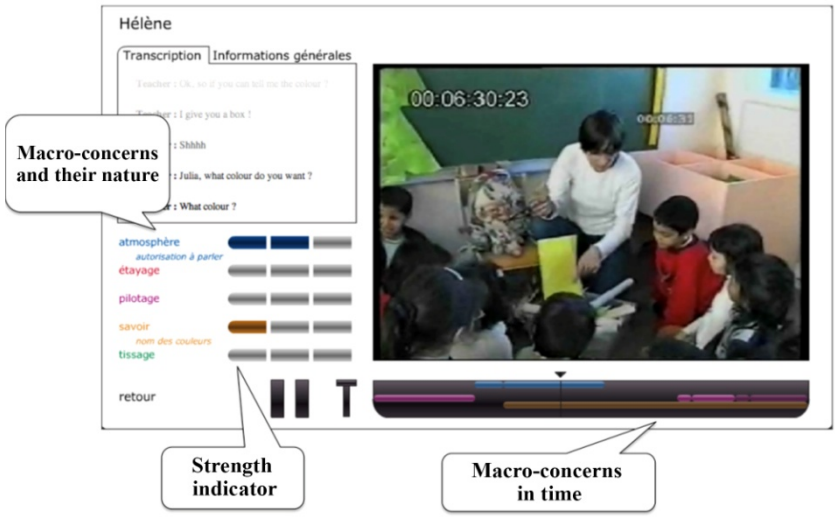

Figure 2.4. *Analysis of a teaching situation of English based on the multi-agenda model (extract from Brudermann and Pélissier 2008, p. 27)*

In this example, on the right side, you will find the film recorded in the classroom and, on the left side, the analysis of the film produced by the teacher and/or other student teachers in the training situation. In particular, you will find the transcript (a written version of the oral exchanges between the teacher and the students) and two boxes summarizing the analysis which can be made of the situation from the proposed professional gestures model. From the *time line*, which is located below the film (represented in the form of a large T), we find the real-time analysis of the situation that is unfolding as the audiovisual document progresses. This box indicates, at any *t* moment of the video, the distribution of the different macro-concerns (presented on the left side). At certain moments, we identify, over a given period of the video, the superimposition of certain macro-concerns. This *time line* allows us to view how several macro-concerns can be superimposed, consecutive, or even partially/fully linear during a teaching session.

Research prospects: the strength indicator (between 1 and 3) is represented in Figure 2.4 in the form of three gray rectangles that can be colored (or not) depending on its presence at *t* moment of the video. It is currently an arbitrary value provided by the teacher him/herself (the actor of the video during the self-confrontation interview). Work on indicators (including linguistic) dedicated to the determination of this influence is envisioned.

In addition, this multi-agenda of macro-concerns, established from face-to-face courses, could be put to the test in other training situations, such as distance learning (ODL, MOOC) or hybrid training. The challenge is then to open the results observed to other training methods, making it possible to propose elements of comparison and generalization (if they exist).

When compared to the six support functions proposed by Bruner, this digital assistance tool offers certain specificities:

– enrollment: the digital assistance tool proposed is intended to encourage teachers to improve their practices. For them, this is an objective that they must retain throughout a professional activity. In keeping this in mind, it is adapted to practices of both experienced teachers and students in training;

– orientation: at every moment, the digital assistance tool makes it possible to analyze the situation, which can then be adjusted depending on the objective that the teacher has set. This adjustment is not currently considered in digital resources as it is currently available. Possible scenario: we could propose to the user to consult, for example, analyses from other contexts which would allow him/her to carry out those adjustments on his/her own. Similarly, it might be interesting to give the possibility to the user-teacher to explicitly state beforehand the objectives of the session, so that they can be correlated with the actual process and the proposed analysis;

– reduction of degrees of freedom: this digital assistance tool does not have a role in reducing degrees of freedom but rather in inciting them. In fact, the possibilities offered to the user to set up situations implementing one or more macro-concerns proposed in the analysis model are infinite. The teacher's creativity is thus solicited;

– focus of attention: this resource does not offer the user a particular situation on which it might be interesting to focus. It is rather an analysis tool of all the situations integrated into an assistance approach, whose role is to provide a view of the situation based on the macro-concerns proposed in the teaching behavior model. Additionally, in the analysis provided by the

system, none of the macro-concerns of the model can be isolated by the user-teacher. It would be interesting to set up this function to be able to discuss in training sessions the different ways to implement a particular macro-concern, or to reflect on the reasons related to the absence of certain macro-concerns;

– frustration control: digital assistance offers young teachers the means to de-dramatize the difficulties encountered during their first courses. Indeed, the resource offers the possibility to view and analyze several teaching situations, according to different disciplines and different target audiences;

– demonstration: through concrete examples (recordings of teaching situations) integrated into this digital resource, the teacher can view multiple situations that present a linear and controlled process and/or difficulties for the teacher (related to the discipline taught or the poor management of time or even of space). Digital assistance does not offer ideal situations, "ready-made recipes", but rather a means to discuss difficult but real situations.

2.3.3. *Example of assistance for a repetitive activity*

A repetitive activity is defined as an activity occurring at a high frequency[4]. For example, the correction of papers is "carried out by a teacher who turns to his/her own approach, in isolation" (Capelle 2010, p. 123). As a result, the corrector writes his/her own comments, several times, on the same paper or on multiple papers. Resources supporting this correction activity are possible. The goal is not to replace the evaluator but to facilitate his/her activity.

RESULTS OF RESEARCH WORK.–

Situation studied: research has made it possible to identify the training needs of trainee students of English at the IUFM, through written and oral tasks. This identification has led to the implementation of a mediation system in the form of a task revision matrix (Brudermann 2012), taking into account recurrent, or even systematic, Non-Compliant Productions

4 A report entitled "La définition du travail répétitif comme facteur de pénibilité", written by Hervé Lanouzière, ANACT Director General, for social affairs, health and women's rights, labor, employment, vocational training and social dialog. URL: http://www.ladocumentationfrancaise.fr/var/storage/rapports-publics/154000690.pdf.

(PNCA) of students during a production in the English language. The proposed digital assistance tool integrates into this mediation system.

Objective: its purpose is to facilitate the correction activity of papers sent via email by the students. The objective is to save the teacher time in his/her tasks of writing comments associated to a recurring PNCA in one or several productions/papers of students, and of selecting remediation micro-tasks associated with it (exercises to be carried out independently by the learner, in particular).

Methodology: the students' papers were collected and analyzed, the PNCAs were listed and categorized. For each PNCA, different comments were subsequently proposed, discussed and classified, and training micro-tasks associated with a remediation were submitted by the teacher.

Scientific results: the results of this work enabled the implementation of a conceptual model of data. Among these data, we found an organized list of PNCA (corpus of errors), comments and training micro-tasks. The conceptual model was, in a second stage, implemented in the form of a computer aid (using MOODLE), accessible by the teacher during his/her paper revision activity. During the process, each assignment turned in by the learner is read by the teacher-tutor, who can annotate the paper using the computer program which is as follows:

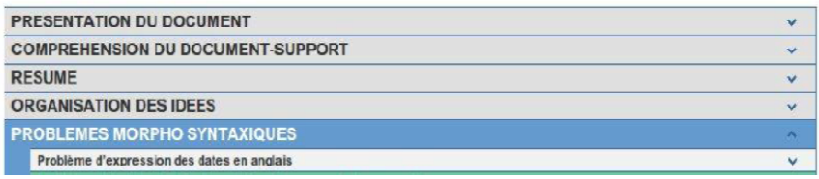

Figure 2.5. *Online task revision matrix of production in English (Brudermann and Pélissier 2011)*

Thus, using MOODLE, the teacher highlights the non-compliant points in the student's paper and then uses the application (see Figure 2.5) to select the title that appears to be the best match to the problem identified. By simply clicking on the title, the comment associated with the error identified – as well as proposals for remediation exercises – will automatically be added to the students' revision sheet, who thus benefit from individualized feedback. This sheet is returned to the learner at the

end of the correction of the paper. It will enable him/her to carry out remediation exercises on his/her own, to review his/her paper and to return it corrected to the teacher.

Engineering results: the categories present in the corpus of errors served as the basis for the computer revision program which was integrated into MOODLE, in the framework of a supplementary module. This module is an assistance resource for the online correction of papers in English. It allows the teacher:

– to append a revision code in the work submitted by each learner, in order to characterize the types of problems encountered (grammar, transfer, proofreading, etc.);

– to complete the database of the problems listed during research-action. To each new problem identified, the teacher must associate comments and training exercises/in-depth study (that the learner must carry out on his/her own);

– to consult the individualized revision sheet, which is generated automatically from the revision codes added by the teacher to the paper. This sheet summarizes the various types of problems encountered in the turned-in assignment. Each problem is associated with one or more comments or proposals of exercises present in the database.

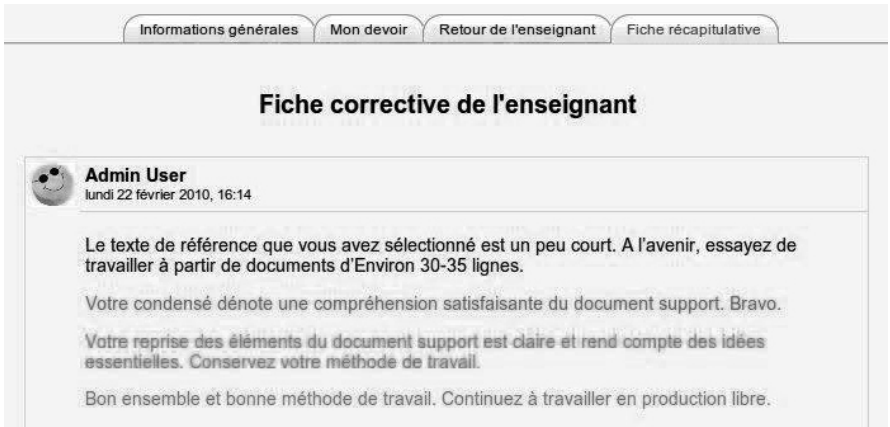

Figure 2.6. *Comment sheet created by the teacher using the assistance module (Brudermann and Pélissier 2011)*

Research prospects: the enrichment of the database (error categories, error sub-categories, comments and remediation exercises proposed), which is manually performed today, could be envisaged according to more automatic procedures (for example, in relation to educational resource databases).

Such a work on the English language required a detailed analysis of the language productions of LANSAD[5] students. Duplication with other target languages seems possible. This student work opens the debate, firstly, on the students' needs in higher education, and secondly, on educational practices related to teaching-learning languages at the university.

This digital assistance tool offers certain specificities, in relation to the functions proposed by Bruner:

– enrollment: the assistance tool is intended to encourage the language teacher to more regularly conduct evaluations which usually represent a time-consuming activity, which is not very interesting from a learning point of view;

– orientation: the proposed digital resource includes comments and training micro-tasks incorporated by the teacher him/herself. These components can then be modified and enriched. This possibility emphasizes the purpose: to evaluate papers, certainly, but above all to facilitate the understanding of the errors made as well as a personalized means to remedy them;

– reduction of degrees of freedom: the simplification of the evaluation task is proposed through the continuation of a programmed action sequence. This sequence begins with the identification of the error in the paper from the proposed categories, followed by a selection of comments and remediation exercises from an available list. Thus, the teacher's evaluation task is reduced to a linear approach imposed by the computer system;

– focus of attention: through the provision of categorized error lists, comments and training exercises, the resource offers the teacher the possibility to focus primarily on the identification of the errors present in the papers;

5 Langues pour spécialistes d'autres disciplines (Languages for specialists of other disciplines).

– frustration control: through the proposed assistance tool, the teacher reduces the time allocated to the repetitive task of writing comments and exercises associated with each error;

– demonstration is not a function of the proposed assistance tool. Only examples of comments and training exercises are already present. These lists can be enriched by the teacher at any time, but no rules for the use of these comments and examples are imposed.

2.3.4. *Example of assistance responding to security constraints*

Studying in prison[6] is part of a specific organizational and legislative framework. Each European country is obliged to provide to its prisoners access to education and culture:

> "All prisoners must have access to education, which should include basic education, vocational training, creative and cultural activities, physical education and sports, social education and the possibility to go to a library[7]."

However, the prison environment is defined as a micro-society (Febrer 2011) within which training has its specificities (Alidières 2013). It must respect security obligations, meet administrative requirements, and respond to the specific needs of each of the student-prisoners[8]. These prison constraints are not anticipated in the systems currently proposed by the university. Thus, in order to respect these recommendations and to open university training to student-prisoners, different aids have been proposed and implemented by the institutions responsible for the training and awarding of diplomas and degrees.

6 A French report "Activités d'enseignement et de formation en prison : état des lieux en Communauté française" URL: http://www.huytebroeck.be/IMG/pdf_PUB2009_1884_FormationPrison.pdf.

7 Recommendation No. R(89) 12, adopted by the Committee of Ministers of the Council of Europe on October 13, 1989.

8 "Les spécificités de l'institut pénitentiaire", RAUDIN Report (Recherches aquitaines sur les usages pour le développement des dispositifs numériques). URL: http://raudin.u-bordeaux3.fr/wp-content/uploads/2011/01/institution-penitentiaire.pdf.

RESULTS OF RESEARCH WORK.–

Situation studied: in prison, the use of software and access to computers is limited. The use of remote communication tools is also governed by rules and regulations. Yet today, universities have platforms[9] and digital work environments (ENT) for the distance training of their students. These courses are organized according to university calendars, without taking into account prison constraints, such as Internet access time, sports, visits, walks, or even meetings with lawyers, judges, etc.

Objectives: the goal of the conducted study was, on the one hand, to characterize the assistance that can be implemented in training systems in the prison environment, and on the other hand, to define the role of language in the support activities of the target audience.

Methodology: two methodological approaches were carried out concurrently. In the first approach, training situations, extracted from a prison environment, were filmed and analyzed according to an ethnographic approach. In the second approach, we compared this analysis to the theoretical assistance models which have already been established from training situations outside the penitentiary environment.

Scientific results: the results made it possible to emphasize the omnipresence of a particular form of assistance, modulation assistance, which is not present in a context outside prison. This aid is intended to facilitate continuous adaptation of teaching activities to a space-time context imposed by the prison structure: irregular presence of student-prisoners in courses, recurring prison stays, transfer of student-prisoners in different penitentiary institutions, etc. The presence of this aid in the framework of prison training can be explained by the precarious balance that reigns within a prison environment and imposes the implementation of a particular space.

> "The course space is the accomplishment of the participants – teacher and students – of a unifying space of experiences. Teacher and students co-organize the social activity of prison studies through the resources available in the course environment and the spatio-temporal organization of the prison." (Alidières 2013, p. 215)

9 In information and communication technologies, a *Learning Management System* (LMS) or *Learning Support System* (LSS) is a software that supports and manages a learning process or an education path.

Thus, a space is co-built by the people involved based on linguistic practices.

> "Language practices and corporal behaviors of the people involved can thus create new spatialities and redefine space boundaries." (Greco *et al*. 2009, p. 265)

Through language (between teachers and learner-prisoners), modulation assistance is being implemented. Its purpose is to facilitate the definition of educational activities which are both diverse and adapted to the needs of student-prisoners, according to their current state of mind (quite variable from one minute to the next) and less in the perspective of obtaining a diploma or a good grade, as is maybe the case in the framework of a university training context outside prison.

Engineering results: the identification of modulation assistance opened up the possibility of implementing digital management resources for the different activities carried out within penitentiary institutions: activities related to penitentiary administration and activities related to learning (courses, meetings with training managers, etc.).

For example, assistance to the organization of all activities surrounding the learner-prisoner has been proposed. It takes the form of a common timetable for penitentiary administrative personnel and Local Education Officers (LEOs) who are in contact with universities.

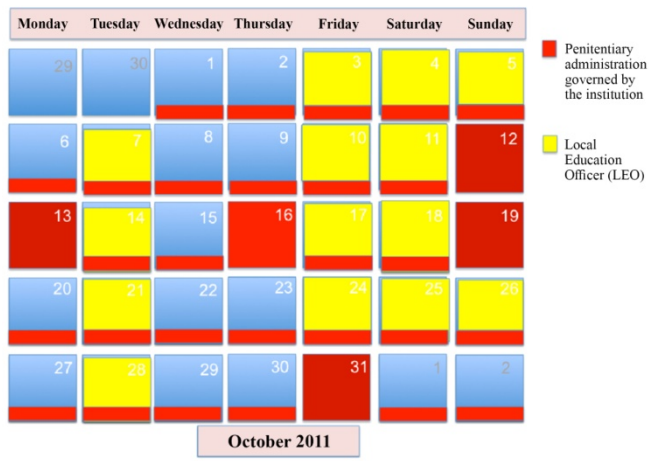

Figure 2.7. *Assistance timetable tool for activity management of student-prisoners (Alidières and Pélissier 2013). For a color version of the figure, see http://www.iste.co.uk/pelissier/learner.zip*

In Figure 2.7, the proposed timetable takes into account and separates the activities related to the education offered in the prison establishment and those which support the student-prison in his/her daily life (visits, sports, etc.).

Prospects: we can question the relevance of modulation assistance in the training context outside of prison. Why not consider the implementation of such assistance for new incoming university students, to maintain their investment in sports, cultural, artistic and social activities that they wish to pursue concurrently with their university training?

This digital assistance tool offers certain specificities, in relation to the functions proposed by Bruner:

– enrollment: the proposed assistance tool encourages the permanent learning activity of student-prisoners in precarious conditions proper to the prison environment;

– orientation: at any moment, the proposed resource makes it possible to temporally view the completed courses and the organization of the upcoming courses in order to obtain a diploma;

– reduction of degrees of freedom: through this resource, the student-prisoner identifies the offered courses and other activities internal to the institution;

– focus of attention: through the provision, in the proposed resource, of a color scheme, the student-prisoner identifies class schedules. In this way, he/she can be prepared, carry out readings or talk about it;

– frustration control: through this assistance tool, the teacher de-dramatizes the difficulties encountered by the student-prisoners into implementing a sustainable learning procedure. He/she discerns the specificities of the context and can adapt to it if he/she wishes;

– demonstration is not a function currently implemented in this assistance tool. We could consider supplementing the resource in a way to encourage student-prisoners to participate in the course: we could provide course extracts filmed in a way so that they can project themselves on a future learning activity.

2.3.5. *Example of assistance responding to innovation situations*

Innovation is defined as "a new idea which is materialized by putting a new item or a new service on the market" (Tomala *et al*. 2001, p. 1). It indicates both a result (a real and concrete production) and a process (approach) which made it possible to obtain this result (Loilier and Tellier 1999).

For example, MOOCs are training systems which have recently appeared. They have been in France for half of a decade[10] and allow thousands of Internet users to obtain a "certificate of completion". This certificate is defined as a certificate of participation. The topics covered are very diverse. They integrate academic but also professional and personal knowledge. Beyond its marketing vocation, which is intended to show the dynamics and openness to digital technology of the university to which the MOOC is related, this can be seen as the result of a complex procedure of the production carried out by designers (creation/dissemination and animation of digital resources) and the dissemination of content to Internet users. To achieve this result, an organization of the members of the design team is set up. It can be supported by digital assistance tools facilitating its organization. Here is an example.

> RESULTS OF RESEARCH WORK.–
>
> *Situation studied*: designing, producing, publicizing, moderating and personalizing (Clerc *et al*. 2014) a MOOC for a motivated educational team and a university institution leading the project is not a simple task (Lhommeau 2014; Pomerol *et al.* 2014). The technical, temporal and organizational constraints associated with the different professions solicited[11] render it a separate system.

10 Developed in 2012 but reinforced since 2014 with the opening of the FUN (France Université Numérique – France Digital University) ministerial project.

11 These professions were presented during our participation in MOOC Camp Day on June 14, 2014, at the Montpellier 2 University: teacher, graphic designer/designer, Web integrator, platform administrator, policy maker, audiovisual technician, etc. URL: http://www.france-universite-numerique.fr/14-juin-2014-moocamp-day.html (consulted on August 2, 2015).

Objectives: one of the challenges of the study we conducted was to define the major stages related to the innovation process in the university context. More particularly, it was a matter of describing the issues related to the design and moderating of a MOOC within a heterogeneous group of invested people (teachers, developers, graphic designers).

Methodology: research work was carried out based on the different situations both experienced and observed as participants. Analyses of the traces left by the process of each person and of each working group formed (teachers, integrators, moderators in the MOOC and *community manager* on social networks) were carried out: written (meeting minutes, jointly written documents) and oral (audiovisual recordings of remote exchanges) traces.

Scientific results: the implementation of a MOOC is organized around five major stages (scriptwriting, production, integration, adjustments/ beta-tester, moderating) and different components which structure the exchanges in virtual teams (Karoui and Dudezert 2010): flows and spaces.

Flows are defined as actions carried out by one or several people involved in the production process based on information which is internal or external to the MOOC. Internal information is information extracted from the process (figures, statistics, phenomena, etc.) by a person involved (designer or participant in the MOOC), or returned by the computer system. External information is information provided, for example, by supporting structures of the project (university institutions or technical platforms).

In Figure 2.8, we note all the complexities of the implementation of assistance to the negotiation, exchange and sharing of data produced by the people involved in (communication) spaces.

Flows are defined as the transfer of information among several spaces, according to the technical constraints imposed by communication tools or collaborative tools selected to respond to the temporal constraints imposed by a tutoring institution of the project (examples: university, MOOC technical support service).

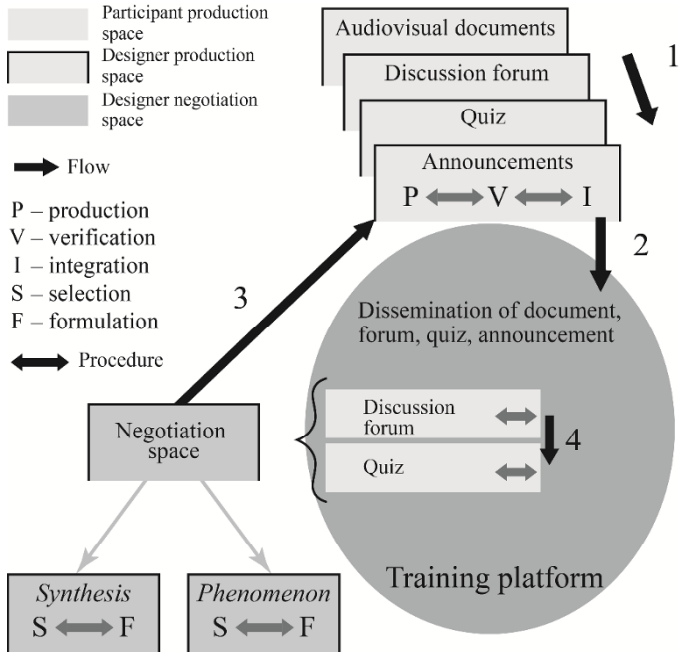

Figure 2.8. *Assistance spaces and flows for the implementation of a MOOC (Pélissier and Bezeghiche 2014)*

Engineering results: scientific reflection on flows and spaces involved in the implementation of this assistance resource led us to consider description tables of the different sessions that make up a MOOC. In this methodological aid, you will find the time allocated to the activity for the learner, the theme addressed, the different resources produced by the creator's team, different activities requested of participants, in an individual and/or collective view of the work to conduct and submit on the platform.

Prospects: investigations on the different pedagogical methods involved in this type of training system (MOOC) were identified: confrontation, awareness and sharing (Pélissier and Vassallo 2014). They can be questioned in other training systems (in particular, face-to-face and hybrid).

Session 1	**Citizens and sustainable development – at City Hall**		
Time	Three hours of work during the week		
Themes addressed	*Human rights and sustainable development, institutional and city skills, urban planning and sustainable development, citizenship*		
Resources	**Disciplinary content**	**Resources produced**	
	Course on three generations of human rights, global, national and city illustrations	2. Video presentation of the origins of DD by the teacher	
Activities	**Collective**	**Personal**	**Individual / group**
	6. The resources submitted by each participant will be seen and commented on by all MOOC participants	4. After participating in producing responses in small groups, some of these questions are included in the individual questionnaire 5. Submit a particular resource to illustrate a particular point of the course that the participant particularly appreciated, and justify their answer	1. The participant writes what they know about DD 3. Answers to questions in small groups. Questions related to the proposed video

Table 2.1. *Presentation model of resources and activities in the expected MOOC Ville Durable (Sustainable City) scenario, by week – work document for September 2, 2014 (extract of Pélissier and Duthoit 2015, p. 117)*

This digital assistance tool offers certain specificities, in relation to the functions proposed by Bruner:

– enrollment: this assistance tool makes it possible to maintain collective activity when faced with difficulties in communication, implementation of collaborative work, for a result in an unknown form (it is an innovation);

– orientation: at any time, the assistance tool makes it possible to carry out an assessment in the progress of the project by the presence of traces left by different people involved in the tasks listed on common documents;

– reduction of degrees of freedom: in the assistance tool, no reduction of degrees of freedom is proposed. There are three main reasons for this. Firstly, the nature and form of the expected result in the project are not

known. Secondly, the methodology to achieve the final production has not been clearly explained. The members progress in the project without identifying intermediate milestones. These milestones (or stages) are identified only when the work is completed. Thirdly, the creativity of the people involved is put to the test of the proposed technologies. The project requires the implementation of communication and production solutions which do not yet exist or which have to be adapted to the identified needs. These solutions must be found in real time (quickly) and cannot be the result of an in-depth reflection on the best possible solution(s);

– focus of attention: through the proposed assistance tool, the designer's focus of attention is first on the working time requested by the MOOC participant, as well as the theme addressed (which must motivate the MOOC participant). Then, the proposed content and format of the chosen multimedia resources are targeted. They are discussed within the design team. Finally, the possible adjustments between desires and the technical reality are considered, and then discussed in a way to identify the best procedures to implement in the achievement of the resources necessary for the deployment and animation of a MOOC. Thus, a gap is created as the project progresses between the initial desires of the people involved and the final result (Pélissier and Duthoit 2015);

– frustration control: in this assistance, no frustration control of the people involved is proposed. In fact, in this type of project, the people involved begin with predetermined ideas, without knowing either the form of the expected result or the advancement methods which need to be implemented, in order to achieve this result. They are adapted to each stage, without any particular method, one that each person masters in view of his/her own experience: projects already carried out and tools created as the collective reflection progresses;

– demonstration: this is not a function implemented in this assistance tool. In fact, no model is available during the implementation of an innovative project, because it is, by definition, created by the people involved in it.

2.3.6. *Conclusion: support functions for digital assistance*

The analyses of the previously presented digital assistance tools are summarized in Table 2.2.

Functions proposed by Bruner **Example of Digital Assistance**	***Enrollment***	***Orientation***	***Reduction of rules of freedom***	***Focus of attention***	***Frustration control***	***Demonstration***
Response to a reflective activity	Encourage teachers to improve their practices	Analyze a situation which can be adjusted at any moment	Not a reductive but rather an inciting role for taking initiatives	Function not implemented	De-dramatize the difficulties encountered during the first courses	View several similar or different situations, which facilitates comparison/ convergence
Response to a repetitive activity	Facilitate the time-consuming evaluation activity	Facilitate the comprehension and processing of errors made by the students	Follow a programmed action sequence in the correction of papers	Focus the teacher's attention on the errors present in the papers	Reduce the time allocated to writing tasks (same comments and same training exercises)	Function not implemented

Functions proposed by Bruner **Example of Digital Assistance**	***Enrollment***	***Orientation***	***Reduction of rules of freedom***	***Focus of attention***	***Frustration control***	***Demonstration***
Response to security constraints	Encourage the learning activity of students-prisoners in specific learning conditions	View the completed courses and the organization of the upcoming courses, at any moment	Know the layout of the courses in relation to the other activities internal to the institution	Identification of the courses with the help of a color scheme	De-dramatize the difficulties encountered and implement a sustainable learning procedure	Function not implemented
Response to an innovation situation	Maintain the collective activity in the face of difficulties	Carry out an assessment of the progress of the project by the presence of traces, at any moment	Function not implemented	Focus of attention on educational content, then on technical solutions, and then on the adjustments to consider	Function not implemented	Function not implemented

Table 2.2. *Digital assistance in Bruner's functions approach*

The analysis summarized in Table 2.2 leads us to make four comments:

– digital assistance can include several support functions. None of the proposed aids presents only one function. They integrate between three and six functions simultaneously. Thus, digital technology gives a multifunctional dimension to assistance;

– some digital aids have functions other than those present in Bruner's list. For example, in the aid entitled "response to a reflective activity", the "reduction of rules of freedom" function is replaced by the "incentive to take initiatives" function. The decrease of rules of freedom disappears in favor of openness to the rules that the assistant does not control in advance, as is the case in the "reduction of rules of freedom" function. This new function gives digital assistance a dimension of openness on creativity not controlled beforehand;

– the orientation function in each of the digital aids in the example is associated with a temporal view. In fact, with this function, assistance offers the available information at any moment. This gives digital assistance a timeless dimension;

– the enrollment function also offers a temporal dimension. In the "response to a reflective activity" assistance, it is a matter of encouraging teachers to improve their practices throughout a professional activity. Regarding the "response to a repetitive activity" assistance, the enrollment function aims to facilitate the time-consuming activity of classwork assessment. Concerning the "response to security constraints" assistance, this function takes the form of a learning encouragement of student-prisoners in specific, long and difficult-to-predict, training conditions. Finally, in the "response to an innovation situation" assistance, it is a matter of maintaining the collective activity when faced with organizational and temporal difficulties.

These remarks give digital assistance four dimensions: multifunctional, openness, timeless and temporal. The multifunctional dimension is not unique to digital assistance. It emphasizes the multidisciplinary aspects to take into account in the study of this complex object. The openness dimension gives digital assistance characteristics of creativity left to the designer of the assistance tool, an aspect Bruner had not emphasized. The timeless dimension offers to digital assistance properties of constant, automatic update, facilitating decision making and awareness among the assistant and the assisted person, of a state of knowledge or advancement in

an activity. Finally, the temporal dimension gives digital assistance the time-saving property for the assistant in his/her activity. These aspects had not been identified by Bruner, who was more particularly focused on the assistant's activity.

2.4. Assistance in its processing

2.4.1. *Theoretical framework: assistance activity and design theory*

Activity theory has its origins in the Soviet historical and cultural psychology school, initiated by Vygotsky during the 1920s and 1930s (Ben Abdallah 2012). For him, "human action is mediated by artifacts bearing a historical and cultural dimension which connects the thought of the individual to the society in which he lives" (Venturin 2012).

Within this theory, learning, before being the result of a process implemented by a single, isolated person, would be first a social phenomenon, occurring in a cultural context. In this way, gradually, it has proven to be a means to unify the understanding of human activity, taking into account the individual (the human himself) and the socio-cultural context (the context of the individual).

> "Activity theorists argue that consciousness is not a set of discrete disembodied cognitive acts (decision making, classification, remembering), and certainly it is not the brain; rather, consciousness is in everyday practice; you are what you do." (Nardi 1996, p. 7)

It constitutes a framework for studying different forms of human practices which are defined as developmental processes combining individual and social aspects. Human activity is "a coherent system of internal mental processes, external behavior and motivational processes which are combined and directed to achieve conscious goals" (Bourguin and Derycke 2005, p. 13).

These goals characterize an action which is intended to be a component of the three-level structure of activity theory (Leontiev): activity (high level), action (intermediate level) and operation (low level).

Within this theory, assistance activity is oriented by a motive. It is in a relationship with a conscious purpose, satisfying a need or a motivation. It is carried out by the assistant through a chain of actions. Subordinated to activities, these actions, whether individual or collective, are oriented by conscious goals. They are, according to this theory, an intermediate in relation to what motivates the assistance activity (the activity motive, the production of a response to a need for assistance), and the operations. We cannot understand the action (of assistance) outside the activity in which it is integrated (situation of learning/professional teaching and/or the assistant's status which can be teacher or a hierarchical superior). Are operations "executed unconsciously"? They are established through the experience which is built through contact with the actual conditions of the situations encountered and the materials left available. Operations refer to often routinized behaviors. They are executed in a manner that is faster than the action and are implemented in an automatic way. Internalized, the operation is performed without the assistant being necessarily able to technically justify his/her role in the targeted action.

These three levels of the activity theory are not compartmentalized. First of all, an action can participate in various activities and an operation in several actions. Then, operations are actions which have demonstrated to be genuinely reliable with the experience of the person involved, according to certain conditions, not necessarily conscious on the part of the assistant, but which have allowed their internalization. We can thus regard operation as an action which has dropped in the hierarchical structure (activity-action-operation). Moreover, an action can itself ascend a level and become an activity (Kuutti 1996). Finally, an activity can correspond to an action in another activity on a more general level.

Thus, by this activity theory, the boundaries between the different levels of the hierarchical structure of an assistance activity are shifting. The action-operation dynamic and the possibility to build, over time, highest-level actions (which then become activities) is a fundamental property of human development. These back-and-forth mechanisms are important. They contribute to the construction of the assistant's personal experience.

Through these mechanisms, the assistant, faced with an assistance situation, is obliged to use his/her own knowledge from his/her training and/or experience. The assistant is then faced with two possible paths. In the first (usual) path, he/she focuses on assisting an individual through

research/development of a single solution, a single aid, the one that comes to mind as quickly and naturally as possible. He/she then feels satisfied to have found, designed, produced and transmitted it to the person in need of assistance, thinking/hoping to have filled the need identified. In the second (rarer) path, he/she seeks to develop one or more aids and one or more procedures allowing for the design and production of each of them. This approach will later allow him/her to adjust, if necessary, the assistance that he/she has just formulated if it does not meet expectations, to possibly propose new aids of the same type, or to reuse and reinvest them for other people in need of assistance, in similar situations. These two solutions are part of the difference that Piaget (1974) made between "succeed" (solution 1) and "understand" (solution 2): to succeed in assisting lies within the result obtained, whereas to understand lies within the process that has been implemented to achieve this result. For Falzon (1994), two types of activities are distinguished: functional activities and meta-functional activities. According to this distinction, functional assistance would be oriented toward "immediate production" and meta-functional assistance toward the "construction of knowledge and tools… intended for possible future use".

Later in this book, we present five digital aids that we characterize based on the three levels proposed by activity theory.

2.4.2. *Example of assistance by deviation of use*

The deviation concept is more particularly addressed in the artistic environment (Laszlo 1994). It is defined as an incongruity from the gap between what is expected and what is said or done with the object (Bariaud 1983; Priego-Valverde 2003). This gap implies, in regards to the uses, a break in the mechanical process of life, opening in some cases onto humorous interpretations (Bergson 2011; Koestler 1965) not initially planned by designers.

RESULTS OF RESEARCH WORK.–

Situation studied: in a digital system, it is not because an activity (exchanges on a discussion forum, for example) is proposed by a teacher (planned activity) that it will be inevitably carried out by learners under the envisaged conditions (actual activity).

Objectives: the identification of deviations of forums shows the appropriation that the user carries out, and participates in the definition of adjustments (instrumentalization process) that can be proposed to the design team. Assistance is then defined as support for the personnalization of learning (Bejaoui *et al.* 2015).

Methodology: audiovisual recordings of the screens of users using a discussion forum in a training activity, and questionnaires on its usefulness in the activities requested of the students on the VCiel platform[12] (Mailles-Viard Metz and Boukhriss 2006) have been conducted. They made it possible to characterize the uses which deviated from the discussion forum proposed on the platform.

Scientific results: on the one hand, the forum, initially implemented in VCiel to facilitate exchanges among learners, becomes for some students a learning aid of the contents of the course (disciplinary knowledge), for others a place of exchanges around dates and examination content (training organization), for others finally, a way to achieve the tasks requested in the framework of the course.

Figure 2.9. *Discussion forum colored by learners in order to carry out the tasks requested by the teacher (Mailles-Viard Metz and Pélissier 2010). For a color version of this figure, see www.iste.co.uk/pelissier/learner.zip*

12 Campus Numérique Français: master VCiel - Visualisation et conception infographiques en ligne, http://vciel.univ-lyon2.fr.

From the teacher's point of view, the discussion forum is an aid for the evaluation of knowledge among students, an aid for the structuring of the course during its design and an aid for the constitution of a community of learners.

Pedagogical results: these results show that the discussion forum is, for some of the people involved, assistants and assisted, an aid for different activities carried out. It is interesting to reflect on the integration of these observations of the deviations of forums at the level of the implementation methods of pedagogical scenarios. Several types of forums could be proposed in the framework of the courses on the VCiel platform: Some dedicated to the training organization (where learners pose their questions), to the preparation of a course (where the teacher underlines the essential points of the course) and others dedicated to the learning of the content of the course (different forums according to the main themes addressed).

Prospects: this reflection on the integration of these observations of deviations constitutes the research result that could be integrated into instructional design approaches. These results are generally omitted consciously from the reflection on the technical development design, whereas others can be omitted due to ignorance of their existence (by educational engineers, for example). The means of communication between the two areas, scientific and engineering, must be discovered.

In this example of deviation, in relation to activity theory, the assistance activity is first linked to a highest-level activity:

– learning activity is divided into several activities: the activity of the assimilation of content of disciplinary/transversal knowledge, carrying out of the tasks requested, comprehension of the training organization and, of course, assistance activity to peers;

– teaching activity is also divided into several activities including the assistance activity to learners, to oneself and to other teachers: the activity of the selection of knowledge to teach, of implementation and evaluation of this knowledge, of temporal structuring of selected content, etc.

Then, the assistance activity integrated into the teaching activity is composed of actions:

– toward the learner: putting at the learners' disposal one or several discussion forums making it possible to consult the course content, to present the task(s) requested as well as the course organization, etc.;

– toward oneself: setting up the forum to decide which knowledge to evaluate, to structure its course content, to adjust its content according to the exchanges observed, etc.

Regarding the assistance activity integrated into the learning activity, it is also composed of actions:

– toward the learner him/herself: using the forum to identify among his/her peers those who are more invested in the course or with whom he/she is likely to have affinities to carry out the collective activities requested;

– toward his/her peers: using the forum to identify the difficulties encountered by the others, so as to be reassured or to provide information that is likely to allow him/her to overcome these difficulties.

Finally, operations are organized, for example, around the choice of colors used in the forum proposed in the example. This choice is related, on the one hand, to the learner's experience of using colors to differentiate components (such as manual highlighting, with a felt-tip pen). The learner could have chosen to copy/paste on another media and reclassify them according to his/her needs (by providing titles to different groups). Furthermore, the learner chose a particular color for each participant. This choice, based on one of the interviews conducted, was not conscious. The colors were chosen without real reflection. Yet, it could have been done consciously, depending on his/her favorite colors or on the favorite colors of each participant. In this case, this choice would have been an action and not an operation.

2.4.3. *Example of assistance developed from disciplinary knowledge*

In the design process, the assistant selects the field knowledge and/or the methodological knowledge which appear to him/her to be relevant to implementing in an aid. This knowledge is derived from his/her experience and/or recommended by official texts.

RESULTS OF RESEARCH WORK.–

Situation studied: high-school students (especially professional sections), encounter difficulties (Barrié and Massé 2012) in taking notes on the texts discussed in French classes, in organizing them (according to the themes or other networks to which a text belongs), in structuring argumentation when faced with a question asked about the text by the teacher, and in integrating cultural aspects (historical, political and artistic, in particular) in this argumentation.

Objectives: this study consisted of identifying and formatting disciplinary knowledge involved in the different possible interpretations (of the teachers questioned) in the teaching of the French language in high school[13] and, more particularly, the literary texts studied in class in the framework of the preparation for the oral exam of French of the baccalaureate.

Methodology: an empirical approach was implemented. We made observations in relation to interviews with several high-school teachers of several French regions.

Scientific results: several lists of knowledge organized in a model were established for each of the texts targeted by teachers of French: these lists were developed based on work in literature, linguistics and teaching practices. This knowledge was then used in the production of a digital aid for the approach of literary texts. The digital resource developed is named *Lytext*.

Engineering results: *Lytext* is a "resource"-type digital environment (De Vries, 2001). It implements the different models of knowledge dedicated to the approach of literary texts. This resource presents several methods for approaching each literary text, proposed by the teachers in charge of this teaching.

13 Teaching program of French in general and technological tenth grade class. URL: http://www.education.gouv.fr/botexte/bo021107/MENE0202333A.htm.

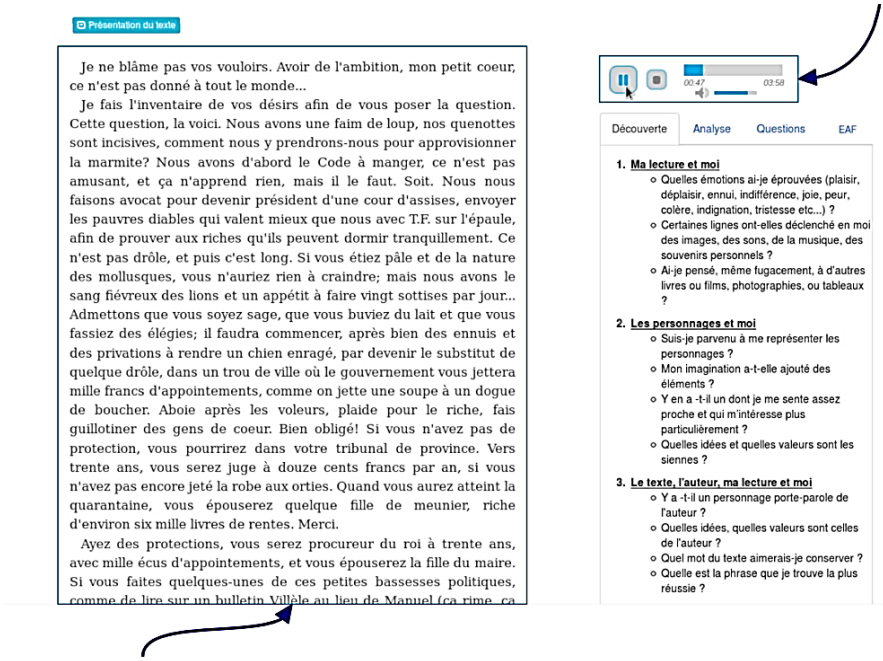

Figure 2.10. *Lytext excerpt – a model of knowledge to study a text integrated into the French baccalaureate exam*

As shown in Figure 2.10, the user (an eleventh grade student) can listen to a reading of the selected text (see arrow at the top right of the screenshot), discover possible reading focuses (see *découverte* [discovery]), access elements facilitating the analytical reading approach (see *analyse* [analysis]), have examples of questions that can be asked on the day of the exam (see questions), as well as reminders about the conditions of the exam (see FAE).

Prospect: this work leads us to question ourselves on the disciplinary knowledge from different disciplines (art history, sociology, geography) and the technical means at our disposal for their implementation (virtual visit to museums, 2D and 3D animations to visit the cities present in the text addressed) in a single assistance resource for the interpretation of literary texts.

In this example, the assistance produced appears as lying at the junction of several skill areas (artistic, linguistic, social or synthetic) that some learners can master, discover and integrate into the analysis of a text, and that teachers can present in their face-to-face courses.

Within activity theory, this assistance resource appears as a preparatory activity for a competitive exam, an examination or a diploma. Included in a formal request, it is controlled by actions in connection with the disciplinary knowledge that can be explained and consciously structured (present in the description of the exam or its preparation) as well as by the questions that have already been asked previously in this exam (for example, in past papers). These questions serve as examples and a source of training. Operations have to be connected with the knowledge presentation method: in the form of colors (for the rhymes of a poem, for example), underlining of the components of the text (to present the different components of stylistic devices, for example), arrows (to indicate the directions of the reading facilitating the interpretation of the text), information bubbles (to recall the definition of particular terms depending on the context and the historical period, for example) or any other graphic component that would be chosen without prior study or special reflection.

2.4.4. *Example of assistance developed from resources from the world of research*

In a policy of dissemination/development of research results to the largest number possible (to researchers and non-researchers), the institutional supervisory bodies (for example: laboratory, university and CNRS) leading projects seek to facilitate the dissemination, pooling and reuse of resources produced by its different communities. “Data recycling by research programs for which they had not originally been designed is an important source of economy” (Bergougnioux *et al*. 2014).

The challenge is to minimize the financial and human costs in producing resources reusable or adaptable to other targets and other research work.

14 CNRS is governed by Articles L. 321-1 to L. 321-6 of the Research Code and by Decree No.82-993 of November 24, 1982, as last amended by Decree No.2007-195 of February 2, 2007.

RESULTS OF RESEARCH WORK.–

Situation studied: researchers have the habit of using several documents/technical solutions (publications, technological tools, prototypes, models, etc.). Among them, in language sciences, but also in other areas, the major linguistics resources, such as FRANTEXT or TLFi, serve as a reference[15].

Objectives: in the context of dissemination and massive use of resources produced by university institutions, an adaptation of the content and the form of these great resources to an originally unconsidered audience was the subject of a study.

Methodology: three stages have structured the approach:

1) the analysis of the content of the resource and its representation method of information/knowledge;

2) a reflection on the norms and standards of the system targeted;

3) the compatibility of these two formats in the production of a new resource intended for a different audience.

Scientific results: the informational content of these great resources, initially proposed to researchers, are questioned in their contributions to other people involved, some targeted (language students, for example) and other broader (the general public), soliciting changes to the resource in order to be integrated into activities that were initially not targeted (writing of textual, oral or audiovisual documents, for example).

Engineering results: knowledge models incorporating the language information present in TLFi resources (etymology, definitions, examples, history, construction, technical field) were selected and reinvested in digital resources dedicated to college training, in SEGPA[16] and Political Sciences of Nancy[17].

15 Developed by ATILF-UMR7118-CNRS, Nancy 2 University.

16 Sections of general and adapted vocational teaching. URL: http://eduscol.education.fr/cid46765/sections-d-enseignement-general-et-professionnel-adapte.html.

17 Collège SciencesPo de Nancy: http://www.sciencespo.fr/admissions/fr/content/le-campus-europeen-franco-allemand-nancy-les-prerequis-linguistiques.

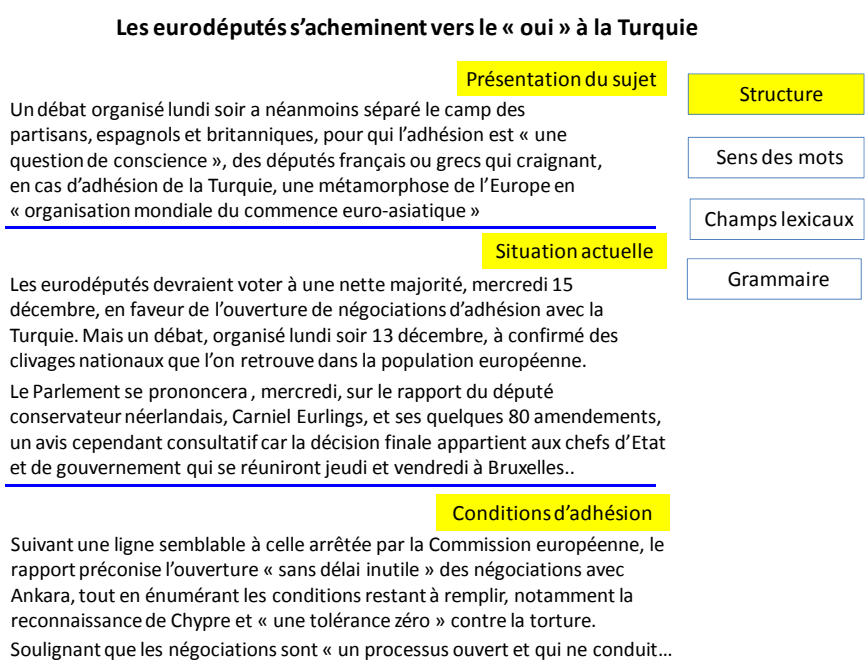

Figure 2.11. *Integration of knowledge presented in the TLFi in order to address the analysis of texts at the IEP Sciences Po Nancy (Pélissier et al. 2005)*

In this example, a journalistic text (*Le Monde*, on December 14, 2004) is presented as being able to be broken down into four parts (theme presentation, current situation, membership conditions and diversity of opinions). This segmentation is marked by lines of colors that appear in the text on the screen. It is supported by the choice of the vocabulary used by the author (Vocabulary label in Figure 2.11).

Prospects: through this example, we emphasize the possibility of proposing assistance to the implementation of an adaptability process of a resource which already exists for other targets and/or other conditions of use.

In the framework of the activity theory, this assistance resource takes place not in the design process but rather in the adaptation process. Regarding actions, it aims to propose adjustments, changes in the components that are integrated into the resource. These modifications link

the components of the already built application according to the new knowledge identified as a target for this audience, of their grouping/ ungrouping by priority and their contextualized linking. Operations are carried out at a minimum unconsciously from presentation choices already made in the first version of the proposed assistance resource.

2.4.5. *Example of assistance developed from trace analysis*

A trace left by the users in a training system is defined as "a temporally located sequence of observed elements, which is either a mediatized interaction among humans and mediated in a variety of ways by a computer, or a sequence of actions and reactions between a human and a computer" (Lund and Thousand 2009, p. 4).

According to this quotation, the trace represents a series of observations, in a given time and in the framework of a mediated communication. It is a product (individual and/or collective) that is observable and observed (as action and/or reaction to an event) during exchanges between several participants. The product here refers to "any tangible, materialized and *a posteriori* observable result of an activity" (Mailles-Viard Metz 2015, p. 90), instrumented by a communication tool (examples: discussion forum, chat rooms, videoconference) or a document with information (examples: collaborative documents, places of storage, sharing and exchange of documents).

Two studies in relation to trace analysis will be presented. In the first study, the user leaves traces in a discussion forum. In the second study, it is the designer who leaves a trace of his/her activity (a website).

2.4.5.1. *Traces left by the user in a discussion forum*

Within the work dedicated to MOOCs, blogs and forums have quickly become the subject of particular attention within the scientific community. This can be explained by the fact that a major part of communications among the different participants (widespread and heterogeneous) is carried out asynchronously (Mak *et al*. 2010), in order to give the participants the possibility to organize it to carry out the activities requested.

RESULTS OF RESEARCH WORK.–

Situation studied: by studying the first *Circuits and Electronics* edX MOOC, Breslow *et al*. (2013) show that only 3% of the learners use discussion forums. These authors propose a categorization of exchanges according to two dimensions: the theme (relating to the content of the course) and the role of the student's intervention (request for assistance, request for information and assistance given to the other participants).

Objectives: through the characterization of these exchanges, the purpose is to specify the nature of the interactions involved in MOOCs in comparison with those integrated into remote systems (FOAD).

Methodology: based on the research trends of computer-mediated pedagogical communication (Alvarez Martinez 2007) and conversation analysis applied to pedagogy (Seedhouse 1994; 1997), we carried out a discursive analysis of the sequentiality (Mondada 1999) of these exchanges. More particularly, we tried to reconstitute *a posteriori* the activity being conducted, in order to be able to describe the adjustment methods of the members among themselves, according to three dimensions:

– the role of the technical configurations of the system on the sequentiality of the exchanges and their uses by the participants;

– the insertion methods of the pedagogical activity in the platform by teachers and their effect on the thematic and sequential orientation of exchanges;

– finally, syntax, as a resource mobilized by participants for the sequential organization of discourse and interactions.

Scientific results: this analysis has shown that forums, as they are currently proposed in MOOCs, do not facilitate interaction among participants, at least not in proportions that would correspond to the MOOC designers' expectations: exchanges of ideas, debates, recovery of data provided by others, mass participation. The conducted analyses reveal, in fact, that if the affordance of these digital mediators function *a minima* to favor the development of the participants' autonomy and the collective construction of knowledge, their functioning is simultaneously inclined to hinder "the participating action" (Brudermann and Pélissier 2017).

Prospects: this analysis opens the debate on the recommendations that we could make for MOOC designers, in order to create interactions among participants: confrontation of opinions argued (collective or individual), assessment of beliefs (in terms of knowledge) from MOOC, sharing of valid information sources according to a collectively established protocol on a given issue for a collective attitude. Based on an analysis of the traces left on these forums (Henri and Charlier 2005), we believe that some artifacts currently proposed and defined as learning aids must be redesigned in advance, rearranged, reviewed and retested to better respond to the users' needs.

Through the activity theory, assistance processing goes through the conscious action of being questioned on the means of collecting traces, of interpreting them, in the process of this activity and in its results. These traces take the form of audio recordings, audiovisual media and texts/graphics submitted by users on platforms and/or carried out by an observer of the situation. Their analysis is conducted either in a separate/isolated way, or jointly. The analysis elements are thus studied separately or together, so as to bring out elements facilitating the production of assistance in its founding principles and its limits in terms of contribution. Operations are carried out unconsciously based on the choice of tools technologically integrated into the approach of data collection and analysis. This choice, if it is not questioned according to the context, the expectations, the field studied and the people involved, appears as an operation, an unconscious automatism.

2.4.5.2. *Traces of the designer on a website*

According to the national Prévalence-JEU 2012 survey, 3.7% of people over 18 years old, that is approximately two million French citizens, gamble online. The legislative framework has led gambling establishments (such as Française des jeux) to develop a responsible gambling policy. It is embodied in particular through the implementation of a digital platform dedicated to user-players online. This platform participates in the implementation of a digital assistance resource.

RESULTS OF RESEARCH WORK.–

Situation studied: the "Responsible gambling" websites offered by online gambling establishments must guide user-players to identify problematic

(excessive play) daily behaviors (eating, sleeping, managing a budget, etc.). The objective is to make them aware of a management approach of addictive pathological disorders by specialized centers.

Objectives: the problem lies in the identification and description of the implementation process of behavioral changes through the deployment of assistance (incorporating a website) specific to online gambling. The objective is to facilitate, through this resource, the triggering of an awareness of one's state and a management process when faced with real or possible difficulties.

Methodology: the project approach is organized in several stages[18]. More particularly, in the first stage, we observed the information architecture of the digital platforms of several groups (Tranchant, Lucien Barrière and FDJ) dedicated to prevention. We focused on the methods of interrogation of players, the interactional methods and the personalized exchange methods (Laboureau *et al.* 2015).

Results: the first observations highlight, in several websites labeled "Responsible gambling", the use of interrogation methods of the players specific to this type of website: forms where the visitor is "made to speak" in first-person singular, dialogical questioning methods, use of non-personal forms, use of non-personal third person, and interpersonal forms in nominal sentences (Alidières and Pélissier 2016).

Prospects: an observation of the FDJ site is in progress. It is conducted based on *eye-tracking* and EEG[19] methods. These methods will make it possible to identify interaction specificities and to open up the debate with the help of the results on design methods specific to these prevention systems.

Through activity theory, digital assistance is viewed as integrated into the prevention activity (higher-level activity). This prevention is based on a digital platform, a website. The actions carried out are focused on the methods of interrogating players, the interactional methods and the personalized exchange methods. These methods specify the nature of the

18 (1) an analysis of the architecture of the FDJ platform; (2) a conceptualization of the digital prevention concept; (3) a design of a virtual agent serving as mediator (Avatar).

19 Electroencephalography (EEG) is a cerebral exploration method which measures the electrical activity of the brain.

messages conveyed by the media toward the visitor. Finally, regarding operations, they take web technologies as a starting point. It could be interesting to reflect on the different mediatization methods of preventive content. Here, the website is taken as a technical solution, without any real study of its contributions and its limits in terms of prevention. For example, we could have conceived of a prevention method which uses a video clip or an audio production (e.g. radio spot).

Through these two trace examples, we note a disparity regarding the assistance form as they can be envisioned with digital technology. In fact, in the first example, assistance aims to design "new discussion forums", while in the second example, we envision the design of digital systems labeled "responsible gambling". It is a matter of two different assistance levels: the "responsible gambling" system is located at a comprehensive level (the website participates in digital assistance), and the discussion forum is located at a more localized level (integrated into a pedagogical scenario presented through a training platform that participates in the digital assistance).

2.4.6. *Conclusion: digital assistance between activity and operation*

The analysis of the different digital aids presented leads us to make three remarks in relation to the three levels of assistance activity:

– digital aids can take very different forms: some aids are defined as activities which are incorporated into higher-level activities (activity of learning, teaching, preparation for competitive exams and examinations), and others are in the form of activities of adaptation, observation and prevention. This list is not exhaustive, but shows the diversity of assistance resources which can support, guide or solicit an individual;

– in order to carry out the activity, the actions take the form of requested tasks, of uses of pre-developed tools (e.g. discussion forums), of a temporal organization, of groupings or ungroupings of digital components (examples: chat, discussion forums) or of linguistic indicators. Whatever their form, these actions examine the disciplinary knowledge involved and their presentation methods to the user which, for some, are imposed by technological, institutional frameworks and, for others, by the users' habits;

– actions are implemented by operations. For example, in the proposed aids, the designer makes choices which disregard the media used (web,

audio, audiovisual, graphic, text), colors, underlining, the use of arrows, bubbles and techniques already considered in previous productions. These choices generally take place unconsciously, according to the habits/skills of the designer of the assistance resource, the technologies used by/with the community, the designer's representation of the assistance recipient, and the technological solutions (on-trend) of the moment.

Through these three levels (activity, action, operation), we stress the need to scientifically equip the approaches and processing methods of assistance, to evaluate them and to train future people involved in the design of these aids.

2.5. Assistance in terms of its usefulness

2.5.1. *Theoretical framework: zone of proximal development and assistance evaluation*

Vygotsky (1934–1997) has sought in his/her work to specify the manner in which the child articulates personal mental development with contextualized learning. To evaluate this mental development, he takes into account the activities that the child solves alone and the activities supported by a person involved (more experienced than him/her), who assists him/her in the process. Two hypotheses are formulated: on the one hand, the supported child is able to achieve much more than he/she is able alone, and on the other hand, the activity carried out with an assistant today can be accomplished independently in the future.

The difference between the level of problem solving with support and that achieved alone corresponds to what Vygotsky (1985b) calls the zone of proximal development (ZPD) (see Figure 2.12). This ZPD is defined as "the distance between the actual development level (independent problem solving) and the potential development level (problem solving supervised by an adult or in collaboration with more skillful peers)" (Bodrova and Leong 2011, p. 62).

This ZPD makes it possible to make assumptions about the child's future developments and to characterize the dynamic of his/her developments which is this defined as a transformation which takes place between the potential and the actual. Three activity zones are therefore differentiated.

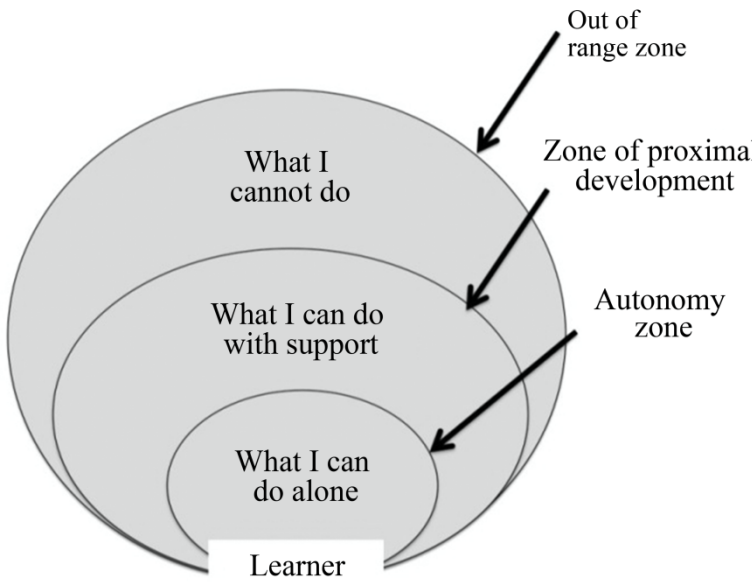

Figure 2.12. *Activity zones depending on Vygotsky's approach*

In Figure 2.12, we find an autonomy zone in which the child can achieve his/her activities alone, the ZPD in which the child can carry out certain activities with support, and the out of range zone in which, even with support, he/she cannot carry out the activities. From these three zones, we define digital assistance as facilitating the construction of two processes:

– an expansion process of the autonomy zone (what the child can do alone), through integration, in the process of digital assistance, of digital resources provided (by a teacher) or accessible online (on the web): tutorial, user manual, technical documentation, etc. (marked as 1 in Figure 2.13);

– an expansion process of the ZPD in the direction of the out of scope zone, through a process of assistance integrating synchronous (online exchanges among peers, teachers, professionals) or asynchronous digital resources, if digital resources are accessible, as exchanges on a discussion forum, audiovisual documents (e.g. recordings of meetings), methodological descriptions, etc. (marked as 2 in Figure 2.13).

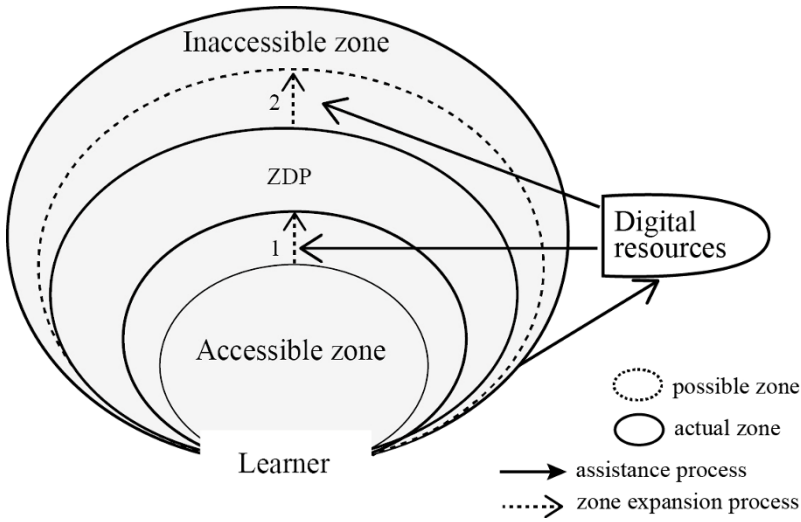

Figure 2.13. *Expansion roles of digital assistance*

In the first process, the accessible zone expands: the learner, alone, has the possibility to consult digital documents (texts, databases, discussion forums, etc.) offered in a formal (pedagogical scenario) or informal (in a personal capacity, from the web) framework. The documents participate in the assistance process, allowing the expansion of the accessible zone.

Regarding the second process, it is the ZPD that expands: the learner has the possibility to view documents such as audiovisual recordings of professional practices as examples of management of meetings. These practices are not yet accessible to him/her through his/her knowledge of the profession at the beginning of his/her career. However, viewing these recordings makes him/her want to question the people involved, and/or to seek a person who can assist him/her to make this activity possible.

In the first process, the development approach is rather individual: assistance (integrating one or more digital resources) serves as a mediator between the learner and knowledge/skills, which allows him/her to take charge of all or part of the activity that he/she will be able to accomplish alone. In the second process, the emphasis is on a more collective work approach. In this case, assistance has more of a mediating function between the learner and the activities that he/she wishes to carry out in the near future.

In the first case, digital resources participate in an aid guided by the needs of the assisted individual, who will conduct an activity alone which is behind his/her approach. In the second case, digital resources participate in an aid guided by the desires of the individual, who can then plan the realization of an activity by collaborating with another actor (peer, Internet user, teacher, etc.).

For the measurement of the contributions of the digital assistance implemented, these two processes can be used as a reference. A specified progression or change in the perception of comprehension and realization of an activity based on identified digital resources can be marked by an expansion of the autonomy zone. Similarly, a specified progression or change in the perception of comprehension of a future activity based on identified digital resources can be marked by an expansion of the ZPD.

In this context, some aids, taking the form of models, offer the possibility to characterize certain activities produced in the framework of professional or personal practices. These models are intended to promote the implementation of a process carried out alone or with support, aimed at the advancement of a project or the acquisition of knowledge/skills.

For example, later in this book, we take the professional gestures model (see Figure 2.3) and re-examine it in three contexts: in the framework of the activity of online teaching/learning in a university (assistance to the teacher and the student in a remote training system), the analysis of websites produced by teachers in order to disseminate their professional skills (assistance to the teacher community) and the training of student-trainees of English at the IUFM (assistance to the analysis of educational practices dedicated to foreign languages).

2.5.2. *Example of assistance evaluated based on adjusted component models*

The professional gestures model (see Figure 2.3) was examined in the framework of teaching in a remote system at a university.

RESULTS OF RESEARCH WORK.–

Situation studied: the study consisted of analyzing the assistance produced by teachers and learners in a distance learning situation in a master's ergonomics course.

Objectives: the aim of the analysis was to highlight the roles that should be prioritized for each aid produced by the different actors in the system.

Methodology: the analysis of interviews, as well as questionnaires distributed to all the participants in the training (students, teachers), made it possible to categorize the expectations of designers/producers of assistance.

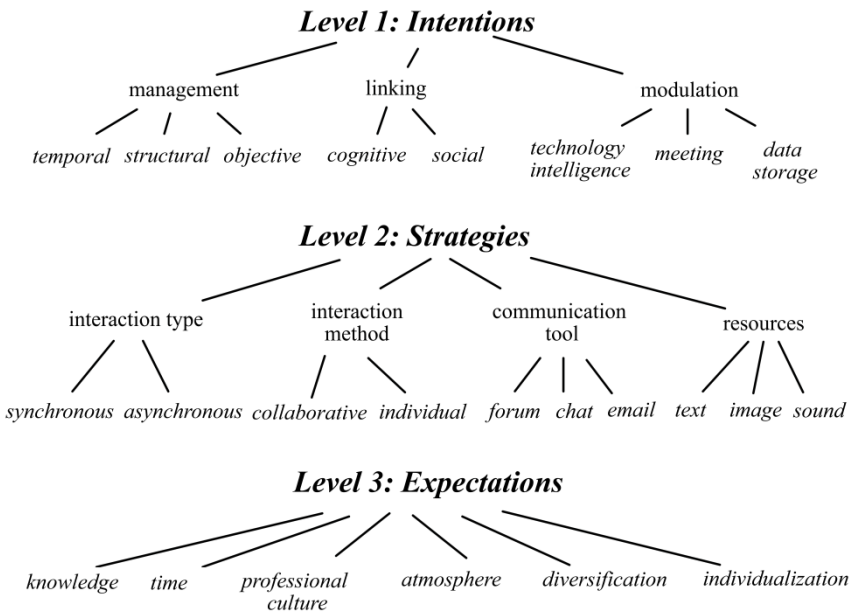

Figure 2.14. *Expected strategy intention model (Mailles-Viard Metz and Pélissier 2010)*

Scientific results: the initial teaching behavior model was thus restructured into three major levels: intentions, strategies and expectations[20].

The ESI model offers an interpretive framework for the digital assistance produced according to three levels: Intention, Strategy and Expectations. Intentions define the role of the assistance in the target activity. Strategies present the manner and the methods of exchanges used to circulate the assistance produced, and Expectations posit the underlying values that are inherent to the person in his/her role of assistant.

Prospects: this three-level organization offers the possibility to characterize the assistance developed by teachers and learners. The analysis shows, among other things, that atmosphere is an important expectation for the student, who seeks in the assistance resources that he/she develops, a "dose" of pleasure in using it. For the teacher however, atmosphere does not seem to be a priority, as he/she prefers to emphasize the diversity of the proposed assistance resource (through management) of the targeted activity.

In this example, the differences seem to exist between the assistants and more particularly their status in the system. In fact, in this study, the results show that the assistance resource must respond, as a priority, to disciplinary expectations (especially for the teacher), while it first responds to recreational expectations (especially for the learners).

From these three levels proposed in the ESI model, the digital assistance evaluation is carried out in relation to the different zones solicited.

In Figure 2.15, the ESI model permits the implementation of two expansion processes. The assisted person has the possibility to evaluate on his/her own the assistant's appropriate practices based on the proposed model as well as the practices implemented by other actors (autonomy zone expansion). He/she also has the possibility to evaluate these same practices (his/her own and others) in the framework of online training or discussion

20 Intentions are defined as concerns (extracted from the initial model) which underlie the activity (management, linking). Strategy corresponds to the means used by the designer to produce an aid (examples: written, oral, synchronous/asynchronous) and expectations are the personal reasons of the person involved (teacher and learner) which constitute a triggering factor in the implementation of an aid (examples: save time or even change his/her routine practices).

forums. Divergent opinions will enable him/her to project him/herself into an assistant activity which has not yet been considered (expansion of the ZPD).

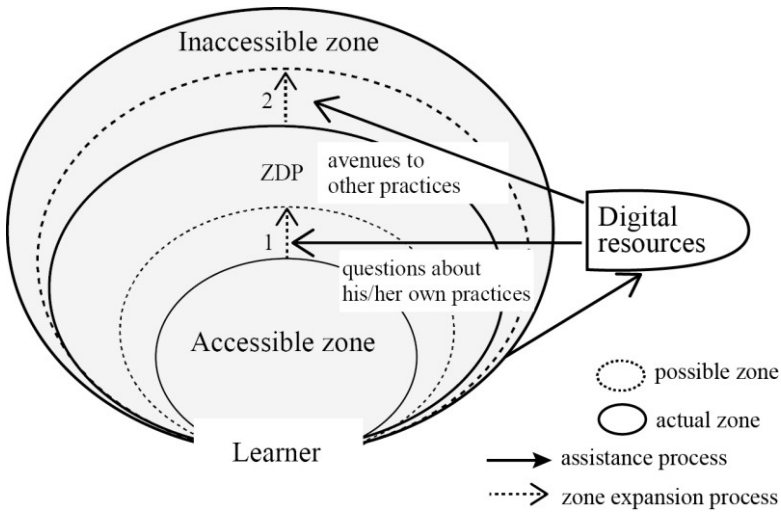

Figure 2.15. *Evaluation of the assistance provided by the ESI model*

2.5.3. *Example of assistance evaluated based on reorganized component models*

The professional gestures model was also used in the characterization of the dissemination process of the practices implemented by some teachers. This dissemination is carried out in the form of websites for their peers.

RESULTS OF RESEARCH WORK.–

Situation studied: from a social perspective, communities that share informal practices, which take the form, in particular, of blogs, sites or even discussion forums, make their appearance on the web. These communication/exchange media allow teacher communities (Henri and Pudelko 2006; Wenger 1998) to be created, to expand and to participate in the dynamics of the evolution of pedagogical practices.

Objectives: some of our work is intended to contribute to the definition of the spontaneity concept, as it is implemented in these media produced by secondary school teachers for other teachers. These productions (generally

in the form of websites/blogs) have the objective of assisting other teachers of the same discipline in their reflection on their own professional practice.

Methodology: the professional gestures model has served as "binoculars" (hypothetico-deductive approach) to the analysis of the reasons that push a teacher to design such a site that it qualifies as "assistance for the implementation of good teaching practices". Some interviews were conducted face-to-face, others remotely. They were analyzed according to an ethnographic approach (Marcus 1998; Cefaï 2010).

Results: the results of this study (Lédé and Pélissier 2014) show that the main reason which pushes the teacher to design a site/blog open to colleagues is organized around three levels: a first level centered on concerns of linking (to forge links between members of the same teaching community), a second level centered on the showcase value of different personal activities conducted (e.g. to transmit corporatist values), and finally, a third level centered on their desire to show and develop their personal experience with other colleagues (e.g. mutual assistance within the same teaching community).

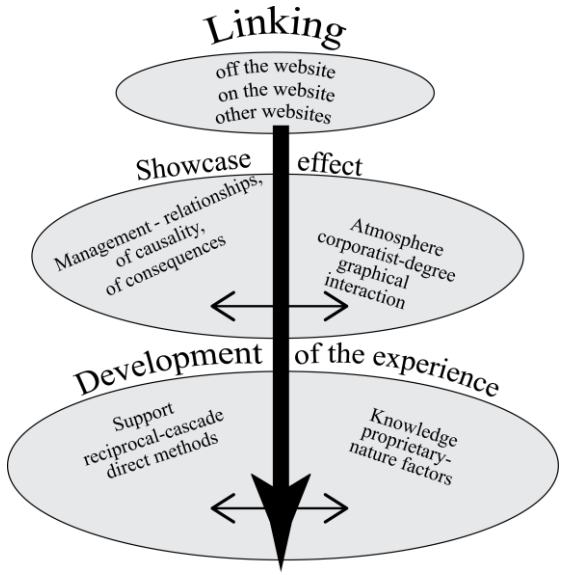

Figure 2.16. *Organization of concerns related to the production of a personal website*

This model presents an organization of the macro-concerns of the professional gestures model on three levels: development of the experience, showcase effect and linking. These three levels make it possible to discern the reasons that underlie the production of websites/blogs among teachers (through the analysis of the interviews).

Prospects: the showcase effect and the development of the experience are not integrated into the initial professional gestures model. But these levels reveal, in their definition, macro-concerns that are already considered (management, atmosphere, support, knowledge).

This model, offering a three-level organization of macro-concerns (linking, showcase effect, development of the experience), is a methodological aid to the interpretation of the interviews conducted during the course of the study and makes it possible to identify the nature of the assistance as it is envisioned by its designer (secondary school teacher). It can be seen as an aid to the expansion of the autonomy zone.

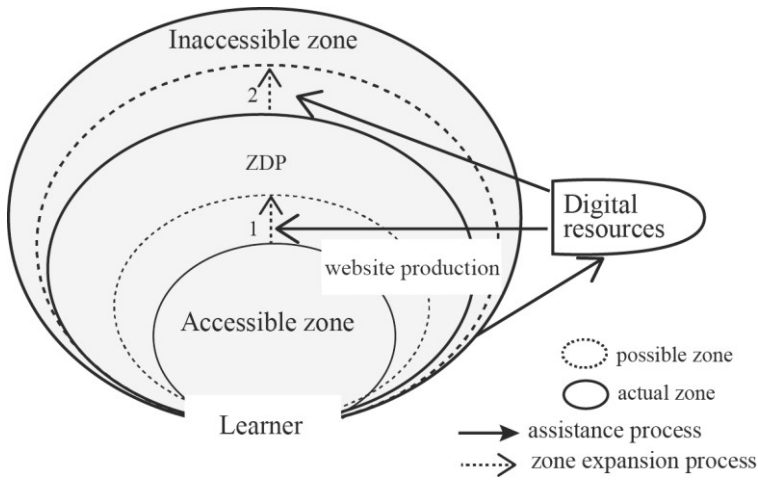

Figure 2.17. *Evaluation of the contribution of the assistance provided by the reorganized model*

In fact, the website produced not only allows the teacher to implement already mastered skills but also to acquire others from the consultation of other websites of the same type, bringing into play other technologies that the teacher can collect and with which he/she can be trained through

tutorials/videos, for example. In addition, the three-level model offers to the assistant the possibility to analyze and position the reasons which underlie his/her activity as a website producer.

Through these two examples (ESI model and personal website analysis model), we set the professional gestures model as an assistance resource to the characterization of informational content presented on different media: websites/blogs (produced by teachers) as well as content of the proposed assistance resources in the framework of training, in response to an explicit request.

2.5.4. *Example of assistance evaluated based on weighted component models*

The weighted models do not offer a new organization of the components of the professional gestures model, but allocate weight to some of its components. This approach offers the possibility to propose models of knowledge specific to each situation as well as generic models, providing guidelines for the definition of different weighted models.

RESULTS OF RESEARCH WORK.–

Situation studied: in a language teaching situation, the professional gestures model, as it is proposed, is not completely suitable. In fact, the central concern of some language teachers (those integrated into the conducted study anyway) is not necessarily knowledge, but rather atmosphere.

Objectives: the purpose of this study was: 1) to propose a new model specific to language teaching based on the adaptation of the original model; 2) to explain the reasons for these adjustments.

Methodology: we conducted an ethnographic approach. It consisted of examining trainees on the usefulness of the professional gestures model in their training at IUFM. Audiovisual recordings[21] of the interviews between the researcher and the trainee were made.

21 54 hours of recordings.

Figure 2.18. *Screenshot of an individual interview with a trainee, future teacher of English (source: Deyrich and Pélissier 2008)*

Scientific results: the analysis of the interviews shows that the trainees are not convinced of the usefulness of the professional gestures model within their training. Their questioning leads us to put forward the professional gestures model with a weighting of certain macro-concerns.

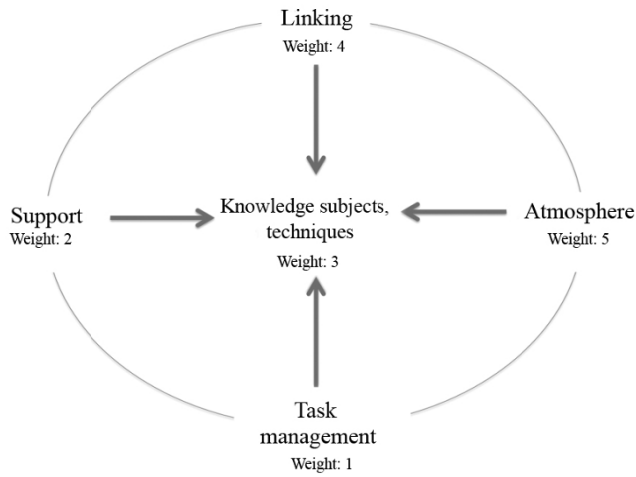

Figure 2.19. *Weighting of macro-concerns of the foreign language teacher*

In these adjustments, a central place is given to atmosphere. It facilitates the arrangement of link(s) with the native language, the approach of a new knowledge accompanied by an adapted support. Thus, the language teacher, through the implemented atmosphere, interacts with the learner and sets up an adapted management.

Prospects: the work on languages other than English and on audiences other than trainees has to be considered, so as to establish weighted models among the organizational principles which are likely to appear.

This model, which offers a weighting of macro-concerns specifically related to the teaching activity of foreign languages (where atmosphere and linking are essential), constitutes an aid which can be evaluated according to its contributions to the ZPD expansion.

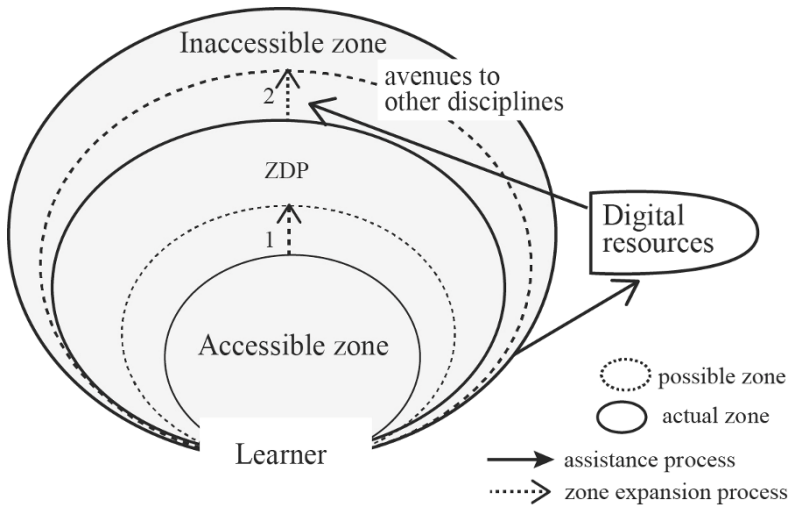

Figure 2.20. *Evaluation of the assistance provided by the reorganized model*

Indeed, through the analysis of English teaching situations, the model gives the assisted person the means to consider other approaches to the language, like for example, bi-disciplinary teaching (Pélissier *et al.* 2017) during which the English teacher collaborates with another teacher in a different course (mathematics, geography, computer science, etc.). Thus, the assistance by weighted models opens up the possibilities to characterize the different collaborations that the language teacher is likely to implement, and which he/she had not considered.

2.5.5. *Conclusion: ZPD and digital assistance*

The three zones proposed by Vygotsky allow us to propose an evaluation methodology of assistance regarding its usefulness and more particularly its contribution to the two expansion processes identified: autonomy zone expansion (the learner conducts his/her activity alone), and ZPD expansion (the learner conducts his/her activity with support). Some models (of adjusted components, of reorganized components and of weighted components) are evaluated as assistance aids favoring the expansion of the autonomy zone (see Figure 2.17), the ZPD (see Figure 2.20), or both (see Figure 2.15).

Highly targeted, the assistance examples presented here show the full diversity of the possible aids: assistance to teachers and learners in a distance learning situation in a master's ergonomics course, assistance for the evaluation of websites made by teachers for other teachers and assistance in the analysis of practices of English teaching trainees. The professional gestures model allows, in the framework of its implementation in these different contexts, the definition of new aids (new adjusted models), whose contributions we can evaluate. The challenge is not to present an exhaustive list of aids, but rather to initiate, through concrete examples, a reflection on the offered possibilities of adaptation. Here, the professional gestures model was adapted to different contexts, fields of activities, fields of investigation and people involved.

Derived from the verb "adapt"[22] the term "adaptation"[23] refers to an action in the sense of "adjusting". In the 19th Century, thanks to the rise of biology, adaptation included the idea of modification. It then took on its semantic dimension through its transdisciplinary appropriation, particularly in psychology, and its transposition in sociology (Taché 2003).

22 From the Latin word *apere* (link, attach), whose past participle *aptus* (qualified), added to the locution *ad* (at, to), provided the verb *adaptare* (adjust to, with a view to) (Rey 2006). This term was borrowed from Latin in the 13th Century; the word "adapt" appeared first in a concrete sense (apply), then figuratively (agree with something).

23 The term "adaptation" is derived from the medieval Latin word *adaptatio.*

Concerning the assistance concept, the term "adaptation" is perceived as a continuous, permanent effort to take advantage of the environment in which the person involved and his/her productions evolve. Adaptation, according to Simonet (2009), "refers to both a resulting action (process) and purpose (state), a terminological duality summarized by Piaget's 'adaptation-state' and 'adaptation-process' (1967)".

Adaptation is a process that enters into a reflective dynamic set up by the assistant, within which his/her personal values will adjust to the values of the environment and/or organizations with which this same actor is linked. This adaptation process operates according to two directions: an adaptation toward individualization (individualization process), giving rise to individualized assistance as a result and an adaptation toward personalization (personalization process), offering personalized assistance (Duthoit *et al.* 2012).

2.6. Assistance in its future

2.6.1. *Theoretical framework: proactive or reactive assistance*

Some research work differentiates proactive assistance from reactive assistance (Gerbault 2006). Proactive assistance is defined as a document present at the beginning of the activity. For example, it can take the form of a help section (Capobianco and Carbonell 2006), labeled in computer applications as such (help, ?, assistance). It is most often unused, or sometimes in an unadapted way (Aleven *et al*. 2003). Several reasons can explain this. The first reason is that the user is not always aware of its presence and/or its location. The second reason comes from the fact that the user does not always know how to examine and use it, because it is decontextualized from the situation in which the user finds him/herself. Finally, the third reason is that digital applications "do not allow the evolution and adaptation of assistance to the different situations encountered in practice" (Sehaba 2012, p. 56). For Gapenne (2006), if the exhaustiveness of assistance systems is ideally desirable to facilitate the users' autonomy, it appears at the same time that the complexity and the number of use trajectories make it impossible to satisfy this constraint. Proactive assistance systems cannot respond to an exhaustiveness of contexts, different perceptions according to users, activities and/or strategies of comprehension of this same activity.

The assistance designers cannot therefore proactively propose all the possible aids adapted to all the problems that can be encountered. Nevertheless, the use of a digital system integrating a proactive aid in tutoring, for example, "has a significant influence on the use of the set of tools and these effects are differentiated according to the functions fulfilled by the implemented assistance tools" (Hare and Dépover 2002, p. 1).

Alongside proactive assistance, we find reactive assistance. It responds to a targeted need, in a particular situation. This assistance tool is contextualized. Generally tailored for a specific individual, in a unique situation, it can take the form of advice, a response to a question or even information that can guide the problem-solving strategy.

Ideally, a change in status in both directions should be possible. In fact, we should be able to make an aid proactive which was reactive up to this point, by integrating it into a help section, for example. Thus, the help section would be enriched based on different reactive aids which are developed as requests and needs progress. Conversely, an unconsulted proactive aid should be able to disappear from the help section and become once again a reactive aid in the event of a request or an observation. The aid would thus move from a proactive status to a reactive status, and *vice versa*, as needed.

For the moment, no scientific study has focused on these aspects of one-off status change (proactive-reactive). One of the reasons is certainly the difficulty in the identification of indicators on which we could rely in order to give a specific status (proactive or reactive) to each aid produced. Among these indicators, the first one, which seems to be the most natural, is the number of occurrences: the number of times the aid is provided to an assisted person.

As an example, in Figure 2.21, we define the number of aid diffusions as being essential in the process of determining its status: if the request is a one-off incident (happening once), the aid remains reactive. When the request for assistance reaches a threshold (n times), the assistance designer has the choice to maintain it in its reactive status or to give it a proactive status (in anticipation of new requests, for example). When the aid is diffused n+1 times, then the reactive format is abandoned and the aid becomes proactive, that is integrated to a topic. If the proactive aid is not

used, it disappears from the help section, but it can be reproposed in its reactive format. It will then be archived and reused if the need reappears.

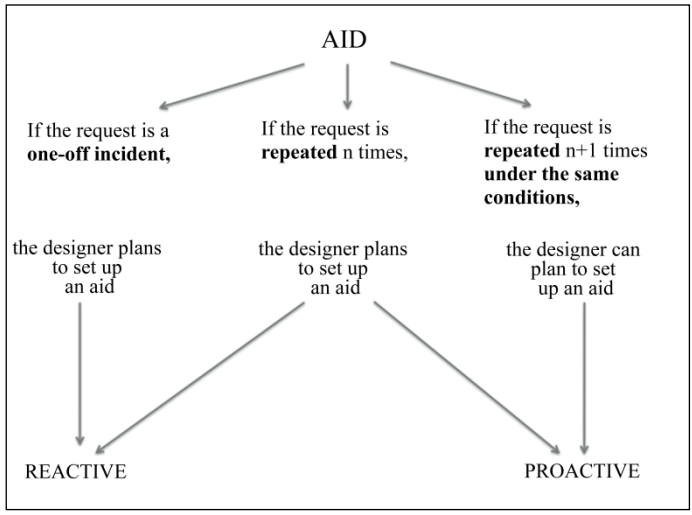

Figure 2.21. *Example of an indicator of assistance status change*

Apart from this quantitative indicator, others can also intervene. We define one in particular: assistance orientation.

2.6.2. *Example of orientations for assistance*

For us, "orientation" refers to strategic reasons for which an aid has been produced. This orientation specifies the circumstances and the guidance according to which integrated knowledge for assistance have been selected and then implemented. More particularly, we identify three orientations: reflective, communicational and curricular.

2.6.2.1. *Assistance in its reflective orientation*

Reflectivity is a meta-competence (Chaubet 2012). It is defined as a "property of being able to reflect on oneself"[24]. Through its reflective orientation, assistance offers:

24 *Trésor de la langue française informatisé*: http://atilf.atilf.fr.

– support to students: for example, the creation of a digital environment as a personal learning environment (PLE) questions the student about the knowledge/skills that he/she has implemented in the fulfillment of one or several of his/her tasks, questions his/her choices in the selection and organization of the tools he/she chooses to consult and use in order to build his/her own knowledge and/or to make progress on tasks that are requested of him/her (Vayre *et al*. 2014). The design of this PLE is an aid to the development of a global reflective approach;

– support to the professional in an academic career: for example, the participation in a MOOC can appear as an action integrated into the decision to change professional activity, to resume studies or to conduct other less routine activities for a while, generating (or not) a certain creativity;

– a lever of evaluation: assistance can be defined as a lever integrated in the evaluation process of the actions of an individual and/or an institution (Pélissier and Mailles-Viard Metz 2012). It opens the debate on:

- the role of each actor in a community: rights, duties but also human personalities which must be taken into account in order to produce together, to ensure the function of the assistant and the assisted person;

- the evolution of a situation in which each subject or group of actors identifies some necessary adjustments to the advancement of collective projects.

2.6.2.2. *Assistance in its communicational orientation*

Assistance, in its communicational orientation, is related to the mediation process of the actions of an individual or a set of individuals, integrated (or not) into an institution (public or private). The mediation process, in this orientation, is defined as an "ethical communication process based on the responsibility and autonomy of the participants, in which a third party – impartial, without decision-making or advisory power, with only the authority that mediators acknowledge – fosters through confidential interviews, the establishment and the reestablishment of the social link, the prevention or settlement of the situation in question" (Guillaume-Hofnung 2007).

Research work on MOOCs illustrates this orientation. In fact, MOOCs are defined as a recent training system (Charlier 2014), questioning other work on online training (Mangenot 2014). But, these new systems allow for

the solicitation of audiences different from those who normally frequent universities.

> "Most of the MOOCs are followed 70% by employees with a strong interest in all matters concerning management, as with the MOOC Project management of the École Centrale de Lille or Effectuation, entrepreneurship for everyone of EM Lyon."[25]

Work on the support methods necessary to develop these systems "but also to understand and evaluate them" must be initiated (Charlier 2014, paragraph 16). Keeping this in mind, the challenge of the assistance resource lies in the identification of the nature of scientific knowledge, transmitted and/or constructed knowledge, as well as the effects of these systems on the participants' motivation.

2.6.2.3. *Assistance in its curricular orientation*

Through this last orientation, assistance is related to the mediatization process. It implements some disciplinary (or multidisciplinary) knowledge identified as intervening in the learning process, according to on-screen presentation methods.

The assistance for the mediatization of curricular content (Van den Akker 1998; 2006) can be translated by the design of a "learning plan" (Taba 1962) which, for the learner, takes into account very early his/her objectives, his/her already initiated training experience and the learning strategies implemented. It is not a matter of planning everything, but rather of setting up an approach in advance, so as to better manage potential obstacles, without losing sight of the goals to reach.

For example, some of our works (Pélissier *et al*. 2017) show a desire from the teachers to decompartmentalize disciplinary subject matters. In diploma models, however, the content of these subject matters is still dedicated to a single discipline. The concern of digital assistance is to foster the convergence between these disciplines, without losing sight of each of their objective.

25 Olivier Rollot, *Le Monde*, on September 24, 2014, "*Mais pour qui sont faits les MOOC*?" URL: http://orientation.blog.lemonde.fr/2014/09/24/mais-pour-qui-sont-faits-les-moocs/.

2.6.3. *Conclusion: different statuses of digital assistance*

In this section, we presented assistance in its future. First of all, it is described as being able to be characterized and change status (proactive or reactive) according to indicators that have not yet been constructed. Our example indicator is the number of times assistance is provided. However, this indicator raises the question of the similarity between two aids. Indeed, to what extent can we say that two aids are similar or identical? When the knowledge conveyed is the same, or the choices implemented (sending via email, for example) are identical (even if there is a person CC'd in the email, for example)? Both? These questions seem to us to be necessary today, but have no scientific answer.

Then, we differentiated several futures for each of the aids. Regarding reactive assistance, it can:

– disappear, in the case where it is specific to a learning situation for a given learner and it is therefore not useful to save it;

– be archived in the profile of the assisted person, in order to later make hypotheses on its representation;

– be indexed in a database characterizing the already proposed aids. This indexing will make it possible to make assessments and summaries of the aids implemented in a given period, or toward individual assistants.

As a proactive assistance, it can be:

– disseminated to other learners (group) likely to have the same needs;

– integrated into a computer system and thus be available before the beginning of the activity, in case the need to which this assistance responds is recurrent in a given period.

Then, we presented assistance as being characterized by an orientation which refers to the approach, chosen by the assistant, of which the assistance comes within the scope: reflective, communicational or curricular. However, the same assistance can be related to several orientations at the same time. It can also start an activity of the assisted person in a different orientation than that envisioned by the assistant. Indeed, the designer can choose to offer assistance by focusing his/her approach on a curricular orientation (most often). This assistance can then create, through its recipient, an activity integrating the assistance in a communicational orientation. For example, if a

request for assistance focuses on the comprehension of the wording of an exercise, the assistant, in the assistance tool that he/she produces, can refer to a humorous video resource on the Web, formulating the wording in another way; the assisted person can carry out his/her exercise by integrating humor in his/her response (the use of humor was not considered before the production of the assistance).

2.7. Conclusion: methodology of the digital assistance approach

Even if autonomy is an expected quality, it must be recognized that no one is fully autonomous or totally independent. Requesting assistance, finding the "right one", identifying methods to develop a means to progress in the construction of our own knowledge, are activities that are important to specify, in order to better support learning activities. On the other hand, opening up assistance to scientific questions aimed at offering design methods of these aids, so as to make the ignored but effective practices transparent, is a line of research which has not yet been considerably explored. With this in mind, in this chapter, on the one hand, we presented assistance in its complexity, and on the other hand, we identified its components and its inputs.

To conclude these aspects, we can say that assistance is defined as both a process and the result of this process. It is viewed as a cycle initiated by a situation of an assisted person and processed by an assistant. This cycle consists of four essential stages. In order to determine the characteristics of digital assistance, at each of these stages, the example aids were analyzed according to a framework of reference. This framework made it possible to highlight certain functions associated to support (stage 1: assistance origin), upward and downward integration processes (stage 2: assistance processing), two expansion processes of certain zones identified by Vygotsky (stage 3: assistance evaluation), and finally, two statuses and three orientations (stage 4: assistance future). At each of these stages, a result is expected: assistance in its objectives/responses to a need (stage 1), assistance itself produced by the assistant (stage 2), evaluated (stage 3) and examined in its future (stage 4).

Based on this definition, assistance can no longer be viewed as an additional component to the implementation of a training situation and static in the sense that it is not only a result produced by an actor, but rather as a

dynamic component, integrated into the activity of an assistant, whose result is correlated to the activity of an assisted person. Assistance no longer appears as an obligatory component to be implemented by the designer within a digital system, but as the result of a constant, recurrent reflection, leading at any moment to its appearance, its maintenance, its dissemination to other individuals, obliging them to adjust the content it conveys, its presentation methods and its status.

As a dynamic component, assistance can be addressed scientifically, according to a linear approach, with a sequential view. This view consists of three essential stages:

1) identification of the higher-level activity (teaching or learning) to which assistance is associated;

2) planning of actions related to the assistance activity itself. For a given assistance, several action plans have to be considered. Each plan corresponds to a sequence of ordered actions corresponding to the orientation chosen by the assistant and leading to the production of the assistance, its evaluation and its future. It is also in the framework of the identification of these action plans that the presence of a digital resource (video, text file on the Web, etc.) is considered and examined regarding its contributions (Porter, 2013), in relation to the sequence of action. This examination focuses on the knowledge (disciplinary or non-disciplinary) conveyed, its origins (validated/non-validated, developed by teams of scientists/practitioners, based on data collected/analyzed according to frameworks to identify, scientific articles, surveys conducted and synthesized, etc.) and the traces left by the assistant during the design process as well as by the assisted person during the integration of the assistance (as a result) in his/her activity;

3) each action is then defined in its operations. Carried out unconsciously, these operations offer the assistance recipient a real production, the result of the design process. This result can take different forms depending on the choices of operations envisioned by its designer.

All three stages can be represented by the following diagram:

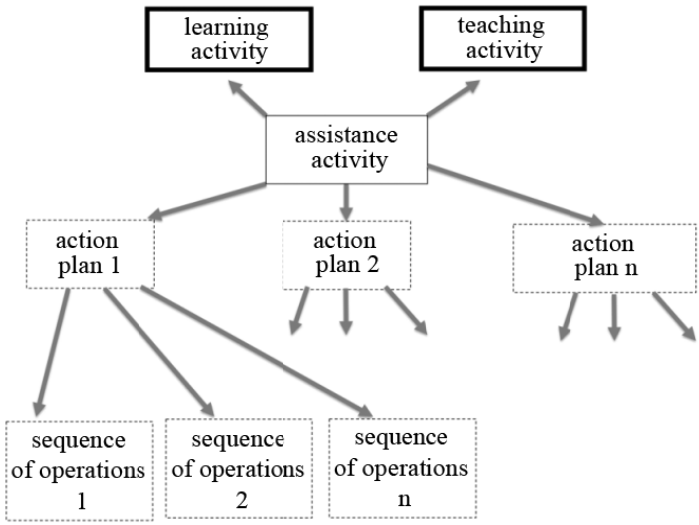

Figure 2.22. *A sequential view of the assistance process*

In Figure 2.22, the approach is linear: 1) the identification of the (high-level) activity to which the assistance activity is associated, 2) the action plans that can possibly correspond to this assistance activity, 3) the operation plans which can eventually compose each action identified.

With this in mind, everything happens as if the assistance activity is no longer defined in a linear, unique and well structured approach, but as a set of possibilities, among which the assistant makes choices according to his/her perceptions. The assistance design process is thus complex due to the possible choices left to the assistance designer at the level of the action plans considered (he/she must consider several plans and make a specific choice) and the sequences of operations considered (he/she must consider several sequences of operations for each action and make a choice). We are in a planning procedure of possible actions and operations, in a procedure of choice in consistency with the previous aids and activities carried out by the assistant, as well as the aids already received by the assisted person, in relation to his/her present and future activities.

All of these proposals related to the definition of the assistance concept are examined in the context of the researcher's activities in the digital humanities era in the second part of this book.

PART 2

Digital Assistance in the Researcher's Activity

Learner Support in Online Learning Environments,
First Edition. Chrysta Pélissier.

Introduction to Part 2

Following on from the first part of this book, which presented in particular the digital assistance concept, our objective is to establish, in this second part, the place of this assistance and its components within the different activities conducted by scientists.

We would like to remind you that in the framework of this book, we have taken into account only a part of HSS researchers (who were interviewed in surveys), and we have completed our study based on our own personal experience in the language sciences field.

In the first chapter (Chapter 3), after having described the objectives, the work context as well as the researcher's different activities, as they are presented and structured in official texts written by research organizations, we characterize the place of digital resources in their contributions according to the three previously identified orientations. These guidelines allow us to emphasize the current availability of digital resources of assistance to the researcher, the possible adaptation and adjustment of some existing resources in order to utilize them in the assistance of the scientist, and finally to define the outline of new resources, which do not currently exist, but which could be considered in the framework of the support of certain activities (Pélissier and Pujas 2015). In this way, we describe the full extent of the research and engineering work that remains to be conducted to better respond to the institutional demands associated with a rapidly changing profession.

In the second chapter (Chapter 4), we discuss the place of digital assistance in the researcher's professionalization process. After having presented professionalization as it is defined and approached by some authors, we describe the scientific scenario concept. This scenario is proposed as a component of the professionalization process and as a triggering factor for decision-making. It integrates into a desire to better manage careers based on indicators that can be measured and that allow for the development of activities conducted with digital technology, whether individual or collective.

Finally, in the third and final chapter (Chapter 5), we present the results of a survey that lead us to propose the action researcher model. This model is a means of addressing the different activities that a researcher is led to conduct, his/her needs in relation to his/her activities, and the contribution of digital resources. Through the three levels that form it, it offers a method of approach to past, present and future scientific activities (level 1), to his/her expectations of support/assistance through digital technology (level 2) and to the resources associated with the increase of his/her cognitive activity. As a matter of fact, concerning this last point, we envision the development of a cognitive activity increased by the establishment of digital assistance tools. We defend the idea that this concept, through its storage/memorization, synthesis/categorization and planning/replanning functions, can ease the researcher in some of his/her activities. In addition, through requests and linkings, the researcher can be engaged in collaborative activities, for example, that he/she would not have been able to envision without the assistance that he/she is offered.

This model is a way to identify the manner in which the activities are actually carried out by the researcher (field of action 1 of digital humanities), the contribution of some digital resources as they are currently proposed (field of action 3) as well as the place of such assistance in the development of the professionalization process and of the opening toward new professional scientific practices.

3

Digital Assistance in the Researcher's Activity

In this chapter, we describe the researcher's scientific environment, his/her activities, as well as the digital resources that are involved.

First, we present the context of the researcher's work based on the thought process and the research situation. This thought process and this situation integrate into the environment and the contract which bind the actor to his/her professional activity. Then, we focus on describing in particular three activities among all those which are found in the researcher's professional standards (official texts). For each of them, we differentiate the two roles of the scientist: to be an assisted individual in the framework of his/her activities, and to be an assistant in the activities of other actors (doctoral students, for example). For each role, we describe the activities that the researcher conducts alone (in the autonomy zone) and those that he/she carries out with the support of another actor (in the ZPD).

Finally, the digital resources are described as being able to be used in one or more of the three orientations that are envisioned (curricular, communicative and reflective). Their potential contributions are established, as well as their limitations.

Learner Support in Online Learning Environments,
First Edition. Chrysta Pélissier.

3.1. Context of the researcher's work

3.1.1. *The researcher's thoughts in research situations*

The researcher, whatever may be his/her discipline, fills his/her daily life with thoughts.

> "Thought is not an abstract thing; […] it is conducted in the routine of reading, writing, successive corrections, bibliographical consultations, personal and progressive data accumulation, (epistolary) exchanges, discussions and arguments… Knowledge made of snippets, of paths followed and abandoned…" (Bert 2014, p. 11)

Thus, "scholars" (researchers) occupy their days practicing "a set of operations, routine and modest, solitary or shared, conceptual or manual" (*ibid.*, p. 13).

They read, think and write, leaving behind traces or records, such as a draft of a published text, a book, a notebook, an agenda of scientific events, a schedule of tasks related to a project, sketches, a recording instrument (camera and recorder), a collection of objects (memory card), slides/photos/films, a press clipping from a regional/national/international newspaper, or even the annotated photocopy of an article from a specialized journal.

These traces take different forms according to the disciplines and subjects concerned, but they open up conversations between members of a same community or of a same research unit within which "it is difficult to make a clear separation between the discussions of purely descriptive, technical and theoretical nature" (Latour and Wolgar 2008, p. 167) on conventions/protocols for research practices, scientific information selection, data collection, research methodologies or community-specific writings.

This daily work is organized in the framework of different "research situations". A research situation is defined based on a problem raised and approached by a privileged actor, the researcher him/herself. Where didactic situations are used for teaching (Brousseau 1980), research situations are used both for "searching" and "researching". The difference between "to

research" and "to search" is crucial here. In "to research", the lexicographer[1] emphasizes the implemented reflection and the method making it possible to "know". As far as "to search"[2] is concerned, the emphasis is instead on the desire to carry out a motivated action in order to "anticipate". Accordingly, the scientist formulates a research question that he/she will choose based on desire, passion, or personal conviction, to identify a methodology that he/she will choose among those that he/she masters, those that are recommended to him/her (by a dissertation supervisor, for example), and those already presented in written articles, which he/she will have to adapt (to his/her personal knowledge and the features of study).

This research situation differentiates the action of the researcher from other actions leading to discovery, invention and innovation (Forest *et al*. 1997). For Malinvaud (1996), discovery is defined as what has been found but also perceived as an important and sudden step in knowledge (such as Galileo's astronomical works, for example). At the starting point of the discovery process, we find certain reasons/certain factors such as luck or the convergence between different areas of activities, based on existing knowledge. In regards to invention, it is often confused with innovation. In invention, we move away from the world of science to get closer to the conceptual domain, where imagination trumps a physical reality, to envision a nonexistent process to meet a need, or most often a latent desire. Finally, innovation leads to a result which appears to be new, but which in reality is the result of a production in response to a need identified and expressed in advance. Most of the time, invention is transformed into innovation. However, for this transformation to take place, technical solutions must be mobilized: product design, prototype construction, trials and tests, production process design, industrialization, etc. If these technical/ technological solutions are not mobilized, invention will never transform into innovation.

It is difficult for the researcher to talk about discovery, for scientific practices are well established. Nothing is actually found by chance: methodologies and theoretical frameworks are described. The framework refers in particular to the work done by other researchers in the same or a

1 According to the TLFi, "to research": to seek to know; to search with precision, method, reflection.

2 According to the TLFi, "to search": to anticipate someone or something; to search with intensity, desire.

neighboring discipline. Awareness of these other works makes it possible to determine the position of the work done, the novelty contributed. Concerning invention and innovation, the work of the researcher lies at the border between these two. In fact, the action of searching is linked initially, as we have mentioned, to a desire to approach a problem (a question) according to research (methodology) procedures, established by the community adopted by the researcher and/or described in responses to calls for funded projects. According to the scope, the scientific work gives rise to technical/technological innovative productions, which can be presented, for example, in the form of specifications initially, and then in the form of prototypes developed in laboratories in a second phase.

3.1.2. *Between "environment" and "contract"*

Just like Piaget, for whom the student learns by adapting to an "environment" (Brousseau 1990; Brousseau 1998) which produces contradictions (between old and new knowledge) and difficulties (knowledge internalization), the researchers learn to adapt to an environment, which produces contradictions (presented in previous articles), difficulties related, for example, to his/her approach of an investigation field for legal, geographic, temporal reasons, etc., of imbalances between beliefs/ hypotheses, methodological difficulties or interpretations of the results obtained. In this way, the researcher builds him/herself up and judiciously adjusts his/her research situation, by identifying beforehand the question that he/she raises, the chosen procedure, the first difficulties to circumvent, and the form of the foreseen results. Later in his/her approach, he/she queries, through the discussions he/she writes (in articles of certain disciplines), the limits of his/her approach and the consequences of the difficulties encountered, and repositions his/her question in a set of other questions that emerged in the course of the data processing or their interpretation.

This approach is explained in a "contract". It is not a "didactic contract" (Brousseau 1990) but rather a "professional contract". The didactic contract is defined as all of the teacher's behaviors which are expected by the student, and all of the student's behaviors expected by the teacher. It is a mutual commitment. In the scientific context, the contract provides the framework for the experiment conducted, a theoretical anchor specific to the work done.

It responds, on the one hand, to institutional expectations (CNU[3] section, host laboratory/research unit, disciplines questioned, networks of researchers solicited, etc.), and on the other hand, to the researcher's desires (ideas, values, knowledge conveyed in written and published articles).

3.1.3. *The researcher's activity in official texts*

The researcher's everyday work is not explicitly described in official texts. Only the common statutory provisions are presented in Decree No. 84-431 of June 6, 1984[4] with regard to university lecturers and researchers, and in Decree No. 83-1260 of December 30, 1983[5] for research fellows. These statutory provisions present the commitment of public servants in research, training[6] and administration activities. Article L952-3[7] of the Education Code details their missions: "teaching including formal and continuing education, tutoring, orientation, counseling and assessment tests; research; knowledge dissemination and connection with the economic, social and cultural environment; international cooperation; administration and management of the institution."

Neither an article nor a decree specifies the degree of this commitment. As far as research is concerned, the texts do not specify the quality and quantity of publications. Only AERES[8] had set standards on the nature and

3 *Conseil national des Universités* (French National Council of Universities).

4 Decree No. 84-431 of June 6, 1984 laying down the common statutory provisions applicable to university lecturers-researchers and bearing particular status of the faculty of universities and of the lecturers. Available at: http://www.legifrance.gouv.fr/ affichTexte.do;jsessionid=9CE7661D0650167F562568254A2DF7E8.tpdila23v_1?cidTexte=JORFTEXT000000520453&categorieLien=cid.

5 Decree No. 83-1260 of December 30, 1983 laying down the common statutory provisions to the community of public servants of public scientific and technological establishments. Available at: http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=LEGITEXT000006064030.

6 The researcher's main missions recognized by CNRS: http://www.dgdr.cnrs.fr/drh/metiers/cherch.htm presented in a national Charter of Ethics of research professions: http://www.cnrs.fr/comets/IMG/pdf/charte_nationale__deontologie_signe_e_janvier2015.pdf proposed by CNRS.

7 Amended by ACT No. 2008-112 of February 8, 2008 – Art. 2. http://www.legifrance.gouv.fr/ affichCodeArticle.do?cidTexte=LEGITEXT000006071191&idArticle=LEGIARTI000006525618&dateTexte=&categorieLien=cid.

8 Agence d'évaluation de la recherche et de l'enseignement supérieure, http://www.aeres-evaluation.fr.

number of publications requested from a lecturer-researcher and a researcher[9]. As for the administrative commitment, the texts do not specify the time allocated to this function and do not specify any tasks to conduct (too many and too disparate according to different authorities). Only the "Researcher's Professional Standards[10]," written by the CNRS Directorate of Human Resources about 10 years ago, specifies the nature of the activities that the researcher conducts.

3.2. Researcher's professional standards and digital resource contributions

According to the researcher's job description, the scientist carries out different activities[11] organized around seven major tasks[12] (see annex 1). This job description, in its present format, does not differentiate between the researcher's two roles: that of the assistant (doctoral students, for example) and that of the assisted person (in the construction and writing of a research project, for example). It does not distinguish between the activities that are provided in the autonomy zone (activities carried out by himself) and those carried out in the ZPD (with the support of another person involved). Finally, it does not present the digital resources that can play a role in the achievement of these activities. In the rest of the book, we present these differences. However, out of all the activities present in the job description (98 activities in total), we made the choice to focus on three of them:

R111: scientific monitoring conduct (bibliography, documentation, patents, conference, etc.);

9 Two publications in A or B journals on a quadrennial plan for a lecturer-researcher, and four for research fellows, between 2008 and 2014.

10 Produced by the Directorate of Human Resources, CNRS, 2003-2007, which "is not a 'constraint' which would confine the researcher in a set of activities necessary for his/her professional fulfillment. This is not a model of the typical researcher. The professional standards groups a set of activities, all inherent in the researcher's profession, but can be more or less implemented according to the profile of the researcher him/herself". https://www.dgdr.cnrs.fr/drh/omes/publi/documents/mcpi/NoteMCPI-CP_OutilRH.pdf.

11 And to respond to the national Charter of Ethics of research professions: http://www.cnrs.fr/comets/IMG/pdf/charte_nationale__deontologie_signe_e_janvier2015.pdf.

12 (1) Construction of a research project; (2) carrying out of a research project; (3) exploitation and dissemination of results; (4) coordination and scientific evaluation; (5) training through research and teaching; (6) scientific, economic and cultural development; (7) operation of the research system.

R211: theoretical model development;

R741: personnel management.

This choice was motivated by the desire to address activities related to three of the seven major tasks present in the professional standards, and by the current existence of digital resources that can contribute to their achievement.

For each of the three activities taken as example, some of the results of a survey are presented (see Tables 3.1, 3.2 and 3.3). During this survey, the exchanges were conducted with the intention of dissociating the two roles of the scientist (to be assisted in his/her own activities and to assist other people involved). For each role, we then led the interviewee to distinguish the activities that he/she conducts alone (from the autonomy zone) and those that he/she carries out with the support of another person (in the ZPD). We also questioned the candidates of the survey about their use of an existing resource in relation to the mentioned activity. We asked them to clarify its contribution in the expansion process of the autonomy zone and the ZPD.

Next, we present a (lower-level) activity in a more precise manner, as well as its connections with one or more specific digital resources. First, we describe the activity itself in its objectives and contributions for the researcher. Secondly, we describe the digital resource(s) dedicated to this activity.

Finally, we discuss more specifically the digital resources that have already been mentioned. We establish the orientations that characterize them. This study allows us to identify its strengths and limitations in the framework of the researcher's overall activity.

3.2.1. *R111 activity: scientific monitoring conduct*

3.2.1.1. *Survey results*

This activity consists of keeping up to date with the publishing of different scientific publications (articles in journals, books, etc.), but also of articles from specialized press, available audiovisual documents (scientific communications, testimonies, etc.).

	Vygotsky's approach		Contribution of resources	
	Autonomy zone	**ZPD**	**Expansion of the autonomy zone**	**Expansion of the ZPD**
Role: assisted	The scientist searches alone for books in libraries.	The scientist searches for books with the assistance of a librarian.	The scientist searches alone for works based on references introduced in a bibliographic database which is accessible online.	The scientist searches for books based on resources such as bibliographic databases of which he/she is not aware but which were recommended by other researchers. To carry out his/her requests, he/she can use information material such as "getting started" tutorials on the Internet.
Role: assistant	/	The scientist assists a doctoral student in the search for bibliographical references: he/she advises the student to look at article bibliographies, for example.	The scientist offers a tutorial which explains to the doctoral student how he/she can search for books alone in a specialized bibliographic database in a specific field (that of the dissertation).	The scientist offers a set of supports presenting several professional practices aimed at achieving different bibliographic requests in several databases which are available online.

Table 3.1. *R111 – solicited expansions and resource contributions*

In this table, in addition to the following two tables (Tables 3.2 and 3.3), we note that the researcher, as an assistant, does not play a particular role in the activities which take place in his/her autonomy zone. Everything happens as if the researchers themselves did not need assistance in the search for books or scientific journals. They know how to conduct their research alone in the library. It is knowledge certainly acquired in the course of their previous training or in the course of their experience, but this information is not provided by the interviewees.

3.2.1.2. Content[13] curation and monitoring activity

In the digital humanities era, the challenge is to disseminate the knowledge presented in books and scientific journals to a greater number of actors in the scientific community, as well as to teachers and managers of institutions (and even more). With this in mind, the R111 activity, which involves the carrying out of scientific monitoring (bibliographies, documentations, patents, conferences, etc.), can be supported by digital resources in relation to the content curation activity.

Digital resources dedicated to curation[14] aim at a deep and comprehensive revision of the landscape of research and education[15]. Indeed, the idea is to ask the scientist to become a curator and the curator to examine the scientists' issues and needs. This phenomenon calls for researchers to become aware of their responsibility with regard to knowledge materials currently produced and those which will be produced in the years to come. Scientists are thus present alongside librarians and archivists in the development of a reflection in the face of the specific challenges and opportunities of an ever-exponential growth of documents, especially from the Web.

The work of curators establishes the preconditions of new research methods that go beyond the boundaries of the solitary expertise of the researcher and the research assistant/archivist. It is a question of moving toward a less compartmentalized, more fluid, more participatory daily

13 This section was initiated based on the contents of the courses offered by Chantal Charnet in the HumaNum master's degree at the University of Montpellier 3.

14 The term "curation" is derived from the Latin word *curare* and designates initially the act of treating. By extension, the Anglo-Saxons use the word *curator* to refer to the person whose role is to select artistic works that will be presented at an exhibition or which will constitute a museum collection, to take care of them, while taking into account the audience to which these works will be proposed. Moreover, by extension, they chose the term *content curator* to describe the Internet user who, by desire and/or passion and/or need of recognition, shares and organizes his/her digital discoveries on a curation service. More recently, the term "curation" appeared in the 2000s. "Content curation" dates back to 2009.

15 From the digital humanities manifest, p. 189: "*Les Humanités Numériques reconnaissent dans l'activité de curation une caractéristique centrale pour l'avenir des humanités*." (Digital humanities recognize in the curation activity a central characteristic for the future of humanities.)

activity, in which the traditional forms, which have been independent up to this point (separation of activities related to the two professions), find commonalities within all the objectives, in line with activities already carried out and those to be considered. Thus, curation breaks the isolation of disciplinary, professional and institutional spaces. It envisions the production of open knowledge, designed to be disseminated to the largest number possible and to attract/develop new institutional (research, teaching and administration) models.

As an activity related to scientific monitoring (R111), curation aims to find content and share it with others. The curator realizes "work related to a series of intellectual operations consisting of selecting, formatting, connecting discourses, objects, forming a new object of knowledge" (Fabre and Desmet 2014).

He/she selects information that he/she him/herself has chosen by browsing the Web, and/or by selecting among those that are proposed automatically by the computer system based on themes, keywords, the browser history, the content of his/her exchanges on social networks, or based on his/her own RSS feed aggregator. This information takes the form of a URL, file, image, video or *web clipping*[16] that can then be disseminated to (more or less) targeted individuals, through custom public pages, through the social networks which the actor uses, blogs, sites *via* the generation of copy/paste codes, and/or by mail with the generation of automatic newsletters or RSS feeds incorporating the items to be shared.

This information and these documents are likely to be integrated into an assistance process for researchers in their own activities of bibliographic research and/or related to the community to which they belong. We also note that the sender of this content has the possibility, in some curation systems, to comment on the items that he/she proposes to readers (personal comments, *like*, note, stars, etc.), in order to customize them for a group or a particular individual. This possibility gives researchers a space of freedom that they have not had in the past in an information dissemination method and in the presentation form of publications which are interesting for them.

16 Extracts of pages "trimmed down" by the curator (images, texts).

3.2.1.3. *Resources dedicated to the curation activity*

The digital resources which serve the curation activity are numerous[17] and their diversity[18] never ceases to grow. They are organized around four phases: gather information, aggregate content sources, classify and categorize information, and finally, enrich and share data.

Information gathering can be achieved based on bibliographic databases[19], from major collective projects such as ISIDORE[20] (Maignien 2011), catalogs[21], international scientific publications[22] portals, web-specific research[23] tools (such as *Google Scholar*), dedicated to the creation of scientific and technical information[24] and applications permitting a

17 Fifteen essential curation tools: http://outilsveille.com/2013/11/15-outils-de-curation-incontournables/.

18 Twelve curation solutions are analyzed according to 32 established criteria: http://www.slideshare.net/ crid/comparatif-de-12-solutions-de-curation.

19 HSS database: HAL: https://hal.archives-ouvertes.fr/, Francis of INIST: http://www.inist.fr/?-Bases-de-donnees-; with an enrichment since 2013 with ABES for the consideration of theses, reports, conference reports.

20 The ISIDORE (*Intégration de Service et Interconnexion de Données de la Recherche et de l'Enseignement supérieur* – Higher Education and Research Data Interconnection and Service Integration) project is part of the construction of the digital infrastructure of the ADONIS-CNRS Very Large Equipment.

21 Catalogs of publishers such as Le Seuil (http://www.seuil.com/catalogues.php) and others that have HSS-specific sections such as De Boeck (http://superieur.deboeck.com/onglets/3/sciences-humaines.html) and university catalogs such as *Sudoc*, the Système Universitaire de Documentation (University Documentation System) catalog which is a French collective catalog created by libraries and documentation centers of higher education and research. It includes more than 10 million bibliographic records.

22 HSSOpen Center Portal: http://www.persee.fr/web/guest/home. In 2015, this portal had 14,007 audio versions of articles. *Gerflint* portal: coordinates, publishes, edits and indexes a global network of scientific journals (http://gerflint.fr). BiblioHSS portal proposed by the CNRS: provides its units with access to the full text of more than 11,000 journals and 12,500 monographs.

23 For access to theses: Dart-Europe for theses in Europe (http://www.dart-europe.eu/basic-search.php) and Thèses.fr for French theses (http://www.theses.fr).

24 Urfist (*Unité régionale de formation à l'information scientifique et technique* – Regional Training Unit for Scientific and Technical Information), for the Brittany and Pays de la Loire region. It is a training and research organization with an interacademic vocation, intended to develop in higher education the use and mastery of scientific information as well as digital resources: http://www.sites.univ-rennes2.fr/urfist/ressources/connaitre-les-moteurs-de-recherche-de-linformation-scientifique/50-outils-de-recherche-po.

personal[25] classification of articles stemming from this research (facilitating the composition of the bibliography of a particular article in the process of writing, for example). We also note the existence of OpenEdition[26], an infrastructure that offers different services to the dissemination and research of scientific articles. OpenEdition hosts the *Revues.org* platform. This open-access platform disseminates almost 690 HSS journals, that is more than 100,000 articles, 95% of which are accessible in full text. OpenEdition also hosts *Hypotheses* research logs, presenting the research content of a team or project at any time in its progression (and not only the results). These research logs take the form of a publication platform for academic blogs giving the researcher the possibility to publish the development, the advancement of his/her research and his/her collaborations on his/her projects. OpenEdition also offers Calenda[27], the calendar of Literature, Arts, Humanities and Social Sciences. It is an agenda that gives any scientific event organizer the possibility of broadcasting announcements, calls for contribution, participation, the event program, conference seasons, job offers or research grants. Finally, in another framework, OpenEdition Books has initiated the open-access dissemination of book collections from catalogs of university publishing houses and human sciences publishers freely available on the Internet.

Other examples of bibliographic resources are also available, such as the CAIRN[28] platform, which offers electronic publications (Dozo and Provenzano 2007) associated with more than 400 journals and 4,000 books in HSS, Scopus (Elsevier), Francis (EBSCO), *Web of Science, Sudoc, Proquest Dissertation and Theses, Emerald Journals, Education Research*

25 Such as research and bibliographic classification tools: *Endnote* (http://endnote.com) or *Zotero* (https://www.zotero.org) or *Refworks* (https://www.refworks.com), *Procite* (http://procite.software.informer.com/5.0/), *Mendley* (http://www.mendeley.com).

26 With CLEO (Centre pour l'édition électronique ouverte – Open Electronic Publishing Center), OpenEdition conducts an active policy for the construction of partnerships, in particular with actors in research, training, communication and dissemination of knowledge, in France and abroad, http://cleo.openedition.org/pilotage/partenaires. It aims at facilitating the appropriation of OpenEditionservices and contents. OpenEdition is in collaboration with CCSD (*Centre pour la Communication Scientifique Directe* – Direct Scientific Communication Center), which is a mixed service unit of CNRS, INRIA and the University of Lyon, created at the end of 2000, mainly dedicated to the realization of open archives. This center provides hosting services to OpenEdition, https://www.ccsd.cnrs.fr/index.html.

27 http://calenda.org.

28 https://www.cairn.info.

Abstracts Online, Érudit, Computers & Applied Sciences Complete, PsychINFO, Computer Database (Gale), Applied Science & Technology Source, Springer Link, Education Source, Education Research Complete, Eric (EBSCO), and Persée[29] which is a portal of HSS journals.

These different bibliographic resources enter into the process of assisting the scientist: they facilitate access to readings which are essential to the construction of his/her theoretical positioning. While, a few years ago, the documents were in protected places such as libraries, these places no longer have geographical boundaries and are open to everyone from a private or public access. These bibliographic resources are thus located in the expansion of the researcher's autonomy zone, enabling him/her to access various publications from several disciplines on his/her own.

However, some publications are only indexed in some (specialized) databases/digital resources, while others are not indexed at all. This can be explained by the fact that the integration of scientific publications in databases is currently carried out by the researcher him/herself or community organizers (symposium proceedings and journal articles) or even robots (e.g. *Google Scholar*). An effort of referencing and homogeneous dissemination of all publications to different databases should be considered.

Concerning the aggregation of content sources, we look at the example of the *Feedly* resource. It is an RSS feed aggregator. A drive centralizes the articles of all the blogs and sites to which the user is subscribed. Thus, through enrollment to different networks (*Twitter*, *Google*, *Facebook*, etc.), this resource presents the researcher with a set of sites related to the theme(s) that he/she him/herself has chosen.

In this case, the digital resource centralizes the information (a single type of information here) in the same physical location, allowing the scientist to save time in documentary research, and providing an opportunity of which he/she would not have thought, if he/she had not been solicited. We are both in the expansion of the autonomy zone, in the sense that it is about the researcher building up his/her scientific knowledge, and in the expansion of the ZPD, where the activities of other actors (present through publications) become a source of inspiration for original research or completes the bibliographical references for works in progress.

29 http://www.persee.fr.

However, the aggregation of content sources is generally only performed based on keywords these days. An effort of indexing of scientific articles regarding the issues addressed, the theoretical frameworks solicited, the nature of the results obtained or the interpretation of these results by the other actors in the community, for example, could allow the researcher, in the years to come, to better target and apprehend the work of his/her peers as well as to better position his/her personal scientific contributions.

Concerning the classification of information into categories, we look at the example of *Pocket*[30]. It is a digital resource which selects articles that have recently appeared in bibliographic databases according to parameters set by the researcher. It offers the scientist the possibility to manage a list of articles which have been read or which will be read in the near future. A permanent backup of the articles[31] proposed and selected by the researcher is possible. The search (for a specific word, for example) in the body of the text of each selected article or in categories, which enables us to group them (by article source or keywords, for example), is also possible. An article archiving system is also offered. In addition to *Pocket*, the *Buffer* resource offers the possibility to schedule the sending of messages on social networks[32] in a way that does not flood the representatives/contact persons with messages at a given moment and to better target the recipients. This resource performs an analysis of message deliveries (number of people reached, number of clicks made), with the number of *retweets*, *likes* and comments, in particular.

With this type of resource (*Pocket* in the example), the researcher classifies his/her own documents, which have been proposed beforehand by the computer system. This classification is linked to the moment of their reading (immediate or postponed), their source (place of publication) or their keywords. Thus, the scientist becomes more efficient in his/her research of articles and, consequently, in the management of other tasks. In this case, the resource participates in the expansion of the autonomy zone of the researcher: the articles are categorized according to current needs, allowing him/her to build up his/her knowledge on his/her own. He/she is also exposed, for his/her own articles, to feedback from the community through

30 *Pocket* (https://getpocket.com/) appeared in April 2012. It was previously named *Read It Later* (which appeared in 2007).

31 The download of all articles, except the videos for which Internet connection is essential.

32 Twitter, LinkedIn, Facebook, and Google.

retweets, *likes*, comments or even, in the case of *Google Scholar*, the list, the frequency of citation of his/her articles (with the possibility of adding an alert on the subsequent citations of his/her latest publications). This information can appear as an argument which motivates modifications in the researcher's scientific orientations and/or validates his/her theoretical positioning choices.

Nevertheless, not all classifications proposed by this type of resource are directly interesting for the scientist. If he/she wishes to use these results to write an article for example, a comparison of each document with those that he/she has already read from the same author, those which are already present in his/her personal bibliography, or those which are included in the bibliography of the article that he/she is in the process of writing, would be interesting for him/her.

Concerning content enrichment and sharing, we take resources such as *Scoop.it*[33] or *Paper.li*[34] as examples. They offer the possibility to enhance a web page, based on selected themes (*topics*) and a list of social networks taken as a source (including *Google* and *Twitter*). This content can be presented in the form of an online personal newspaper with a real-time feed, a blog or a website. It can even be used to establish the basic outline of a *newsletter*. Thus, the user has the possibility of setting up active (publish a newspaper and share it) or passive (subscribe to journals created by others) monitoring.

In the use of these resources, the goal is to establish the researcher's expertise in a particular field (which is determined by chosen keywords and selected sources). He/she determines the criteria for the selection of documents to which he/she wishes to refer in the framework of his/her research, propose their interpretation through a customizable journal which is disseminated to his/her community(ies) consultable at any time, dynamically updated, and shareable through the social networks of his/her choice. We are in the presence of an expansion of the ZPD, in that the recognition of the issues raised by the researcher and of the field in which these questions are asked are, through this resource exposed to others and put to debate. A real-time peer evaluation of publications posted on the web,

33 http://www.commentcamarche.net/faq/35176-scoop-it-creer-et-partager-sa-veille-d-informations.
34 http://paper.li/.

of opinions on his/her research objects, on the research questions raised and the research results obtained, is thus transparent, qualifiable and quantifiable.

3.2.1.4. *Orientations of resources dedicated to assistance through curation*

Through these digital resources dedicated to curation, assistance is presented in its curricular orientation. The challenge is to propose technical solutions in order to facilitate documentary monitoring, which is essential to the researcher's activity in the development and realization of research projects (see Researcher's Professional Standards).

However, by providing such access to scientific information and such selections, these technical solutions examine the indexing methods of documents of knowledge (articles and books). This indexing is generally established manually and personally by the author or authors of the material and/or the designers of the document platform. Yet, an article can be interesting for a researcher because it addresses a sensitive subject/field, implements a particular research methodology and/or provides conflicting results compared to other publications. These different elements are not all necessarily specified in the chosen keywords (very few – five on average). Automatic indexing focused on different components of the article (field, question, methodology, nature of results) would give the researcher the possibility to refine and to better target his/her scientific documentary research.

Regarding to the reflective orientation, the result of the monitoring activity returned by a computer system examines the researcher on the relevance of integrating (or not) these results in his/her own research. In fact, this integration can, on the one hand, encourage the researcher to best position his/her work; but on the other hand, given the significant number of published documents, it can demand a lot of effort in the subsequent selection operation: some articles can disgress considerably from the addressed subject and others can be non-credible due to the impertinence of the disciplines concerned. These days, the selection of documents, their layout and their role in the approach are specific to each scientist. These actions will occur without the clear identification of the (selection, layout and role) criteria, such as, for example, scientific reputation/validity and popularity of the selected document. The criteria of choice, exploitation and

dissemination of the results from this monitoring should be considered, in order to better respond to the needs of the assisted researcher.

Finally, with regard to the communicational orientation, these digital resources open up the possibility of disseminating publications according to several circuits. We currently see scientific articles disseminated on sites dedicated to scientific journals, databases for (open) archiving or even on personal pages (which are created by the authors of the articles). Professional social networks dedicated to specific fields, disciplines or even journals are in the process of development, but they are not yet well-integrated by all communities and by all scientists. One of the reasons is perhaps the important work of moderating and constant organization demanded by the creation and maintenance of these networks, a work not explicit today in the Researcher's Professional Standards (other than in the unexplained general topic "scientific organization").

3.2.2. *R211 activity: theoretical model development*

3.2.2.1. *Survey results*

This activity consists of producing and validating models based on different methods and research methodologies. Some of these models are then discussed, adjusted, completed and validated by other research works, which examine other fields and/or disciplines.

	Vygotsky's approach		The mirror approach to Vygotsky's	
	Autonomy zone	**ZPD**	**Expansion of the autonomy zone**	**Expansion of the e-ZPD**
Role: assisted	The scientist alone establishes his/her methodology based on what he/she knows, on what he/she reads in certain articles or on what he/she has already implemented in other research situations.	The scientist establishes his/her methodology based on exchanges with one or more other scientists belonging or not to the same discipline or community.	The scientist alone establishes his/her approach by consulting methodological synthesis documents in the form of tables, for example, available in synthesis articles.	The scientist establishes his/her approach based on several testimonies of researchers present in different audiovisual documents or grids aimed at assisting the researcher in his/her methodological decisions.

	Vygotsky's approach		The mirror approach to Vygotsky's	
	Autonomy zone	**ZPD**	**Expansion of the autonomy zone**	**Expansion of the e-ZPD**
Role: assistant	/	The scientist assists a doctoral student in the establishment of his/her research methodology by asking him/her questions on the form of the expected results.	The scientist proposes to the doctoral student to read a set of scientific articles available online which differ in the implemented methodology.	The scientist proposes to the doctoral student to view on the web audiovisual documents of researchers presenting the research methodologies that they have implemented because of temporal, organizational, personal reasons or data collection constraints, for example.

Table 3.2. *R211 – Solicited expansions and resource contributions*

3.2.2.2. *The modeling activity related to corpus linguistics*

Corpus linguistics[35] processes empirical language data, available to whoever (scientist) wants to observe them. This approach is anchored in the composition of a corpus. Even the concept of the corpus is regularly debated in language sciences[36] without ever establishing a reference definition. It is defined as an object built, developed by the researcher based on raw data according to a specific research outlook, in a specific perspective.

> "The corpus is a collection, governed by principles, of empirical language data, texts (or fragments of texts), which are samples of a given discourse, provided consequently with a representative value." (Teubert 2009, p. 1)

It offers, for linguistics, the possibility to implement two complementary approaches (Mayaffre 2005, p. 1):

> "For some, the corpus is an observatory of a theory *a priori*, while for others, the corpus is an observed, dynamic object

35 *CORPUS* reference journal: https://corpus.revues.org.
36 No. 1 (2000) and No. 4 (2005) of the *CORPUS* journal.

> which makes it possible to describe and then develop models *a posteriori*."

Thus, some linguists use the corpus as a means to demonstrate the models they propose (hypothetico-deductive approach). They establish models, hypotheses, and then they confront them with actual productions.

> "The results of such a computational analysis cannot therefore examine the categories themselves. Fundamentally, the researchers who adopt this approach search for, in the corpus, examples to illustrate the structures or the entities of which they have made the hypothesis." (Teubert 2009, p. 8)

The reproach made, in some cases, to this approach is that researchers do not offer theoretical, modeling thought. They are simply a more or less descriptive approach. Bonelli Tognini (2001, p. 61) refers to this practice as *corpus-based*. It is opposed to the *corpus-driven* method, which is considered to be a *bottom-up* approach, an inductive approach aimed at establishing models based on field data. The approach begins with observations and leads to a hypothesis or a defended scientific model which can be applied to more than one situation.

These two approaches have their place in a global scientific thought. The choice between one and the other is made according to the needs of the study, the nature of the data available, and previous results. However, the recurrent problems (Charaudeau 2009) raised by the composition of these corpora lead us to reflect on a characterization of possible practices based on:

– the written/oral/audiovisual data collection method (of assistance and requests for assistance), present in various media (newspapers, interviews, radio, etc.), according to a procedure established in advance[37], recovered according to constraints (free or imposed by the investigation field) and according to a defined scope (closed/exhaustive or partial/open corpus), with or without the knowledge of the people involved;

37 We will mention here the work carried out by Mathieu Jacomy and Franck Ghitalla on the corpus design methodology in Humanities and Social Sciences with the use of the *Navicrawler* application (which conforms to the version 1.5). Final report: http://webatlas.fr/wp/share/navicrawler/Guide%20m% E9thodo%20NC%202007.pdf.

– categories that will be the subject of the analysis: grammatical (connectors, pronouns, verbs, etc.), lexical, syntactic, with a reflection on the type of speakers emitting and/or receiving messages (of assistance or requests for assistance), as well as the spatio-temporal variables related to the analysis;

– tools for data processing (of assistance or requests for assistance) as a manual analysis, anonymization (automatic or semi-automatic) of exchanges, the use of transcription, annotation, segmentation, or labeling software, for example.

The choices related to these three aspects (collection method, categorization, and processing data tools) are important to successfully complete a search. They can be supported by the digital resources available today. Let us look at the example of data processing.

3.2.2.3. *Resources dedicated to data processing activity*

The resources which assist corpus linguistics have skyrocketed since the 1980s and continue to grow[38] (Paillé 2011). Unlike disciplines in which the computer has emerged as a tool supporting established practices in a low-technology environment the use of digital technology in language sciences is a continuation of technical practices: from data collection supported by recordings ensured by tools (audio recorders or cameras) and adapted computer applications, to their development on the web and through their processing. Digital technology is, on many levels, present in the research approach in corpus linguistics. These digital applications even open up the implementation of new approaches and new work methods (Bergougnioux *et al*. 2014).

Three major stages structure the researcher's activity in this field: data collection and organization, data analysis, and corpus normalization/ standardization. In other words, one must aggregate the content sources, then organize/categorize them, and finally share them.

First, to guide the data aggregation, collection and organization process, several applications are currently available. Some are dedicated to the processing of oral data (phonetic/spectral analysis in *Praat*, annotation and

38 List and characterization of software tools for the development and use of oral and multimodal corpora: http://ircom.huma-num.fr/site/p.php?p=ressourceslogiciels.

transcription in *Transcriber*), others of texts (gloss interlinearization and automatic lexicon creation for *Toolbox*), and others finally of videos (*Clan* facilitates the insertion of the representation of syntactic, morphological and phonetic categories in the form of linear annotations).

Nevertheless, these days, with the arrival of the audiovisual multimedia data, new difficulties have emerged for the linguist. He/she must be able to simultaneously read several videos offering different perspectives, several texts (for the transcription of different actors and several versions), and sounds (possible noises). Applications such as ELAN[39] (Wittenburg *et al*. 2006) offer this option. It is a software for editing specialized language corpora in work on oral language, gestures and visual analysis, in addition to temporal concordance issues. It makes it possible to work in partitions[40], on one to four videos simultaneously, and on sound, for a single document[41]. It matches the images of several videos, audio (speech of actors) and transcriptions of texts with different annotations. These annotations can correspond, for example, to turn-taking, pauses, non-verbal cues (gestures, facial expressions, postures, facial mimicry, etc.) and involvement of instrumental resources (tables, computers, tablets, etc.). Through this type of resources, the goal is to conduct analyses on data of a diverse nature, viewed as one isolation medium (text, audio or video) or miltiple media simultaneously.

The use of these resources gives the researcher's scientific production a methodological verifiability. Indeed, these resources are generally cited in publications. They provide credibility to the study, which is recognized by the community (expansion of the ZPD) as well as the mastery of a (technical) expertise spread by the production of tutorials available on the web. Furthermore, the use of ELAN gives the researcher the possibility to carry out on his/her own an approach that would have been complex to implement, if it was not assisted by computer science. As a matter of fact, it seems difficult for the researcher to implement and then synthesize all of the data that can be presented, in isolation at the same time. Through the use of this resource, we are therefore dealing with an expansion of the autonomy

39 EUDCO Linguistic Annotator: http://icar.univ-lyon2.fr/ecole_thematique/Tranal_i/documents/TutorialELANv2.0.pdf.

40 Like software such as *Praat, Anvil, Exmaralda.*

41 With (annotation, transcription, segmentation) methods and the possibility of setting up *templates* (or interpretative grids).

zone where the researcher can carry out certain activities on his/her own which are difficult to execute due to technical constraints.

Secondly, the different approaches and objectives of qualitative research in HSS have led researchers to use, since the 1980s, software to assist the organization and analysis of data corpora (text, audio and video). Thus, in the field of *Analyse des Données Qualitatives Assistée par Ordinateur* (ADQAO – Computer-Assisted Qualitative Data Analysis)[42] (Kelle 1995; Fielding and Lee 1998), different software applications are currently available such as *Tropes, Neurotext, Alceste, Spad T, Sphinx Lexica,* which facilitate content analysis (lexical statistics, lexicometry, discourse structure) as well as *ATLAS/ti, Nud*Ist*[43], *NVivo, WinMax* which facilitate categorization (Voynnet-Fourboul 2002).

Even if these resources do not conduct the analysis for the researcher (Bourdon 2000), they can assist him/her in his/her scientific approach, namely in data organization, the choices concerning the empirical materials to analyze, and to question him/her in its possible interpretation. The analysis of (massive and heterogeneous) data involves their structuring, so as to identify regularities, recurring phenomena or logical hierarchy between different segments observed. These resources form, based on their functionalities, an aid to the construction of theoretical knowledge extracted from an on-the-ground ground reality, observed and structured by the researcher him/herself. The researcher can thus identify (in particular, sequentially) an isolated phenomenon, understand it in its components, its engaging factors and its implementation in relation to others. He/she can even advance toward a schema including people, interactions and processes involved. This production (codification and categorization) effort is situated in the balance between its ability to give meaning to the data it has collected and to implement an abstraction based on a reality highlighted by this data, but also by the already existing literature.

These digital resources, dedicated to the data collection and organization process, offer the means to the researcher to validate his/her studies with the

42 The French version of *Computer-Assisted Qualitative Data Analysis Software* (CAQDAS), the better-known English acronym in literature. ADQAO is also designated by *Qualitative Data Analysis Software* (QDAS) or QDA (*Qualitative Data Analysis*).

43 *Non numerical Unstructured Data Indexing Searching and Theorizing software*, application dedicated to qualitative research analyses, http://www.nursing-informatics.com/qsr1.html.

community (expansion of the ZPD) and to bring new results out through these uses, results which may not have been able to be observed (or rather more difficultly and with a longer analysis time) manually, without the use of digital technology.

However, we note that one of the dangers of these ADQAO tools is that they may not be used reasonably, and that they may no longer meet the researcher's needs.

> "Users prefer to stop using a particular software application rather than having to adapt their research strategies to the program." (Lee and Fielding 1996, cited in Kelle 1997)

This author shows that the more research experience and culture is growing, the more the researcher's methodological posture is asserted on the basis of personal information; consequently, the user aims to control the tool, to use it to serve his/her own approach, at the risk of no longer using it if it no longer meets his/her expectations at all or in part.

Thirdly, while the linguists' work methods have evolved with the use of these resources for data collection and analysis, the challenge these days is to assist researchers in a dissemination and pooling process. In order to accomplish this, the Oral and Multimodal Corpus Consortium (IRCOM[44]), which brings together a group of researchers and engineers involved in this work, offers training but also targets the development of common reference standards and the provision through development, visibility and accessibility (interoperability) to corpora.

The pooling of corpora realized by digital technology gives the HSS scientist the possibility to build a positioning in addition to the knowledge present in scientific articles (expansion of the autonomy zone). With this pooling, the researcher is able to do his/her studies without repeating work that has already been done regarding the data collected (raw recordings already made that could give rise to new analyses) and the technical solutions developed (prototypes that can be reused entirely or partially to analyze certain data types, or anonymize them), in order to save time by reusing existing recordings on his/her own (expansion of the autonomy zone)

44 The IRCOM Consortium belongs to the Huma-Num TGIR, http://ircom.huma-num.fr/site/accueil.php.

or collectively (expansion of the ZPD). Finally, corpus production encourages the researcher's collaboration with other actors (IT developer, platform manager) with technical skills that can be learned by the researcher on his/her own from tutorials (expansion of the autonomy zone) or accompanied, in collaboration with others (expansion of the ZPD).

3.2.2.4. *Assistance orientations in corpus linguistics*

Through the use of digital resources which serve the analysis, curricular, reflective and communicative assistance orientations provided to the researcher are examined.

First of all, corpus linguistics places, as we have seen, data analysis methods as being essential to the comprehension of the scientific approach. They determine and clarify the results obtained. Access to the scientific approach is therefore important. The corpus thus constituted completes the published article(s). An effort of networking of text publications and corpora has not yet, however, been constructed. To this day, the link between these two productions is not always understood by the community. This can be explained by the absence of some corpora online, the temporality of the writing of an article in relation to corpus creation (one after the other) or even the lack of scientific competence faced with sharing of data collected (from raw recordings to the composition of a standardized corpus).

Next, the aid proposed through these digital resources is examined in its reflective orientation. The design and development of a corpus raise new research questions which were not necessarily asked during the description of the original project. Thus, the technical production leads the researcher to address new issues, examine the chosen research methodology (to clarify its limitations), or identify the study limits of the collected data.

Finally, concerning the communicative dimension, the compliance of a corpus to norms and standards (TEI-XML for textual corpora, for example) is a full-fledged research theme. It represents the technical development procedures inherent to the different activities of the researcher working in this field. The job description associated with the researcher profession does not answer this question. It certainly has never been questioned in these terms.

3.2.3. *R741 activity: personnel management*

3.2.3.1. *Survey results*

This activity consists of identifying the people involved in all the scientific activities carried out within a team or a research unit. This activity includes maintaining a database of registered people or, more broadly speaking, registering their activities in the framework of this administrative supervision: university professors, lecturers, doctoral students, post-doctoral students, administrative agents, interns, permanent or non-permanent employees. This database makes it possible to place purchase orders, project/business trip reimbursements, purchases in accordance with allocated budgets, etc.

	Vygotsky's approach		The mirror approach to Vygotsky's	
	Autonomy zone	**ZPD**	**Expansion of the autonomy zone**	**Expansion of the ZPD**
Role: assisted	The scientist develops on his/her own a document with his/her coordinates that he/she gives to the administrator/manager: the headings are those that he/she thinks are necessary (name, personal address, bank account identification document).	The scientist completes a form provided by the administrator who will require in a form a number of items which are necessary to complete a project reimbursement, for example.	The scientist fills in a form remotely online which is associated with a database provided by the administrator.	The scientist has access to several forms completed by different members of the team. This enables him/her to view the manner in which his/her own information will be disseminated and thus to anticipate. He/she can also have access to a tutorial informing him/her of the usefulness and the nature of the different items to complete in the online form.

	Vygotsky's approach		The mirror approach to Vygotsky's	
	Autonomy zone	**ZPD**	**Expansion of the autonomy zone**	**Expansion of the ZPD**
Role: assistant	/	The scientist helps a doctoral student to write his/her personal document: He/she gives him/her, for example, the list of information to present in an email that will be sent to the manager.	The scientist offers a tutorial explaining to the doctoral student the purpose of the form and how he/she can complete it online.	The scientist offers to set up a (remote) workshop which makes it possible to support the doctoral students in the process of filling in the different items of the online form.

Table 3.3. *R741 – solicited expansions and resource contributions*

3.2.3.2. *Personnel management activity*

The activity of personnel management (or human resources) is a major point in the accreditation and proper functioning of a scientific structure. It enables a laboratory or research unit to provide evidence of the competence of its personnel, to describe the organization of the different research activities of its different members, as well as to present the distribution of budgets depending on the individuals, teams and projects carried out.

For the researcher, the challenge associated with these activities is to give transparency to his/her individual and collective actions, to his/her scientific responsibilities, to be able to place him/herself within the organization of a structure and to have a vision of his/her evolution. This activity also establishes a means of presenting arguments for scientific choices. For example, an increase in the number of researchers who have joined a research unit can explain the increase in the volume of publications on a given theme, can support a request for the invitation of researcher, for mobility, for training or even for the organization of a research conference.

From a practical point of view, the researcher, in his/her administrative management activities, must be able to quickly:

– obtain information on the institution to which he/she belongs: access to institutional aspects (e.g. organization chart) to present in his/her publications (logo, presentation order of supervisory institutions, etc.);

– manage to identify all the activities carried out by his/her affiliate institution and/or his/her university supervisory bodies: presentation of a scientific review, publications, supervision of doctoral students and presentation of the different research projects currently being conducted;

– identify collaborations and training opportunities in accordance with recently arrived people;

– disseminate his/her activity to the largest number possible, for example through the mailing lists proposed by his/her supervisory bodies or other communities in which he/she is involved.

From another perspective, the personnel management activity can be associated, for the researcher, with the recruitment of personnel such as a doctoral student, a post-doctoral student, a technician or one or more interns, in the framework of a funded project, for example. He/she is also led to manage purchases of hardware/software, travel connected to different projects (scientific, training, gatherings of actors such as study days/workshops). Finally, he/she must develop the collective activities carried out by the team associated with his/her project: meetings, publications or even information dissemination (organizations of events, for example) by digital means (website, mailing lists, research log, etc.).

3.2.3.3. *Resources dedicated to the activity of personnel management*

There are resources currently available to handle all of the projects. They appear in the form of management tools defined as "a material and/or conceptual means linking several variables from the organization and intended to instruct the conventional management acts: predict, decide, evaluate, control" (Grimand 2012, p. 238).

Within a laboratory (or a research unit), the digital resources available which are dedicated to management are limited in their contributions. We can mention the RESEDA[45] application, the CNRS platform aimed at

45 Data Service Repository: http://www.cnrs.fr/insis/infos-DU/docs/docs2015/Reseda.pdf. This service was named Labintel until June 2015. It groups together 1,200 research laboratories.

describing structures and their personnel. It was implemented in 2015 in the framework of the information system modernization. This application offers to research units the possibility to:

– describe the personnel and its organizational (hierarchical) structure, with the aim of anticipating the assumptions of duties and transmitting data to other applications linked to RESEDA (management of project expenses and reservations for hotels/train, flights, etc.);

– enrich and optimize the description of the units (scientific activities) and their personnel;

– manage a researcher's membership in several administrative entities (status of associate researcher, for example);

– foster data exchanges with different institutional partners in accordance with scientific requirements;

– assist in collective data entry, in order to avoid their duplication during their dissemination.

However, this application is not adapted to the daily management of human resources within a small or medium unit (less than 50 permanent employees), in which the activities are limited and the budget lines and partners are very few.

To respond to these more specific needs, other digital applications have recently emerged, such as LOLA[46]. This application enables a research unit manager but also a researcher:

– to collect the information necessary for the establishment of a structural organization chart, a directory (with an organization chart with photographs) of permanent and non-permanent members (doctoral students and post-doctoral students, for example) integrating the personal data of each member (last name, first name, email address, membership team, office occupied, etc.);

– to generate purchase orders and travel orders without re-requesting all administrative information each time from the member of the personnel concerned;

46 Laboratory logistics, developed by Patrice Perret (administrative manager), Praxiling UMR 52-67, University of Montpellier 3.

– to make requests for an outside researcher's invitation, purchase, project expense reimbursement and archive all these requests (even if they have not taken place);

– to automatically generate the forms (which can be adapted) requested by university and scientific supervisory bodies.

Data centralization in the LOLA application enables the researcher to save time in repetitive administrative activities: a single personal data form is to be completed at his/her arrival in the structure. This information then integrates into a database that can be consulted at any moment (to obtain a colleague's coordinates, for example), from anywhere and by any member of the laboratory. This base is not especially related to the other internal university resources. However, it makes it possible today to generate the documents related to the project order request of certain supervisory entities (a university teaching component, for example).

Other forms are also available in LOLA. For example, they enable us to make a request for a project or the purchase of equipment. All requests are thus archived. The researcher can then consult them and make an assessment (for a meeting, a publication or an activity report). Among the IT developments envisioned in the near future, a module dedicated to financial arbitrations management by the laboratory management team or teams is established. It will make it possible to leave, at each meeting, a trace of requests for project expenses reimbursement and purchases discussed within the team.

The use of a resource such as LOLA gives the activities conducted a memory that the researcher, as a human, cannot have over several decades, in a precise and concise manner, for a given project but also for several projects conducted. We are therefore, with the use of this resource, dealing with an aid which expands the autonomy zone (expansion 1), where the researcher on his/her own can carry out certain activities such as the search for a colleague's coordinates, institutional information (the organization chart of the team, the logos of the unit) or the list of travel orders of his/her team in a given duration.

3.2.3.4. *Assistance orientations in personnel management*

Through the use of digital resources put to the service of the personnel management, reflective and communicative assistance orientations provided to the researcher are examined.

On the one hand, at the reflective level, based on information stored in a resource such as LOLA, each researcher's research history can be evidenced by the traces left by individual (request for financing of events, funded travel, invited researchers) but also collective activities, that is to say related to actions carried out within the teams with which the researcher is associated. A reflection on the requests made for calls for projects (even non-obtained) in collaboration with the laboratory members but also other researchers from other institutions, can explain the disparate but also original activities.

On the other hand, at the communicational level, digital resources such as LOLA are likely to participate in the presentation of scientific results (e.g. research units evaluation). These presentations can take into account the thematic requests for funding, issues addressed by guest researchers, or partners involved in different projects carried out by the team.

3.2.4. *Conclusion: prospects for "scientific engineering"*

With these three examples of activities (related to R111, R211 and R741), we describe the full extent of the path that has not yet been discovered, to provide the scientist with the means to be assisted in his/her activities as a producer of knowledge (role of assisted) and as a supporting person of other actors (role of assistant). A reflection on the contributions of digital resources in the approach and the evolution of this professional activity (role of assistant and assisted) aimed, for example, at enabling the researcher to carry out or have a doctoral student carry out bibliographic research in relation to the R111 activity, to consult or have a doctoral student consult audiovisual documents presenting different research methodological approaches in relation to the R211 activity, and to have personnel management remote systems aimed at maintaining the R741 activity, remain to be implemented. Engineering work remains to be constructed.

Despite the work done linked to the field of aeronautics, aerospace, the shipbuilding industry or even the environment, the scientific engineering

concept does not currently exist as such, supported and developed by the community for the researcher profession. In general, engineering is defined as the set of functions that lead the design and studies, the purchase and control of equipment manufacture, to the construction and implementation of a technical and/or industrial installation. By extension, this term is often used in advanced fields (we speak, for example, of computer engineering). It is associated with a technical process, addressing targeted, specialized and implemented needs with the help of advanced and adapted technologies.

One generally speaks of scientific engineering when addressing developments (ports, roads, etc.), the production of a large-scale project (hospital, factory, boat, etc.) or even a specific equipment (section of an airport, electric vehicle, etc.). This term is then introduced as a replacement of the term "engineering", designating "the art of the engineer" which can come up in a very specialized field. Scientific engineering, as we envision it, is to be more specifically compared with instructional design. This engineering, dedicated to educational methods, is to study, design, conduct and adapt teaching, training or course systems. Consequently, scientific engineering is defined as engineering dedicated to scientific activity which involves analyzing, designing, developping and adapting professional systems specifically dedicated to the researcher profession.

Thus, we hope to be able to offer in the coming years digital resources and, more broadly, digital environments dedicated to the training and development of this profession which is evolving in a societal context in full effervescence. Some of these resources have yet to be designed.

3.3. Digital resources to design for assistance

Certain digital resources related to the researcher's scientific approach are not yet available today. Even if the development of digital humanities constitutes an opportunity to consider their design, their development and their dissemination among different communities, as this seems to be the case through the spreading of the content curation activity for example, there are still many activities of the scientist that are not supported by digital technology.

The design and development approach of digital resources dedicated to the researcher's activity in its diversity (according to the fields and the habits

of each one) remains to be imagined. An evolution process is underway, but a long path of production (from the design point of view) and assimilation (from the usage point of view) remains to be discovered.

Design is a highly studied process in the field of ergonomics (Falzon 2004). It is defined as complex due to the large amount of knowledge (disciplinary, methodological, strategic for the designer) and the many factors (temporal, technical and organizational) to take into account for each of the people involved (activity carried out alone or most often in a team). The approach aims to analyze the activities carried out by the designer(s), in particular the way to solve problems that are poorly defined and/or are in the process of definition, as the thought process progresses. Several solutions are proposed to support this process. For example, we mention the user-centric approach or *user-centered design*, recommended by Norman (1999). In this approach, the end user participates in the choices made by the team throughout the design process. The challenge is to identify and reduce the risks of pitfalls, which correspond to the existing gap between the initial objectives and the actual achievements of the user. This pitfall concept refers not only to the difficulties related to the design process but also to those with which the user is confronted, during the use of the established resource.

Concerning the appropriation process, it is defined as the possibility that a user has to conduct his/her activity in an effective and adapted manner. This is based on multiple parameters such as the design choices made by others before the production of a resource, the situation in which the user finds him/herself at a given moment (the state of his/her knowledge, psychological states, social relations, etc.), while questioning the consequences of his/her activity (examples: changes to consider, the form of activity results). Thus, the user acts on his/her environment by integrating this same environment in his/her activity. Expertise in the use of the environment and the activity is developed, increasing day after day or, more precisely, activity after activity. With this in mind, the instrumental genesis concept supported by Rabardel (1995) is fully realized. It summarizes the assimilation and accommodation processes originally developed by Piaget to explain the development of the child (1927), but adapted to these work situations. Through the instrumental genesis process, the individual appropriates his/her environment but also modifies it and (re)designs it so as to respond to his/her needs and desires.

Concerning the assistance process supported by digital resources, two complementary approaches are integrated: an approach linked to the design process of the digital resource within which the individual researcher shares his/her expectations with the team and an approach related to the appropriation process of the resource itself, in which the researcher proposes adjustments which can lead the design team to consider changes in the resource produced.

Under these circumstances, the digital resource is "questioned" in its contributions in advance of the approach and "requestioned" after its use. The researchers-users thus integrate the resources into their personal and collective uses. They propose adaptations specific to their approach, their situations and their activity fields.

Later in this book, we describe some currently non-existent digital resources, which are likely to participate in the assistance process implemented by the researcher in the years to come. Based on the three orientations (curricular, communicative and reflective), we describe examples of resources likely, through their integration in the assistance process, to develop a cognitively augmented humanity. We come back to this concept in the last chapter of the book.

3.3.1. *Digital resources in curricular orientations assistance*

To accompany the researcher in his/her activities, curricular orientation assistance should be considered. These aids meet an individual need, that of the researcher him/herself, a collective need, that of a team to which he/she belongs, and finally an institutional need linked to the affiliate supervisory bodies. For each of these three needs, we offer an example of a digital resource to be designed.

Our example of a resource associated with an individual need is related to the reading and writing activity of scientific supports. Understanding and writing a scientific document is a solitary and complex activity, particularly for young researchers. Writing an article represents the culmination of the work of contemporary researchers (Pontille 2004) and constitutes an essential disciplinary socialization element (Pourmir 1998) of doctoral apprentices-researchers (Bart 2007). A scientific article is not an opinion article, nor a controversial pamphlet or writing, a thesis or a dissertation

(Roy and Laros 2005). It is a written work that responds to a particular literary style.

> "It aims at transmitting structured information, integrating a critical synthesis of the state of the scientific documentation in a particular field; an articulated theoretical framework; a detailed presentation of the method and instrumentation used (if relevant); a discussion relating the preceding elements; the underlining of the limitations and the suggestion of avenues of research…[47]"

An aid to the understanding each of the written scientific articles could be envisioned[48] through the integration of a digital resource which would present, for example, "writing models". For each model, a set of structured articles would be presented, as well as an audiovisual production of their authors, explaining the usefulness and specificity of each part and their structuring. This resource would participate in the expansion of the learner's autonomy zone, by facilitating him/her in the comprehension and writing of articles in respecting scientific habits, often not clarified by journal managers or the researchers themselves.

Even if this digital resource is defined *a priori* as part of an aid having a curricular orientation, it can also be associated with a reflective orientation. Indeed, asking the author of the article to specify the components of his/her scientific writing leads him/her to question his/her practices as a writer. This approach participates in the comprehension of different personal writing habits, offering him/her the possibility of demonstrating he/she belongs in a community and/or of considering integrating in a new community.

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47 Francis Larose, "*La conception et la rédaction d'un article scientifique*", Faculty of Education, Université de Sherbrooke CRIE – CRIFPE, Co-editor of the *Revue canadienne de l'éducation/Canadian Journal of Education*, http://www2.crifpe.ca/medias/pdfs/Redaction.pdf.

48 For example, a scientific writing support workshop has been organized by the *Institut de la Francophonie pour l'ingénierie de la connaissance et la formation à distance* (IFIC), in the framework of the AREN (*Alliance pour la recherche en éducation numérique* – Alliance for Research in Digital Education) system, "*coup de pouce"* (a little help). The dozen selected participants of various nationalities took part in this workshop at Campus Numérique Francophonie (CNF) in Yaoundé from November 21 to 25, 2016. URL: https://www.auf.org/bureau/bureau-afrique-centrale-et-des-grands-lacs/evenements-regionales/aren-coup-de-pouce-2016-atelier-de-redaction-scien/?edit.

Among the examples of resources associated with a collective need, we can cite those that would contribute to the production of activity reports of a research team. Regularly requested by the institution, these reports take the form of, among others, a list of publications, issues common to different members, reports/summaries integrating the examined theoretical frameworks, the implemented methodologies and the different results obtained.

An aid for drafting these reports/summaries could integrate a digital resource which would present other reports (historically developed by the actors of the same team or scientifically similar teams), in order to facilitate the comprehension of the expectations of the evaluation and the form of the expected information. This resource would thus participate in the expansion of the ZPD. By giving teams the possibility to access the different materials that best enhance research, other actors could start investigating unexamined research themes. This could also prove to be interesting for a scientist aiming at the assumption of duties of a team or a unit, so as not to waste too much time and to know as soon as possible the requirements related to the evaluation of the supervised team.

Even if this resource participates in the assistance implementation process which is mostly found in a curricular orientation, it is also involved in the communicative orientation assistance implementation. As a matter of fact, the presentation of the different scientific and pedagogical productions of a team could be made according to new methods (audiovisual documents, for example) which are adapted to the different "multifaceted" development materials of a scientific activity (Albero 2015). It is necessary to consider a (clarified) complementarity in the scientific presentations of teams between the written report (synthesis report) and the oral presentation (experts' visit).

Finally, concerning digital resources associated with assistance dedicated to supervisory institutions, the researcher, in the framework of his/her contracts (postdoctoral, ATER, interns, etc.), must face, in some cases, institutional changes (laboratory, scientific team, line of research). Yet, these researchers, even if they have been present for only a few weeks or a few months within an organization, participate in its activity: they contribute to the definition and implementation of research projects, work in collaboration with other researchers, and initiate, in some cases, scientific directions of which it is interesting to be aware, in order to be able to explain the directions which are subsequently pursued.

Thus, a digital resource offering the possibility of stocking all the data related to the hosted (non-permanent) personnel, such as their research topics and research field, gives then the possibility of identifying through the researcher's motivation and profile, lines of research or emerging projects that will be later developed within the teams. Similarly, the profile analysis of the applications which are submitted for temporary positions (post-doctoral, ATER), can be an indicator of appeal, dynamics, and openness of the activities already conducted by the members of the organization.

Such a digital resource would have the effect of characterizing for a team (expansion of the ZPD) the feeling of belonging to one or several communities (actual or potential), of measuring a thematic attractiveness, and of offering explanations of the evolution of the work done by the organization (the emergence of new objects of study or methodologies). This resource would facilitate the work of management teams: implementation of a strategy, identification of arguments in decision-making procedures, anticipation of changes in scientific orientation, launching of topics in the framework of the recruitment of new members, etc.

These three aids (individual, collective and institutional) are not defined as independent but rather as complementary levels, "inciters" of originality. Indeed, assistance for the writing of scientific articles (individual assistance), in which a digital resource would associate several articles that were written according to a same model, can for example enable the researcher to question his/her own writing methods (individual assistance) and those of his/her team (collective assistance). It can also encourage institutions to request that the researcher explains a scientific positioning based on these writing models.

3.3.2. *Digital resources in communicative orientations assistance*

The researcher's professional activity aims for the fulfillment but also the development of his/her research work (Milot 2005)[49]. For Bart (2007), this development[50] is found at three levels:

49 The term "task" which is used here is based on an institutional prescription, while activity corresponds to what is carried out (Clot *et al*. 2000).

– scientific development refers to "the activities that enable the lecturers-researchers to gain recognition for their work by the community";

– pedagogical development, which "potentially makes it possible to gain recognition from students but also from fellow lecturers". However, "research and training are two separate worlds according to the social status of their respective actors and the goals that they pursue" (Clerc 2008, p.1);

– social development, oriented toward the general public. It allows researchers "to gain recognition for their work in the social field (for example, popularization of knowledge produced)". This development is seldom considered in the researcher's professional career (Kunth 1992). This has consequences on the implementation of national collective actions (Jensen and Croissant 2007).

These three developments make up the career history of the lecturer-researcher and characterize the work of research teams. During evaluation procedures, the list of scientific (scientific development), popularization (social development) publications as well as those aimed at the convergence between research and training (pedagogical development of doctoral students in particular) is requested. However, not all of the activities conducted by the researcher are taken into account in this evaluation: the administrative activities dedicated to pedagogical responsibilities (department head, international relations manager, etc.), the organization of the file intended for the beginning of a training course (formal, continuing, apprenticeship, cooperative), the supervision and organization of teams of teachers, of students in internship/projects, the implementation of an innovative system (hybrid training, distance learning, scientific popularization, etc.), the participation in training courses to acquire new knowledge (participation in thematic schools, summer schools, for example), etc. The aids for the development of all of these activities can be considered regarding the researcher (individual assistance) and the research teams (collective assistance).

50 We note that, since the sixth Framework Program for Research and Development (FP7), initiated by the European Commission, the "development plan" is one of the documents in the application file of research units. Today, we are at the 8th PCRD, Horizon 2020. http://www.cvluniversite.fr/actualites/8eme-pcrd-horizon-2020.

When it comes to the researcher, among the resources used today and with the objective of developing all of his/her activities, we have the portfolio[51] (see Appendix 2) or the e-portfolio[52] (Barett 2000). It presents the different activities[53] conducted, the methods used to carry out his/her projects, the other people involved, the digital resources integrated into the approach (of data collection, analysis and development, for example), the skills acquired and transferable to other research situations, etc. All these are presented in the form of graphs, texts and audiovisual documents representing a collection, but also encouraging a reflective approach which leads to the linking of these activities. The e-portfolio therefore appears as a resource participating in the presentation of the reflection results on the activities conducted, the productions conducted and the methods implemented in order to make them known (expansion of the autonomy zone) and to be solicited in future projects (expansion of the ZPD).

In terms of development, we have also seen the emergence of *THATCamp*[54] events which are informal, non-hierarchical meetings, carried out in communities of numerous, varied individuals (skilled/less skilled), organized without communication prepared in advance, with neither a scientific nor an administrative officer. These meetings enter into a both participatory and democratic dynamic of research and training. They offer each person the possibility to express his/her opinions evidenced based on his/her readings and personal points of view. These opinions and debates are

51 Decree of May 25, 2016 laying down the national framework of training and the methods leading to the awarding of the national doctoral diploma. Excerpt: "Article 15: A portfolio of the doctoral student comprising the individualized list of all the activities of the doctoral student during his/her training, including teaching, dissemination of scientific culture or transfer of technology, and enhancing the skills that he/she has developed during the preparation of the doctorate, is realized. It is regularly updated by the doctoral student."

52 Blogs and personal websites, slide shows and video editing or even platforms dedicated to this type of production (Eduportfolio, Elgg or the best known, Mahara). Each focusing on a characteristic: public or private access, limited sharing, possible interactivity during its visit or even scalability.

53 Example of training in the production of an e-portfolio for a lecturer-researcher, at the University of Upper Alsace: http://www.numerique.uha.fr/formations/utiliser-un-eportfolio/ ; et contenu de la formation présentée par Frédéric Drouhin: http://fr.slideshare.net/alainbolli/un-portfolio-denseignantchercheur.

54 *The Humanities and Technology Camp* is modeled after *Barcamps*. It is a matter of allowing participants to vote democratically, at the beginning of the meeting, a program of workshops during which participants exchange their ideas and experiences. In France, the first one was held in 2010 in Paris. http://tcp.hypotheses.org/318 (consulted on July 28, 2016).

then written in a document published on the web and consultable by everyone. Alongside these *THATCamp*, there are metablogs offering innovative publication methods, generated based on open-access content submitted by contributors and then restructured for a publication[55]. This type of meeting (*THATCamp*) and medium of communication (metablogs) participate for the researcher in the development of his/her autonomy zone, giving him/her the opportunity to express him/herself orally and/or in writing on topics that he/she masters, according to constraints different from those which structure the scientific development activity (in front of specialists in the field).

A final example is *Tweetdeck*[56]. This resource makes it possible to update a set of accounts, from the same single interface and to monitor in real time the information present on different social networks (*Twitter, Facebook, MySpace, Linkedln, Foursquare, Google Buzz*, etc.). This application offers the possibility to update personal accounts, exchange information with contacts, view the content of the profiles of friends belonging to the same network, perform a search on targeted content, and manage, consult and share lists of information. In the case of an activity assistance for the researcher, the implementation of a resource similar to *Tweetdeck* could be designed to quickly update personal data (website), the different media dedicated to research projects (sites presenting the project activities) and to institutional evaluation (file presenting the list of publications of the team), in addition to bibliographic databases (examples: HAL[57], revue.org, etc.). This type of assistance would allow the researcher to save time on the repetitive activities of updating (expansion of the autonomy zone), of disseminating in the best way possible his/her research results on different media of which he/she was not aware or over which he/she does not have complete control.

With regard to the development of the research teams, beyond the pooling of activities and publications of each of the members, a digital resource for assistance in the development of the network(s) linked to different actions (signing contracts, conventions, projects) could be considered. This network

55 This is the case of submissions proposed for the *Journal Digital Humanities.*

56 The main competitor of *Tweetdeck* is *HootSuite*. But there are many others, smaller and less well-known: *TweetBe, Twitonomy, Pluggio, Splitweet. Tweetdeck*: https://tweetdeck.twitter.com/.

57 Hyper Articles en Ligne, an open archive on the Internet offered by the CNRS.

would consist of institutional partners (other teams) and private actors who have already been solicited or will be solicited in the near future, in the organization of a project (selected or not). Thus, the assistance tool would allow the possibility to access a dynamic graphical representation, a team-specific map of the network. This map would be updated, on the one hand, from textual data such as project funding requests, and on the other hand, from audiovisual development documents (educational resources), whose organization is generally provided by internal university teams or external service providers. This assistance tool would aim to disseminate a collective activity in order to introduce the scope of the relationships associated with a team in preparation for future projects and their possible linking (expansion of the ZPD of each researcher but also of a group).

3.3.3. *Digital resources in reflective orientations assistance*

The reflective approach constitutes for Bourdieu (2001) a means to renew scientific practices (Golsorkhi and Huault 2006). It defines reflectivity as a process of mediation and more specifically of self-analysis of the relation that the researcher has to the object he/she is analyzing and to his/her own social and professional history (Vacher 2011). The objective is to make research more motivating and significant in the approach followed and the results obtained.

This reflectivity, even if it seems simple in its definition, is not simple in its implementation. As a matter of fact, the digital resources whose objective set by the designers is to facilitate a researcher's reflectivity, do not exist today. However, this process appears to be an approach that is to be implemented to ensure career evolution and to participate in original and relevant collective activities (writing of articles or even construction of educational models). From a different point of view, reflectivity is a means of teaching oneself (Schön 1993) by guiding the actor (according to Schön 1993, cited in Vidalenc and Malric 2013) in the improvement of his/her efficiency (move faster on some parts of the scientific process and reduce human costs), in the control of his/her actions (observe how the work is "really" carried out, to measure the difference between the prescribed and the actual task), in the interrogation of the quality of his/her own activities and in the emergence of new skills which the researcher needs to continue his/her activities (of scientific production and development).

The difficulty lies, among other things, in the identification of the different reflective approaches, the skills associated with each of them and the triggering factors of this approach. Digital resources for assistance in the characterization of this approach, in the identification of the necessary skills for their implementation as well as measurement indicators have not yet been imagined. This work would enable a better definition of the activities associated with doctoral supervision (Delamont *et al*. 1998; Deuchar 2008), whether it is provided by doctoral schools, by dissertation supervisors (Franke and Arvidsson 2011; Lee 2008) or by peers (other doctoral students). The challenge is, on the one hand, to enable everyone to gain autonomy (expansion of the autonomy zone) by identifying the components of an activity assumed and mastered in his/her objectives, and on the other hand, to take on new responsibilities (expansion of the ZPD) by identifying his/her personal contributions and limitations.

In order to assist the researcher in his/her reflective approach, a personal research assistance environment (PRE) could be proposed. This PRE is based on work from personal learning environments (PLE) and *Workflow* solutions (Vantroys and Peter 2002).

The personal learning environment (PLE) is examined in the training context, for learners, not for professionals. It is defined as "a concept that facilitates the choice of the learner and the control of his/her activities, allowing the selection and combination of formal and informal learning opportunities from varied sources" (Milligan *et al.* 2006, p. 508).

It provides an environment (Attwell 2007) in which the individual can record his/her achievements (his/her activity realizations) and his/her work programs (projections) through new objectives (set in advance of an activity realization). For Schaffert and Hilzensauer (2008), these environments must allow for changes in practices and representations about different dimensions that structure the activity. The idea is that through the PLE, the actor reflects on his/her activities and the means he/she uses to carry them out under the circumstances set by the environment.

Wilson *et al*. (2007) formalizes a reference model for the PLEs around which different services revolve, establishing a toolbox (*Toolkit*) for personal learning. This toolbox appears to enable the learner (Mailles-Viard Metz 2015):

– to learn with others (manage relationships with tutors, peers, create formal relations or not);

– to control his/her resources (structure, share, annotate his/her own or those of others);

– to manage the activities in which he/she participates or that he/she creates (working groups);

– to adapt his/her learning (give him/her the opportunity to link what was learned/acquired here and elsewhere, formally or informally).

The set-up of a PLE is accompanied by a reflective dynamic on the activity, in that it is continuous, more or less regular, allowing for the reevaluation of each activity conducted and for the consideration of new activities, in a different way, if necessary. By regularly reflecting on the activities done and the tools that are associated with him/her, the PLE user takes a step back on his/her learning path, identifies his/her modes of operation, and thus, learns to learn.

In this way, during the design of a PLE, the learner has the possibility to define and organize (hierarchize) his/her learning needs, but also to evaluate the changes already established and the changes that have not yet been implemented for the realization of new activities or the achievement of the objectives he/she has set.

As for the digital resource, integrated into the scientist's reflective approach, it simply does not exist. However, taking inspiration from a PLE, it could be renamed CRE (custom research environment) and take the form of a *Workflow*. A *Workflow* is an application (*Software*) which offers the representation of a sequence of tasks or operations carried out by a person, a group of people or an organization/institution, in order to meet an objective of design, of development, or of production of a real (industrial or scientific), digital (for example, photo retouching) or even conceptual (ideas to clarify) object. The term *flow* refers to the transition of a document from one stage to another, according to a defined orientation. The term *work* refers to the concept of professional activity and experience.

Each profession is associated with a set of activities that it is, through *Workflow*, possible to specify, link and objectify. The activities represent a logical step in the resolution of a test. They are arranged by transitions and passages explained in the steps to follow and/or the skills to acquire in the

scientific context. A *Workitem* (according to the standard terminology of the community[58]) is the representation of a work to be carried out. It is characterized by the potential functionalities opening up a multitude of possible actions to be scheduled to achieve his/her success.

These days, even if the CRE is not available, we define it as making it possible to:

– structure work procedures: manage the different stages related to scientific communication (write the proposal, prepare the oral communication, then potentially write symposium/conference proceedings, book travel tickets, register for the symposium and book accommodations, etc.);

– temporally coordinate the overall workloads, such as the final version of an article at the same time as activities of group monitoring or the implementation of an event;

– evaluate each of the activities already done so as to anticipate those that have not yet been scheduled.

Under these circumstances, the CRE, according to the seven dimensions proposed by Schaffert and Hilzensauer (2008) for the PLEs:

1) would place the researcher at the center of different choices proposed by the digital resource which would evolve according to previous activities, his/her needs facing the objectives set and his/her desires;

2) would provide the possibility to the researcher to personalize his/her environment. This personalization would vary, for example, according to the frequented communities of his/her previous activities and professional ambitions;

3) would facilitate the researcher through an update and an automatic replanning of research and/or teaching activities and/or administrative responsibilities that he/she performs or wants to achieve;

58 To allow for the emergence of standards in the world of *workflow* systems, software publishers, research laboratories and the users of these systems have created the Workflow Management Coalition (WfMC) consortium. The objective of this association is the promotion and development of *workflow* systems: http://www.wfmc.org.

4) would involve the researcher in a permanent interaction between his/her objectives and activities, some of which must be retained and others which should not take place;

5) would offer the possibility to manage the rights on the content proposed in the PRE. It is a question of personal private data which can or cannot be shared with other researchers in the same team, for example;

6) would disclose to the researcher's supervisory institutions (university, INRIA, CNRS, etc.) the information that he/she wishes to provide. Thus, the institutions can, under certain circumstances that the researcher decides, have reader permission in order to retrieve publications, as well as any other information that is necessary to him/her for the evaluation, for example;

7) would inform him/her of newly available resources (articles, digital applications), which can be integrated into an aid facilitating, for example, the interaction between different communities (institutional, scientific, educational, etc.) and/or the dissemination of publications. The researcher would then choose to use them (or not) in his/her personal approach.

The CRE, by its definition, its functionalities, its objectives and its contributions, participates in the development of the autonomy of the researcher (expansion of the autonomy zone). In fact, if the researcher sees him/herself proposing a reorganization of his/her actions according to a temporal obligation (meeting) for example, the researcher can save time in the organization of his/her agenda and optimize the advancement of all of his/her activities. It will also allow him/her to better take on, year after year, an activity that he/she does not necessarily envision completing in a measured and controlled time.

3.3.4. *Conclusion: the beginning of changes*

The researcher’s missions are very broad and very disparate according to disciplines and developments (Fave-Bonnet 1998). Through digital resources integrated into the assistance process, the challenge is to:

– provide the possibility to link institutional expectations and activities linked to each of the researchers according to personal, disciplinary and/or community habits. This gives more legibility to the activities conducted by the researcher alone and collectively;

– thoroughly examine all of the activities conducted temporally with memorization of objectives, methods and results obtained, the networks of human relations that characterize them, and the difficulties encountered;

– make a conscious career choice. The researcher, through a reflective approach assisted by a digital resource such as the PRE, would be able to select one or several knowledge production (curricular orientation assistance), development (communicative orientation assistance) procedures which are specific to him/her. Thus, the researcher's projects would be considered in a calm, reasoned and credible manner for the scientist, the institutions and the communities.

With this in mind, we have described several digital resources. They are a vital issue for the development of innovative scientific activities. Their provision however raises different concerns:

1) the publications derived from informal meetings (*THATCamp*) examine the scientific validity criteria in relation to historically well established standards. The dissemination methods of knowledge, whether supported or not by digital technology, modify scientific dissemination protocols. We have the duty to question ourselves about their contributions and to adapt the evaluation methods of research teams to these new production and dissemination methods of scientific knowledge;

2) the reflective approaches initiated and supported by resources such as the CRE open up career opportunities that must be questioned: integrate private partners into research processes, introduce as soon as possible future researchers to this reflective activity in order to maintain the initial motivation of the people involved and limit drop outs[59] (Lovitts 2001; Moguérou *et al*. 2003).

3.4. Conclusion: three types of assistance

All of our reflections on the context of the researcher's work, the different structured activities in the professional standards and especially the different digital resources proposed depending on the different orientations identified, lead us to consider three types of digital assistance:

59 50% of students drop out of a doctorate: of these, 40% drop out at the beginning of the course, 30% in the middle and 30% at the end.

– environmental assistance by which all of the activities carried out by a researcher are signaled, structured in order to be later analyzed. The traces left by the researcher and analyzed by the environment will complete the researcher's story. Indeed, the idea is to offer him/her the possibility to describe his/her activities (verbally, in writing or graphically) and to confront them with the traces left on a platform which memorizes the activities conducted and which facilitates the linking of his/her perceived feeling with a measured reality. The objective is to allow the researcher to identify and to verbalize the nature of the two expansions (of the autonomy zone and the ZPD);

– situational assistance, associated with specific activities in the researcher's affilieted field. To carry out these activities, the system proposes digital resources provided her by the community, that have already been the subject of deviation or that can be tested, in that they were recently developed. The scientist thus has the possibility to use them, to consult user tutorials, the results of experiments already carried out and the testimonies of users to identify the contributions and the limitations in the activity that he/she is in the process of conducting or that he/she wishes to conduct. This assistance also offers the possibility to record his/her own activities of use to remind him/herself later of his/her actions, during a similar activity. The goal is to not consult the same discovery tutorials, for example, and save time on the next use and on its limits, in relation to a new activity;

– supporting assistance, where medium and long-term personal goals are described and recalled regularly by the system, so that the researcher does not lose sight of his/her approach and knows how to recognize and identify the reasons for his/her deviations. The scientist can thus, at any moment, be guided by reminders and advice formulated by the computer system based on the traces (of activities conducted, resources used) or the reports of these activities (perception of a formulated expansion of zones).

In these three types of assistance (environmental assistance, situational assistance and supporting assistance), the digital resource is presented as having a key function in the assistance, training and professionalization of the researcher him/herself, his/her team and the institution to which he/she belongs. Indeed, based on his/her own traces, the researcher will be able to transmit his/her opinions, formulate his/her feelings, disseminate them if he/she so wishes (field of action No. 1 of digital humanities). Moreover, the institution will have (with the researcher's agreement) feedback, for example, on the service grids it proposes (field of action No. 3), and the

usefulness of the international institutional networks implemented to develop the researcher's activity (field of action No. 2).

A certain transparency will thus be given to the activities carried out by the individual, to research teams, affiliate supervisory bodies, and, at a local level, the personnel management service. This service will thus be able to foresee and better manage researchers' expectations, anticipate the needs and implement supports to meet the ambitions of each person who is involved in the research and strives for a professional dynamic.

4

The Place of Digital Assistance in Professionalization

4.1. The concept of professionalization

Some authors define professionalization as "the passage from an amateur activity (a practice exercised for pleasure) to an activity which offers its practitioner sufficient remuneration on which to live, because of the skills that he/she can provide" (Cestor 2006, p. 1). For Richard Wittorski (2007, 2009), professionalization is first and foremost a social intention (Fernandes 2009), that is a willingness of institutions to introduce new systems, a training proposition initiated by European and national frameworks. This training proposition presents, on the one hand, what is expected of a professional (or rather a future professional) in terms of objectives, and on the other hand, skills. The validation of these skills is most often conducted by peers, belonging to groups that give the individual, after an evaluation, the status of a "professional". Thus, the author (Wittorski 2009), in view of his analysis of social practices, identifies three meanings of the (polysemic) word "professionalization":

– profession-professionalization: professionalization aims for the constitution of a social professional group which shares the same activities and which is organized as an association, for example. Members of the group meet to discuss; they wish to highlight and give visibility to their activities, so as to be part of a market as well as to obtain and defend the statutes associated with their profession;

– training-professionalization: it is an institution which decides to implement a program and/or a training system within which there is a

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prescription, that is a list of knowledge and/or skills, identified and formulated by a small community of individuals (recognized professionals in the discipline), in order to train a large number of people involved in this profession;

– work efficiency-professionalization: on the initiative of businesses, but also more and more of the institutions, professionalization-efficiency requires a challenge of the professional activity throughout life. We question the practices which must constantly readjust to the social context, for a work efficiency that is better adapted to its conditions and its objectives which evolve according to societal and individual needs. For example, the actors must become more autonomous and quick. They must also respond to organizational requirements and acquire transversal or digital skills.

These three "professionalization" approaches are integrated into the researcher's professionalization process. As a matter of fact, the profession-professionalization aspects are present through the organization of researchers in groups or communities. Scientific associations[1] bring researchers together around the same research question, research object, or investigation field. These associations support, in some cases, journals, scientific events (national and international symposia, study days), and/or the organization of thematic courses[2]. These collective activities enter into a training-professionalization dynamic in which the topics addressed and the training issues tackled are reevaluated, are adjusted regularly and give rise to training sessions (doctoral workshops, doctoral student days, Junior Researchers[3] meetings).

1 Such as ARISTOTE (*Association de réseaux interconnectés en systèmes totalement ouverts et très élaborés*), http://www.association-aristote.fr/doku.php/index.php; ATALA (*Association pour le traitement automatique des langues*), http://atala.org; ATIEF (*Association des technologies de l'information pour l'éducation et la formation*), http://atief.fr; AFIA (*Association française pour l'intelligence artificielle*), http://www.afia.asso.fr/tiki-index.php; EGC (*Extraction et gestion des connaissances*), http://www.egc.asso.fr; AILF (*Association des informaticiens de langue française*), http://ailf.chez.com/indexjav.htm.

2 Junior Researchers Meetings in EIAH (RJC-EIAH), supported by ATIEF (*Association des technologies de l'information pour l'éducation et la formation*), http://atief.fr.

3 A thematic course is open first and foremost to CNRS personnel, researchers and research engineers, French and foreign university professors-researchers, who are integrated into a research process (ATER, ALER, doctoral students, assistants). In HSS, we cite, in Lille, the course "in quantitative methods of social sciences", http://quantilille.free.fr; the EIAH thematic courses, organized in collaboration with ATIEF, http://atief.fr/ecoles-eiah; and more

Despite this, part of the training is carried out "on the job" (Gaucherel 2013, p. 6), through experience (Frayssinhes 2015) which is difficult to quantify and qualify, as it is part of the activities specific to each person, which must be challenged in a work efficiency-professionalization process based on socio-economic changes (Wittorski 2007; 2008) and the evolution of the scientific world[4].

> "Research plays an essential role in enabling the different actors to collectively engage in more sustainable development modes. The expectations of society must be taken into account in the research orientation and the decision-making process."

Thus, the three professionalization aspects described by Wittorski integrate into the researcher's professionalization process, starting from his/her master's degree and continuing throughout his/her life. This professionalization is part of each individual's specific professional development, according to a "scientific scenario" which has not been set in advance and is difficult to predict.

4.2. Professional development and scientific scenario

Professional development is a vague concept (Lefeuvre *et al*. 2009), defined as "a gradual process of acquisition and transformation of skills and identity components progressively leading individuals and communities to improve, enrich and update their practice, to act with efficiency and effectiveness in the different professional roles and responsibilities incumbent upon them, to achieve a new level of understanding of their work and to feel at ease" (Portelance, Martineau and Mukamurera 2014, p. 12, cited by Nizet and Leroux 2015).

Based on this quotation, we say that professionnalization development is a means to facilitate the transformation of skills, so as to enrich a latent or already anchored practice for the individual. This transformation gives the researcher a "research professional" label, which is associated with a status (of doctoral student, of lecturer-researcher or of research fellow), but it

generally those supported by CNRS: https://www.dgdr.cnrs.fr/drh/competences/ecoles-them.htm.

4 Research and development: context and challenges. http://www.developpement-durable.gouv.fr/IMG/pdf/Rechercheetdeveloppement-2.pdf.

mostly demonstrates an ability to achieve scientific activities, alone or with support. These activities engage a responsibility (signature of articles, for example) in his/her non-routine intellectual acts, with a view to pursuing objectives specific to each scientist, in a complex research situation. This status, these activities and these responsibilities define the researcher's profession (Cart *et al*. 2008), which currently supports a dynamic around the use of digital technology and specifically, of the two expansion processes (of the autonomy zone and the ZPD). These two processes are seen as components of a "scientific scenario" in the digital context.

The "scientific scenario" is defined based on the traces left by the use of digital resources. It is characterized, on the one hand, as a structure of states, and on the other hand, as a set of stages signaling the integration of these different states in recognized professional practices. A state consists of a set of knowledge and/or skills associated with the use of digital resources to assist the actor/researcher in the achievement of one of his/her activities in connection with research, activities that can be carried out alone (from the autonomy zone) or with support (from the ZPD). A stage is defined as marking the validation of several states. It corresponds to the changes which structure professional activity or, more precisely, career advancement. These changes take the form of an internalization of the operation modes of digital resources incorporated into the realization of an assisted research activity. They participate, but not necessarily in a conscious way, in the procurement of a diploma, a promotion, a position, a bonus or even a prize.

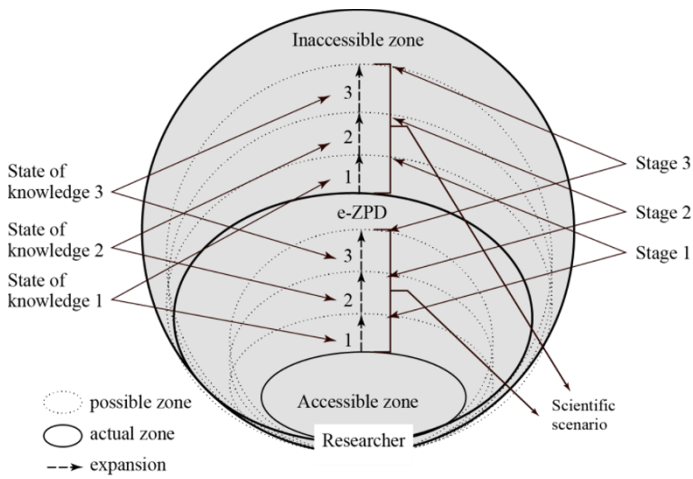

Figure 4.1. *ZPD and scientific scenario*

The term scenario "most often applies to the planning of a pedagogical sequence or session" (Nissen 2004, p. 14). Firstly, it is defined as "an approach aimed at the achievement of educational goals and the acquisition of general or specific skills related to one or several areas of life according to the methods and specifications of new study programs" (Bibeau 2000, p. 1).

Based on this definition relative to the field of education, the scientific scenario is firstly characterized by objectives that motivate the researcher in his/her activities, and offer him/her the opportunity to acquire new skills. We are not in the presence of "new study programs" which would be imposed on the researcher, but rather a program envisaged by the researcher him/herself according to his/her professional intentions and past experiences.

Next, if the pedagogical scenario makes it possible to organize and to orchestrate a learning route according to intentions (Villiot-Leclercq 2007), it is also a means to coherently relate different actors, activities, resources (digital or not), tools (technological or methodological) and services. To this end, the pedagogical scenario is presented to the teacher as a tool of support, structuring the actions of the learner but also, as a result, of the teacher. Regarding the scientific scenario, the relationships between actors, activities, resources, tools and services are decided by the researcher, according to the opportunities which are offered to him/her (scientific events, calls for projects, etc.), his/her membership in one or several communities, and the activities that he/she consciously conducts. The scientific scenario is then presented as a tool of awareness of activities already carried out and of activities that he/she can potentially consider.

Finally, even if the pedagogical scenario is defined in an already structured framework (organizationally and temporally), it takes a form that allows the expression of a certain creativity, leaving room for the invention of "framing" specific to the teacher. In other words, two scenarios for the same course content will not necessarily be the same for two teachers. A pedagogical creativity appears in their components (resources assembled, activities proposed and guidance envisioned for the teacher), but also in their temporal arrangement. Again, no scientific scenario is identical to another. It is directly linked to the choices of training but also of thematics, communities frequented, supervision requested, etc. Creativity is expressed in the choices made, the projects submitted and carried out as well as the collaborations created. It opens up unique career prospects, which are

difficult to identify in advance and to evaluate afterwards (especially by actors who are not involved in the research topics or issues).

The scientific scenario is therefore defined by objectives, skills developed, the coherent linking of different components (actors, activities, resources, tools, services) and the singular creativity that makes it unique in a social, cultural and institutional context. It resembles a history which would emerge from conscientious choices expressed in advance by the researcher.

Yet, the researcher is constantly solicited in a projection of these future professional activities: for example, during doctoral studies, he/she is questioned about his/her life after the PhD defense (his/her intentions of professional insertion), whereas during his/her career, he/she is questioned on a regular basis about the content of his/her future research projects or publications. In this context, the researcher is, at certain times, hardly capable of planning his/her future, because, on the one hand, he/she is dependent on political decisions as well as human, administrative and organizational resources which many not be fully mastered, whereas on the other hand, he/she does not have a clear representation of the (numerous and disparate) activities that he/she has been able to carry out in recent years or months. Positioning, decision-making and prediction tools for his/her activities can, in the framework of the use of digital resources and the implementation of an assistance procedure, be integrated into and facilitate the production of this scientific scenario. The idea is to facilitate the researcher's access to a new approach, giving him/her a greater visibility on his/her activities, past, present and future. In this sense, the researcher can consider his/her scientific scenario in the same way that the educator envisages his/her pedagogical scenario.

For the researcher, defining his/her scenario consists firstly of identifying objectives before starting his/her activities, and secondly, of providing consistency and meaning to the different activities carried out and the resources requested to achieve these objectives. In the scientific scenario, the link between activities is made explicit with a view toward being able to achieve a coherent assessment and/or a more or less long-term forecast on the next objectives and activities to achieve (expansion of the autonomy zone and ZPD). Beyond a well-reasoned positioning linked by an envisioned professional orientation and characterized based on the activities already carried out, unforeseen events (Jean 2008, Jean and Richard 2009) can

appear such as, for example, the participation in the writing of a research project in which the researcher is not the lead, but may be solicited during the year. The identification and the way in which these unforeseen events are managed by researchers are not currently the subject of any scientific work. However, they constitute a way to access the management methods of a scientific scenario, as this can be envisioned, within his/her classroom, by a teacher that modifies his/her initial pedagogical scenario according to the different situations encountered (absence of some learners, difficulties in understanding a concept, etc.).

Through the implementation of the scientific scenario, a separation is established between the previous practices (traditional, led by political institutions and existing communities) and those that open up, through digital humanities, the blueprint of professionalization, demarcated in advance but also personalized according to previous activities and expressed desires. This separation stems in particular from a lack of support functions over time provided by the people involved in training as well as from a lack of socio-scientific (in connection with scientific engineering) organizational innovations offered by digital technology. In particular, these functions can be defined today based on the digital assistance dedicated to the production but also to the development of activities carried out by the researcher.

4.3. Development of the researcher's activities and scientific scenario

The term "research development", which is too often synonymous with "research commercialization" (Bart 2007, p. 1), brings together a set of activities related to:

– scientific popularization, oriented toward the general public;

– pedagogical development, oriented toward students (in universities, but not exclusively);

– scientific development, oriented toward other researchers of the community.

These three development types can be integrated into the scientific scenario. However, two of them are involved in the recognition of the activities carried out by the researcher him/herself but also by the team and the affiliate unit. Indeed, the supervisory institutions request, as part of the

evaluation process, a list of publications by each of the scientists and by all the researchers organized by a team/line of research and by unit/laboratory. These publications are categorized: we find scientific development (books, chapters of books, journals, etc.), scientific popularization (data conferences for the general public, for example) and the activities related to the unifying process between research and training (pedagogical development for master's students in particular).

Pedagogical development, oriented toward students, is relatively secondary in this type of scientific evaluation, as well as the nature of the training sessions done by the researcher to meet his/her needs (scientific development, pedagogical development and scientific popularization)[5]. As a matter of fact, the skills necessary for the implementation of a particular development (popularization, scientific development and pedagogical development) are currently not clearly targeted, nor taken into account in the framework of an individual and collective evaluation. Yet, certain scientific developments, such as a poster, require skills of synthesis but also those of a graphic designer/freelance journalist in digital media before being printed. Additionally, pedagogical development requires skills in instructional design which must be regularly updated. For example, the lecturer-researcher must have the capacity to make an audiovisual recording, a *podcast* or graphic animations in order to present a specific phenomenon presented in his/her classroom, a phenomenon that he/she may him/herself have described in one of his/her articles. Similarly, popularization requires the researcher to have communicational, strategic (targeting a social issue) and organizational (intervention in relation to multiple partners) skills.

To meet these training (popularization and development) requests, modules shared by several disciplines and/or specific to some of them, are implemented, for example within laboratories, in the form of seminars and workshops. But, beyond their contributions to a given activity, these trainings can initiate ideas, for the researcher, in terms of the development/popularization of other activities. Indeed, training dedicated to the popularization of scientific results (for example, graphic representation) can be reused in the presentation of a particular phenomenon, during a

5 We note that, since the sixth Framework Program for Research and Development (FP7), initiated by the European Commission, the "development plan" is one of the documents in the application file of research units. Currently, we are in the 8th PCRD: Horizon 2020. URL: http://www.cvluniversite.fr/actualites/8eme-pcrd-horizon-2020.

scientific conference, in regards to the digital medium of communication. The decontextualization procedure, that is the process which aims to reuse the skills acquired in one field (for the popularization of scientific results) in a different field or in a new activity (scientific development) remains the responsibility of the scientist.

Despite the intensification and diversification of the activities carried out, as well as the requirements in terms of work dissemination, the question of the development of "activities does not seem to be on the agenda of the work on higher education" (Bart 2007, p. 4). The fact that practices require the engagement of unique, adaptive and scalable skills leads us to question the manner in which they can potentially contribute to the redefinition of the current researcher's skills and to his/her career advancement. He/she is asked to use digital technologies. They enter into "individual or collective transformations of skills […] engaged or likely to be engaged in professional situations" (Barbier *et al.* 1994, p. 7).

The training and professionalization process is thus questioned with regard to its components and specifically, the contributions of the digital assistance.

4.4. Contribution of assistance in the career path

An understanding of disciplinary knowledge and existing methodological practices does not seem to sufficiently prepare doctoral students for a career as researchers. In fact, "our future researchers do not attend lectures on the profession of researcher. What a shame! They have courses on science, which is irrelevant. And while our secondary school teachers sometimes take didactic and pedagogical courses, our researchers do not have any research rules, tacit, when they begin. Except for those that are provided through common sense" (Gaucherel 2013, p. 6).

For example, publishing in a scientific journal, which represents the culmination of most of the work of contemporary researchers (Pontille 2004), is an essential element of the disciplinary socialization of doctoral junior researchers (Bart 2007). They identify themselves with a community (characterized in particular by a scientific committee). This identification is dependent upon an awareness of community expectations which does not

necessarily emerge in the first year of a doctorate, but rather after several years of exchanges with different actors and the publication of results.

Even if lectures dedicated to the researcher profession do not exist, the activities related to this profession are integrated, through mimicry (documents corresponding to calls for projects can be examples, or even writing models), through observation (scientific communications) or through the implementation of procedures supported by other actors (doctoral students supported by a dissertation supervisor and/or other experienced doctors). Gradually, the researcher learns, confirms his/her scientific specificity and positions him/herself within one or several communities, the aim being "to make reality intelligible, to understand the methods of operation and, if possible, to draw explanatory models with the aspiration of becoming laws, with dimensions of reproducibility, durability, stability that characterize them" (Bart 2007, p. 1).

The researcher follows, over the years, an intellectual, professional evolution, which is particular to him/her. He/she fills his/her days practicing a set of activities that contribute to the construction of his/her world of knowledge. The construction of this world is defined (Lemire 2008) as a creation of links "between modeling approaches of reality and the general system. It is a way to explain the world perceived as a system that evolves, to better understand and evolve with it, without intending to constrain it; it is also a way to take advantage of its evolution".

Thus, scientific activities are simultaneously aimed at understanding and assimilating a set of knowledge described by others (articles, books, etc.) while also writing new material. These activities are for some of an individual nature and, for others, of a collective nature.

4.4.1. *Individual nature*

4.4.1.1. *Understanding and assimilation of knowledge*

It should be noted that the increase of scientific publications (Samra 2006) makes it impossible today, for a single person, to always know all the results within a discipline, or even a sub-discipline. This reality is linked to two essential factors. The first factor is the number of publications that never stops growing, offering the possibility to some fields of research to become more visible to the community, but also to others, to take first place through

a "flood" of publications dealing with a flourishing theme at a given moment, over a limited time[6]. The second factor is linked to the researcher's cognitive abilities that are necessary for memorization, understanding and positioning of his/her research. Each discipline (or sub-discipline recognized as such) addresses, according to its communities, a field of study in a manner which is specific to him/her: it establishes its questions, its paradigms, its methodological approaches (of data collection and analysis), and gives substance to the results, integrated into unique research programs. It is difficult for the scientist to get his/her bearings and to always have an overview of all the work conducted and published by all the communities. Thus, a selection is made driven by the teams, to which the researcher belongs, and by the theoretical and methodological approaches to which he/she refers. The third factor is linked to the practices of limited disseminations of certain data by the laboratories or the researchers themselves.

In this context, the challenge for the aid is to facilitate for each researcher the construction of his/her own world of knowledge. In particular, the assistance has the objective firstly to facilitate the implementation of a form of monitoring in order to identify, with the help of indicators (not currently identified), the effects of modes on certain subjects/objects of research/fields of analysis/methodologies, etc. at the national and disciplinary level. The scientist perceives the arrival of some phenomena, but cannot always quantify them and argue his/her point of view.

Next, the aid has the objective to facilitate the access to the media of knowledge, by providing the researcher with the means to memorize, understand and position his/her work based on previous research. During numerous reading activities, the researcher takes notes (or not) that pinpoint an interesting quotation, present an emerging idea or even refer to previous readings. These elements are involved in the process of understanding a text

6 This is the case of publications related to "digital identity", which, after giving rise in 2012–2014 to a large number of publications, are now (2016–17) relayed/redistributed in different disciplines (language sciences, communication information, art history, psychology, etc.) in different forms (approach of devices for data collection, trace analysis, etc.). This is one of the conclusions of the CNRS thematic school "*Identité numérique*", organized by Praxiling – UMR 5267 – CNRS – University of Montpellier 3, organized by Julie Denouël and Stéphanie Mailles-Viard Metz, November 23–26, 2016. URL: https://etin2016.sciencesconf.org.

and its use, particularly in the form of quotations or bibliographical references.

Finally, the aid aims to facilitate the access to data with limited dissemination. It can inform the scientist of their existence, even if access is not possible, and offer him/her the means to learn the procedure to follow in order to obtain them.

4.4.1.2. *Writing of scientific supports*

During the writing process, the scientist must respect the rules related to the media used: posters, articles in peer-reviewed scientific journals, articles in popularization journals, scientific conference reports, collective works that include research contributions around a given theme and monographs[7]. We can add to this list the university documents that mark a stage in the researcher's activity (master's dissertation, or summary document of the authorization to supervise research)[8] and the synthesis reports summarizing the activities carried out within a team. This writing process is an "often – or even always! – difficult" activity, and poorly supported, despite the advice that can be formulated (Jay 1998).

Here, the challenge for the aid is to facilitate the sharing of personal experiences of each person as a writer or supervisor of a journal issue, producer of summaries of homogeneous and/or heterogeneous documents (articles, projects and research prospects), team organizer, etc. Three assistance objectives are envisioned.

The first objective is to foster support for the writing process through testimonies and advice from other teams as well as other researchers who belong (or don't) to the same discipline and have previously done this exercise. Thus, the researcher will be able to find his/her own production approach based on the experiences of others while meeting the requirements of his/her own community.

The second objective is to provide transparency to cognitive processes of scientific production, which today are "opaque", so as to be able to transfer them to future generations.

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7 A monograph is a comprehensive study limited to a fact/a social object.

8 Decree of November 23, 1988: http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000298904&categorieLien=id.

Lastly, a final objective is to provide the means to self-assess, offering actors the opportunity to measure the evolution of their activities.

4.4.2. *Collective nature*

The researcher conducts activities in connection with different networks, within which he/she implements factual and/or cognitive cooperations/collaborations (co-writing of articles, calls/responses to calls for ANR projects, European projects, etc.). This cooperation falls into the category of a "distributed collective expertise" (Curien *et al*. 2001). Through this cooperation, researchers enter into a cognitive dependency relationship (Conein 2004) and form "communities of epistemic practices" (Wenger 1998; Cohendet *et al.* 2003). Thus, networks are formed around projects:

– of research: the members of a community (researchers, practitioners-professionals but also, in some cases, manufacturers) share objectives, methods, analysis results, present them in publications and publish them on Internet sites, blogs or research logs;

– of institutions: supervisory bodies, through their calls for projects, bring individuals together around collective actions, events, that can be conducted within university components and/or in partnership with external service providers;

– related to convictions/personal values: communities are based, using "co-configuration" tools (Victor and Boynton 1998) around free software, educational collaborative platforms (e.g. MOODLE), Creative Commons Licenses, or around the choice to disseminate knowledge to the general public (contributing to the "training of minds").

Within these networks, the challenge for the aid is to contribute to these scientific and institutional activities. Through the researcher's participation in the writing of these calls, their implementation and their development, he/she contributes to both the renewal and maintenance of present structures (research laboratories, supervisory bodies and professional associations).

4.4.2.1. *Collective practices observation*

Observing the collective practices set up by the scientific community, participating in them, and then organizing them, constitutes a logical

sequence of activities to ensure a temporal and scientific sustainability of ideas conveyed by each community. Through this process, a recollection of professional practices, a continuity in the projects already initiated by management or reflection groups, is thus guaranteed. The members of these networks are thereby organized to hold events (specialized journal, funding request, launching of calls for projects, etc.). The history of these activities takes, according to the communities, various forms: provision of text documents presenting organizational and financial reports of events, calls for projects already launched, responses to these calls for projects already received, activity reports written, etc.

The challenge for the aid is to facilitate the identification of these different communities (scientific or associative). As a matter of fact, even if the showcase websites present them based on their actions, such as the events that they propose and the journals associated[9] with them, these communities are rarely explicitly described by their objectives, objects of study, past, present and future priorities, integration methods, etc. The aid therefore aims, through these objectives, to provide visibility to each of these communities through the actions carried out, the people involved (the peers), the unifying approach of the collective actions implemented and the conditions of participation.

4.4.2.2. *Peer recognition*

Peer recognition is characterized by a validation of the skills expected in the socio-professional context. It is presented (Mailles-Viard Metz 2015) as encouraging the feeling of personal effectiveness (Bandura 1993; 2003), a subjective feeling which affects a researcher's beliefs on his/her own mastered skills, on those that he/she can develop and on his/her objectives that can be successfully achieved. This feeling is currently not evaluated by university bodies. Only an objective evaluation based on quality and quantity criteria of publications is implemented.

The challenge for the aid is to facilitate this recognition by proposing ways to quantify, qualify and present the different skills of the researchers,

9 As an example, the ATIEF (*Association des technologies de l'information pour l'éducation et la formation*) organizes in turns the RJC (*Rencontres Jeunes Chercheurs*) and the EIAH (*Environnements informatiques pour l'apprentissage humain*) conference. This association also supports the *STICEF* (*Sciences et technologies de l'information et de la communication pour l'éducation et de la formation*) journal, URL: http://sticef.univ-lemans.fr.

as they evolve. By facilitating access to the skills and knowledge of each person, the objective of the aid is to promote exchanges between scientists and to propose innovative projects which involve individuals whose capacity is unknown, has been revealed in previous situations, or is just assumed to be possible when previous activities are taken into account.

Showcasing the personal developments of the researcher's activity which facilitate the start of collaborations/cooperations and partnerships on issues not yet addressed and specifying, based on precise data, which is provided by the researcher him/herself, all the activities that define today and tomorrow his/her profession are the two based that prompt the implementation of these aids.

4.4.3. *Conclusion: activities and expansion process*

The researcher's individual and collective activities (see Figure 4.2), as described in the previous section and supported by digital aids, establish:

– the expansion of the autonomy zone. Digital assistance gives the researcher the possibility to build his/her world of knowledge on his/her own and to write publications. For example, he/she can start reading a book after having read its review on the web, a summary document presenting different theoretical trends or even research methods;

– the expansion of the ZPD. Digital assistance facilitates access to examples of collective activities already carried out by others as well as to the means to become known/recognized by peers. Regarding collective activities, some text and audiovisual resources offer the researcher the means to inform him/herself on the nature of the tools, the methods used and the tasks to be fulfilled in setting up an event, for example. He/she can observe habits, make a choice among the possibilities that are offered to him/her according to the practices described and access the perceptions of the people involved (e.g. online testimonies). In terms of becoming known/recognized by peers, social networks and websites (showcase, blog, Wiki, etc.) provide the opportunity to describe his/her skills and his/her expectations (in terms of projects, disciplines or research objects) to different target audiences.

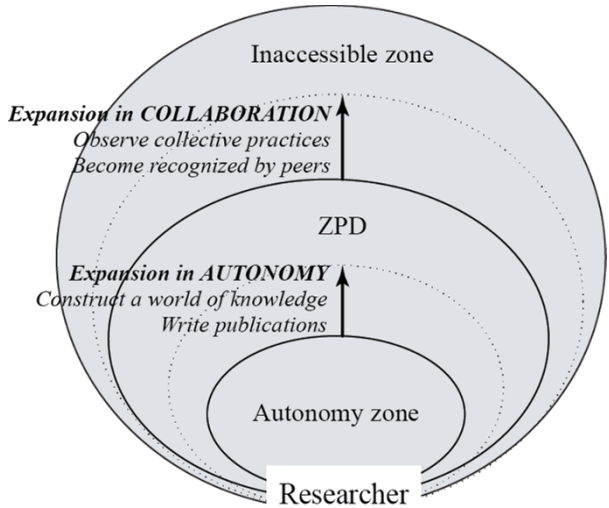

Figure 4.2. *Expansion of the autonomy zone and the ZPD for the researcher through his/her activities*

In Figure 4.2, the researcher is at the center of a double construction: an autonomous construction and a collaborative/social construction. Autonomous construction takes shape through the construction of a personal world of disciplinary scientific knowledge and the writing of publications for which he/she is responsible. Collaborative/social construction is organized around the observation of established scientific practices and the dissemination of information, scientific productions or personal data, allowing others to identify his/her specificities.

4.5. Conclusion: from digital assistance to digitized assistance

In this chapter, we described the researcher's professionalization process as we consider it with the integration of digital aids. Indeed, after having presented generally the concept of professionalization, the contributions of the scientific scenario concept have been highlighted. Next, we mentioned the difficulty that the researcher faces in the development of all his/her different activities and their results, whether individual or collective. In our opinion, this development is currently dependent on the implementation of a scientific scenario, but also of digital aids which integrate the identification

of the expansion processes at stake (contributions of the assistance) in the implemented approach: expansion of the autonomy zone and the ZPD.

One objective is to provide, through the scientific scenario, a global vision not of a reality but rather of an understanding of the meaning given to all of the work envisioned and all of the actual work, from a perspective of comparison, of the examination of the factors involved in the differences and the means of measuring these factors.

This perspective encourages the researcher to make an assessment of his/her use of the resources at his/her disposal, that is which are part of the digital assistance process. It also encourages him/her to examine the consequences of the implementation of these processes as a factor encouraging new experiences, supported by digital technology. Thus, a digital aid can trigger and encourage the implementation of a new digital aid, becoming in that case a digitized activity. This approach questions the researcher on:

– the situations that he/she envisions that can be supported by digital aids;

– new research (prompted or from an opportunity) which can be conducted based on his/her experience related to his/her approach of integrating digital assistance in his/her activity;

– the link between his/her different activities according to the digital assistance selected;

– a feeling of personal effectiveness offering him/her the possibility to make decisions about his/her orientations and/or his/her scientific and administrative commitments, for example;

– his/her motivating representations, stimulating the need to use and discover new unknown digital resources and/or to implement deviations (Béguin 2005) not yet considered.

Thus, the activity with digital assistance integration is digitized in the sense that it calls to be constantly renewed with the (positive) experience. This is only possible after the analysis of the contributions of the digital assistance (expansions of the two zones) considered in the scientific scenario beforehand and measured in its actual contributions at a later time.

5

Action Researcher Model for a Cognitively Increased Humanity

The boundary between intelligence technologies and intelligent technologies is thin. The former allows its user to build new patterns of thought (Rabardel 1995), whereas the latter is a substitute for human reasoning through the development of intelligence entirely generated by a technological/computer system. The first one is controlled by the individual, who uses digital technology as a tool, an instrument (*idem*), so as to advance an activity for which he/she has chosen the goal, the means and the final form. The second one is defined by data, by rules integrated into a computer system, represented in a particular format, the result of which is not always controlled, and the goal of which is to "imitate" human behavior.

While this remains an interesting area to explore, imitating the scientist's behavior is not the objective we have set. However, with a view to helping the researcher to conduct his/her activities, the implementation of intelligent technologies could prove to be important in the area of validation of the scientific results obtained: identifying the reasoning implemented, gathering them, being able to disseminate them, transmitting them or testing them in other contexts. This could also perhaps give rise to new scientific approaches in certain areas. But this remains a utopia, given the complexity and diversity of the implemented scientific reasoning. This could even prove to be counterproductive, if a conditioning of practices were established, if a decision-making independence, to which the scientist would resort to make his/her own decisions, were to be implemented. An endangerment of the scientific evolution could be foreseen if the identified approach does not

Learner Support in Online Learning Environments,
First Edition. Chrysta Pélissier.

allow for the opening up of new concepts usually characterized by the human brain.

In the case of intelligence technologies, the challenge is to propose solutions opening up the individual to new ways to consider his/her own activity, which he/she continues to control in regard to the objectives to be achieved, the consideration of (socio-economic, environmental, etc.) factors, the processing procedures dedicated to the production of a final result, the form of which belongs to him/her. Thus, in what follows, we initially present the results of a survey of researchers who stipulate their expectations. Next, in a second phase, we describe the action researcher model which structures his/her expectations and links them to the needs for assistance as well as possible answers.

5.1. Survey results: the researcher's expectations

Aware of a change of practices regarding their professional activity, researchers surveyed during a study conducted in 2014 (Pélissier 2017) underlined the need to be supported by digital technology in:

– the space for the construction of their own knowledge. Depending on the number, the nature and the diversity of the presentation formats of scientific results currently available (video, written, graphics, raw/processed data), the challenge, for technologies, is to make these results accessible to several audiences (face-to-face/remotely; scientists/general public/students) involved in a scientific, but also pedagogical process. This accessibility is created through a request of the system (scientific monitoring), to encourage the researcher to read new publications (recent or old; of his/her own or another field), depending on his/her ongoing research. This accessibility also involves the implementation of a means of organizing these readings depending, for example, on their current interest (research project in progress), their scientific reputation (recognized author and/or the number of times that this article has been cited in recently submitted research projects), or the temporal work organization (researcher's more or less busy schedule in given periods);

– the networking of their scientific contribution. The researcher develops and then prepares the research results. During one's career, the number and the diversity of publications can be important. However, the link between his/her different publications is not completely identified nor controlled by

the researcher-actor of his/her activities. He/she does not necessarily have the time or the desire to regularly specify the links that exist between his/her own productions. The challenge for digital technology is therefore to facilitate this personal construction, this reflective scientific process, which constitutes an essential activity in the advancement of scientific research of the individual person, but also of the community;

– the provision of arguments for the decision-making process. French research supervising institutions regularly evaluate and ask for the implementation of new perspectives and emerging, innovative research projects of excellence. Yet, the researcher's vision can sometimes be limited, given the time he/she dedicates to his/her numerous and varied activities. It is difficult for him/her to have a clear vision of interesting scientific prospects, at a national and international level at T moment. The challenge for technologies is therefore to propose the means to obtain and formulate summaries of research results as well as the prospects of working with other actors (private and public), in order to consider institutional mergers (between universities), but also between actors in the industrial and/or public world. The objective is the formation of new "mixed" communities, aimed at the implementation of common research. Data centralized and disseminated to all interested individuals would support funding requests for innovative projects, allowing for a glimpse of mixed collaborations according to new scientific organizations between disciplinarily and geographically distant individuals;

– conviviality. The social and emotional dimension of scientific research is not, currently, addressed in research. Nevertheless, it is essential in the determination of dissertation committees, for example, but also in the choice to participate or not in an event organized by a community that the researcher knows, within which he/she regularly interacts and socializes with some of the organizers and/or participants. The challenge for digital technology thus lies in the desire to change the habits related to the dissemination of scientific activities and their results through the use of technologies such as audiovisual media (e.g. "my dissertation in 180 seconds"[1]), humor (e.g. "my dissertation as a commercial", as part of an introduction to the dissertation defense) or the use of interactive tables (e.g. mental maps as part of the presentation of posters). The objective is to make the research results "fun", so as to attract new researchers (especially

1 National competition organized by the CNRS, edition 2017: https://lejournal.cnrs.fr/articles/les-laureats-2017-de-ma-these-en-180-secondes.

doctoral students) toward disciplines that they do not know and/or do not necessarily master, to give another form to the results obtained, depending on the level of expertise of the target audience (disciplinary and non-disciplinary) and of the intended use (e.g. introduction of results presented in a scientific article or scientific positioning, for example);

– mutual assistance. The aid, regarding a dissertation and/or a professional insertion after the PhD defense, can be provided by experienced actors (experienced researchers such as the dissertation supervisor, for example) but also by less experienced actors (e.g. peers belonging or not to the same community/discipline). In fact, beyond the people close to the doctoral student, regardless of their status, their functions or their discipline of origin, different actors with a professional expertise (scientific, educational or other) can share their experience, disseminate their knowledge, formulate an opinion on the skills of the young doctor or help him/her take advantage of his/her professional network. In this context, the challenge for digital technology is the dissemination of testimonies of training pathways, career paths (Mériaux 2008) marked by successes and difficulties, that would help to reassure and/or reinforce the researcher (beginner or experienced) in his/her choice (of training or career, in particular), his/her analyses and his/her desires (professional and/or personal) as well as to identify potential actors who can participate in his/her progress;

– the transparency of the activities conducted. The researchers conduct daily scientific, educational and administrative activities. The challenge for digital technology is to give transparency to all of these activities, more visibility to pedagogical (e.g. implementation of experimental selection protocols regarding student candidates at the University or personalized formats for the dissemination of the courses taught) and administrative (e.g. managerial-project approach implemented between teachers and administrative agents, in the organization of a scientific, associative or cultural event) aspects. The challenge is to open up the scientific activities conducted to other types of personnel that can bring their expertise, put their skills at the service of the community and provide a source of motivation to actors who wish to engage in these innovative activities in relation to their daily activities. This can become a source of inspiration for others and will thus evolve the practices of these different actors of research (scientists, pedagogues, administrators).

These six needs were not ranked by the participants during the survey. However, we can group them according to two approaches: an approach linked to the construction of knowledge and a social approach. The approach linked to the construction of knowledge contributes to the development of a world of scientific knowledge specific to each researcher in his/her discipline, according to his/her research objects and methodologies. It integrates the needs related to the development of his/her own space, to the linking of his/her scientific contributions with previous work and the possibility of presenting his/her arguments for his/her choices during the decision-making process. The social approach contributes to the development of collaborative work. It integrates the needs related to the transparency of the activities conducted, conviviality and mutual assistance. This approach is defined as a triggering factor of present or future, individual or collective actions.

5.2. Action researcher model

Based on the different needs discussed previously, we propose an action researcher model. Even if this work was conducted in the perspective of developing a thought process on the definition and contribution of digital assistance in the current scientific context, the model presented here can be used as part of an analysis of the different activities conducted by the researcher without the contribution of digital technology. It offers the possibility to position his/her present and future activities, to "discuss" them and thus to facilitate the advancement of a reflective process.

This model is structured in three levels. At the first level, we place the scientist's macro-concerns. It is a seven-concept model enabling the characterization of the activities conducted, as well as an approach to their evolution in his/her situated dimension. At the second level, the potential aid needs associated with each macro-concern are specified. This level has the objective to facilitate the expression of the need for assistance according to the target macro-concerns. Finally, at the third level, the possible (digital and/or human) solutions in response to the needs raised are proposed. An examination of the correlation of these solutions with the personal data of the assisted individual and the nature of the needs is set up. It will lead to adaptations (individual and personal, see section 3.5.5), and eventually, to an opening toward an increase of cognitive ability.

5.2.1. *Level 1: macro-concerns*

At the first level (see Figure 5.1), we find seven macro-concerns. They refer to the intentions which guide the tasks conducted by the researcher:

– production of results: this macro-concern aims at producing hypotheses, models and results of experiments that are validated by their methodology and have not yet been published by others in the same field. This intention could potentially involve the identification of a problem, the collection of data and their processing according to an appropriate methodology;

– request: this macro-concern is the only one of the seven macro-concerns to have a double meaning. In fact, it aims, on the one hand, to ask different actors of the scientific world (and of the non-scientific world, as well) to propose (innovative) projects, and on the other hand, to be solicited in order to incorporate teams wishing to differentiate themselves through their angle of attack, their methodology, and thus to propose original results which are relevant to the community;

– planning: the researcher's different activities are spread out over the short term (e.g. modification of an article), the medium term (e.g. production of a synthesis of articles) and the long term (e.g. implementation of a personal research project). They are conducted depending on the spatio-temporal constraints imposed by the structures and personal expectations specific to each researcher. Through planning, the actor is concerned about the way in which he/she will be able to conduct the different activities which are imposed upon him/her, those he/she wishes to achieve as well as those which are likely to be proposed to him/her;

– writing: this macro-concern is defined following on from the production of scientific results. It aims to keep in mind the fact that research is called "scientific" only if it has been the subject of a publication in a journal or a symposium/conference. The written document associated with this publication is (generally) validated by experts in the field (peers). It is then disseminated according to a channel proposed by the editorial community and beyond based on assigned metadata (references of the article);

– dissemination: this macro-concern aims to establish the researcher's intention to introduce his/her activities and his/her skills, in addition to his/her publications. The researcher wishes his/her work to be taken up by others with a view toward an in-depth study or positioning, following on

from the limits of the study conducted. He/she also wishes to be asked to implement new research, new protocols of thought, to enhance his/her skills and develop them;

– adaptation: the aim here is to ensure the adequacy of informational scientific content, as well as its form to different target audiences. This adaptation is essential to the presentation of results to new communities, which may have specific expectations on the content but also on the form of the presentation of the work (fun, responding to a structured demonstration, requesting encrypted results, open to perspectives of in-depth study, etc.);

– categorization: the intention is to consolidate/classify activities, actions and operations, those conducted by the researcher according to a thematic temporality, for example, or those of a community which conducts actions of communication and work dissemination. Categorization is defined as a mental activity involved in taking a step back from the practices conducted. It is performed according to similarities, common criteria which are identified, and which enable groupings (on one or several criteria).

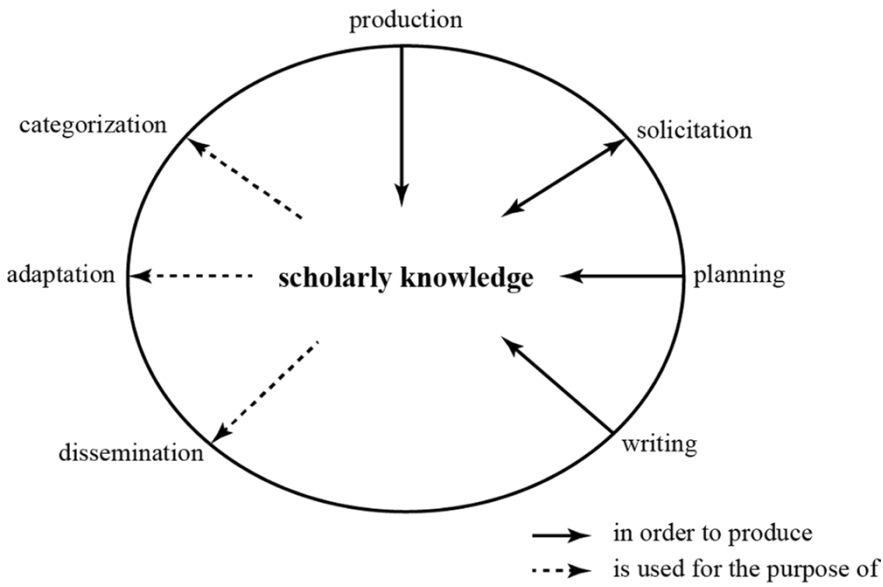

Figure 5.1. *Level 1: macro-concerns of the action researcher model*

Among these seven macro-concerns, four are oriented toward the production of scientific knowledge (production, request, planning and

writing) and three toward the development of this production (dissemination, adaptation, categorization).

These seven macro-concerns make up a complex architecture in that they:

– are never isolated. These macro-concerns are dependent on each other. In their systemic approach, they co-act and act retroactively between each other. For example, the decision to change research communities can be made based on the advice of a peer, article evaluation feedback, possible collaborations (for example, when changing laboratories), the discovery of new methodological tools tested by others, etc.;

– are modular. At the beginning of one's career, the concern to produce results is important. It is correlated with the writing of articles which enables the scientist to find his/her place among the different communities. Thus, the individual gradually positions him/herself within a group of researchers and structures. He/she builds a network with themes, organizations and developments. At the end of one's career, helping young recruits in the advancement of their work, their professional insertion and the implementation of innovative hosting facilities can be a priority. This change is explained by a more thorough knowledge of the institutional operations which evaluate research, but also by his/her ability to take on new activities;

– are hierarchical. Depending on the researcher's responsibilities within the different supervisory organizations, the concern to produce results can, at certain times, recede into the background. Through his/her commitments, the objective of the scientist is then to create favorable conditions for the pursuit of a collective work (pedagogical, research, administrative), which is organized temporally in a structure to which the individual must continually adapt depending on the opportunities (human, institutional, technological);

– are dynamic. The synergy of actors, services, projects and scientific organizations (call for projects, events, etc.) leads to the constant evolution of research contexts. They are more or less embryonic, developed by nascent or well-established, mono or multidisciplinary, divergent communities, depending on the degree of experience of the actors involved and the culture specific to each of them. The activities that aim to establish and maintain the advancement of scientific research prove to be quite variable from one scientist to another, from one community to another and from one team to another.

5.2.2. *Level 2: needs related to macro-concerns*

As for the second level of the model, we identify the researcher's assistance needs as he/she formulates and associates them with each macro-concern:

– production of results: with this macro-concern, the researcher has needs specific to his/her field. For example, we have already mentioned, within the scope of corpus linguistics, the needs regarding the processing of raw and textual data in addition to audio and audiovisual data. These needs are difficult to pool together between disciplines and are difficult to identify without taking into account the implemented methodologies;

– request: in connection with this macro-concern, the researcher first underlines the needs to identify and implement new methodologies, to modify his/her practices (1) which could open up new research and forms of results. Next, he/she poses the needs of relations between different available publications (2), among his/her own publications (3) and all of his/her activities (4). Then, he/she expresses the wish to be solicited for the targeting of his/her readings (5) of articles, special issues or summary documents. He/she considers his/her scientific activity as a complement to other research activities already conducted by others, which he/she has to consult and integrate into his/her own research. Indeed, readings are important for the positioning of present research and future projects. The researcher also foresees to be solicited by other actors (6) to address a new collective subject, implement new research within which he/she could put to the test his/her skills, his/her knowledge and become the actor of a project which is original in its foundations (for example, multidisciplinary) and relevant to the community. Thus, he/she will be able to meet new people (to establish his/her network of professionals), who could then be recontacted (7), asked to participate in a committee (for example, of a dissertation), in a program committee (or the scientific committee/expert committee), in the implementation of a new project, during its submission and/or realization. Regarding doctoral students, who have no professional network at the beginning of their career, their needs concern meeting with individuals from the world of research (experienced researchers or peers) to make progress on their questioning, their doubts related to their first results, the sharing of their methodological approach of the studied phenomenon and their ideas for interpretation during the development or writing process. Finally, the researcher stresses the need to be solicited in order to better adapt his/her presentations (8) to various audiences (experienced students-researchers or

beginners). He/she ponders the characteristics of the target audience, its expectations and the originality of the results that he/she wishes to highlight in his/her presentation;

– planning: among the needs for assistance associated with this macro-concern, the researcher stresses his/her needs in terms of time management, when faced with increasingly heterogeneous activities. In particular, time management must take into account unforeseen events such as economic and social events (difficulties in traveling, difficulties in the procurement of equipment, employability in a rapidly developing sector, etc.) as well as themes that have a strong scientific potential (new theme, promising analysis methodology). It is also a matter of reflecting fundamentally on the priorities to be set at a given moment. Indeed, this priority can change for the researcher looking to evolve his/her position, career and opportunities. It can be determined by the researcher him/herself based on indicators that can later be used as an argument for a decision-making process and a formal request;

– writing: the needs related to this macro-concern are part of the writing process of scientific documents. They are intended to enable the production of textual but also graphic materials, in the case of a poster or communication materials for an oral presentation at a symposium or conference. These documents meet standards specific to each community that the researcher has a hard time transmitting;

– dissemination: with this macro-concern, the needs of understanding the different means of scientific dissemination are posed. The researcher wishes to be able to identify, at any time, the different ways to introduce his/her activities, skills and research results: by proposing an intervention during scientific events, workshops, symposia, etc. These different possibilities are not known to young researchers. They are informed of the possibilities by mailing lists, their dissertation supervisor or their doctoral peers. Therefore, doctoral students stress the need to be informed as soon as possible of these possibilities, so as to implement a publication strategy;

– adaptation: adaptation needs are related to institutional expectations that scientific results should be disseminated to the largest number possible and reused by others. In the first case, it is an adaptation of development of the activities already conducted (to help publish with a view toward several audiences). In the second case, the challenge is to open up scientific questions to other targets and, thus, to open up the debate on the

implemented indicators of proposed methodologies and of the nature of the results obtained;

– categorization: finally, in relation to this macro-concern, researchers need are to be able to classify, organize and reorganize readings made, articles (read and unread) and the documents produced (from the draft to the final article as well as all the other forms of presentation of exchanges and intellectual processes which are associated with it), in order to be able to re-examine them, reuse them, identify intellectual pathways and specify evolutions in scientific production strategies, for example. This need is highlighted by the researcher him/herself, but also by the people responsible for different structures (journals, team, region, etc.).

Among all the needs mentioned, those that are the most numerous and that seem to be, based on the survey conducted, the most interesting are related to the request macro-concern. The needs related to the other concerns are partially ensured by websites (showcase), e-mail (mailing list) or by dedicated applications (management of bibliographies, databases). For the request macro-concern, we find needs for which, currently, digital resources are limited. Thus, it is at this level that we chose to develop the contribution of digital resources, in the third and last level of the model.

5.2.3. *Level 3: soliciting the researcher with digital technology*

A request is defined as an action calling on the aptitude of someone or something, with the aim of conducting or causing an action, a reaction or even making a decision. This macro-concern is particularly associated with eight needs (see section 5.2.2), which are organized around four concerns:

– an intelligent bibliographic monitoring. Identifying and implementing:

- new research methodologies tested by other actors in other fields of research;

- readings of articles, special issues or summary documents in connection with the research in progress;

– a permanent cognitive linking. Establishing a connection between:

- the different publications currently available, according to, for example, indicators of scientific validity and general readings conducted by the members of the community to which the researcher belongs;

– the different personal publications according to the implemented methodologies, the nature of the results obtained and their relationships to the same object of study;

– the different activities conducted in the field of research with those conducted as part of teaching and the initiatives taken as part of administrative responsibilities;

– a recurring human linking. Connecting with other actors who have a potential link with the current research, so as to build a network of professionals that can participate in the organization of future projects. The idea here is for the network to generate the research themes rather than exclusively the contrary, as is often the case;

– an adaptation (on the form and content) of research results according to the different audiences concerned. Several audiences could be interested in certain research results, but for the researcher, certain audiences seem difficult to access.

We are aware that these are perhaps not conscious concerns explicitly acknowledged during a survey. No extensive work has yet been conducted in this dynamic. Rather, it is a concern based on which research prospects could be considered in the near future.

These macro-concerns (level 1) and their needs (level 2) constitute, in our opinion, the bases of the architecture of digital assistance for the scientist, in the era of Web 2.0. It deals with the organizers of assistance for the realization and the result of personal activities, aiming at the advancement of a career and of collective scientific knowledge, which results from human and cognitive linking.

5.3. Conclusion: researcher's position

To conclude on the action researcher model, we establish the concept of position. In a pedagogical context, this concept is defined as "a pre-constructed pattern of 'thinking-saying-doing', which the subject summons in response to a given academic situation or task. The position is relative to the task but constructed in the social, personal and academic history of the subject" (Bucheton and Soulé 2009, p. 38).

Scientifically, we perceive its usefulness in the context of identifying regularities in the process of activities conducted by the researcher which can develop his/her practices and thereby contribute to the advancement of his/her own scientific dynamic. The goal is to observe and examine the researcher's activities rather than the results of his/her activities (for example, list of his/her publications). Through our reflection on position, we examine professional practices of scientists in their progression, which is associated with many variables related to their origin, their cultural roots, their social environment, their education, their training, their university curriculum, their political, religious and ethical opinions as well as their gender (Brun *et al*. 2007). For other authors, having conducted work on researchers' activities, the term "position" is appropriate to "define the person in his/her activity" (*idem*, section 6). It enables one to address his/her ways of thinking, of being and of acting in relation to his/her professional and societal environments (*idem*).

The analysis methodology that we wish to adopt in order to identify these positions is based on the principle of comparison. After having identified the common elements of a scientific path, analyzed using life stories, we will seek to identify areas of variation, of adjustment in the activities conducted, to try to understand the reasons, the triggering factors and the approaches implemented. This will be achieved in two ways: (1) by observing the researchers' daily activity, for several days, and (2) by confronting what we found with what they say in self-confrontation interviews. Our first survey results suggest similar career paths among researchers belonging to the same discipline, as well as recurring factors associated with the understanding of the difficulties of career evolution: poor time management of work as well as difficulties in suspending previous recurring activities, in co-constructing multidisciplinary activities, or in reinvesting his/her own research in teaching activities.

Conclusions and Prospects

In a society in which digital technology is gradually invading our daily life (Compiègne 2007), and particularly, our professional sphere, this book intended to present and characterize the assistance concept, as it intervenes in the educational activity supported by digital technology (Part 1) and intervenes/could intervene in the scientific activity (Part 2) in the near future. Our research results and our own perception of the research profession in HSS allowed us to identify various key concepts dedicated to the approach of this concept.

At the beginning of the first part, we presented digital humanities and specifically, we described three fields of action that characterize them as a research field. Two of them were examined in depth in the rest of the book: the field of observation of the activities carried out by the researcher and the field of the proposed service grids. Next, we defined the digital assistance concept. It is presented as a complex notion that should be approached and circumscribed. It is defined as a process corresponding to a cycle consisting of several stages which are associated with deliverables and a result of this process (the assistance itself) which can be evaluated according to its contributions to the assisted individual and by its assistant-designer. Different concepts, resulting from specific scientific approaches, allowed us to define functions, orientations and statuses as well as the types of digital aids according to their usefulness in the development of the assisted individual and the assistant (roles of actors in the process of the digital assistance).

In the second part, we put this definition of digital assistance to the test. Based on a reflection on the different activities that make up the research

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profession (professional standards), we highlighted the specificities of this assistance. In particular, we described the resources currently available according to different fields of research (example: corpus linguistics) and their contribution in the targeted activities (expansion of zones). The implementation of scientific engineering dedicated to the definition, design and development of digital resources specific to these aids, integrated in this profession, is set. Next, based on orientations specific to the assistance in a scientific context, we proposed and described examples of digital resources that do not exist (example: CRE). In particular, we defined them in their contributions within the process of digital assistance (expansion of zones). Then, we proposed a professionalization process approach. This process specifically involves the concepts of states and stages in the advancement of a career. These two concepts are related to the expansion of the two zones originally defined by Vygotsky as part of the assistance of digital technology. This process also involves the scientific scenario concept. This scenario contributes, for the researcher, to the implementation of a reflective process: he/she him/herself sets personal goals and implements strategies which are specific to him/her as well as production and development activities supported by digital resources involved in the assistance process. These resources are thus evaluated, based on observations and analyses of traces, in their contributions as part of the expansion of the two zones identified as integrated in the professionalization process. In the conclusion of this part, we establish the concept of digitized assistance. This assistance is an activity that encourages the researcher to implement a new digital aid based on the results of the latest digital aids that he/she has implemented. Finally, in the last chapter of this second part, the researcher's needs and expectations are presented as part of a theoretical model: the action researcher model. This model consists of three levels. At the first level, we find the researcher's macro-concerns, at the second level, we find examples of needs associated with each of these macro-concerns, and at the third level, we find the digital resources that could both meet the needs mentioned and give more cognitive abilities to the scientist: to facilitate certain mental processes (example: memory, categorization, planning, structuring and restructuring) which are regularly engaged in his/her activities, to encourage the consideration of some information which is difficult to access without the use of digital technology. This chapter concludes with the concept of position, which gives the proposed model its full meaning: to methodologically understand the activities implemented by each researcher,

to compare them with the activities considered in advance in the scientific scenario and to identify strategies for the advancement of scientific work.

Concerning this last chapter, we believe that it deserves to be dealt with in more depth. Longer observation phases of the different activities carried out by the researcher could be set up. However, a methodology for the collection and analysis of these data will need to be thought out. In fact, our first investigations underline all the difficulties in recording and analyzing tasks as complex as those of a researcher. Very limited work is currently available on the subject.

This can be explained by:

– the difficulty in contacting and motivating the research actors to participate in such a study, which examines their daily activities, their habits and compares them with a differential (estimated and real);

– the difficulty in making the researchers talk about a somewhat opaque professional activity given the important and heterogeneous nature of the actions carried out, which are sometimes complicated to verbalize (towards non-specialists);

– the temporal dimension which is necessary in order to identify the personal strategies implemented, the difficulties encountered and the solutions considered;

– the multidisciplinary dimension to be implemented in order to successfully complete a collection of data that can be analyzed according to different points of view (sociological, linguistic, economic, etc.). Several studies and methodologies will certainly be necessary.

The work envisioned is colossal. As specified in the last point, this can only be achieved as part of a multidisciplinary approach, in which computer scientists as well as linguists, sociologists, psychologists and specialists of these future professions dedicated to science, will need to be summoned. The purpose is to share the approaches and the results of each one, to best characterize the uses of digital technology by the HSS researchers but also, on another level, to deploy an innovative methodology, corresponding to a collective need (field of action No. 1 of digital humanities), that of identifying and proposing digital aids which are both specific to each individual and pooled together (field of action No. 3), as it is currently considered by digital humanities.

This sharing and these exchanges will be able to open up the debate on the expectations of the different disciplinary, national and European institutions (field of action No. 2) as well as perhaps on a new research configuration, which will take into account the expectations and the desires of each person, breathing new life into certain disciplines (which are losing momentum because of their disciplinary isolation, in particular). Thus, links may be considered. A researcher will be able to start his/her career in one field and pursue it in another. This choice will be supported by elements which have been identified based on the traces left by the researcher on a platform (environmental assistance, situational assistance), the objectives posed in a scientific scenario written in advance and executed according to a strategy which is specific to him/her. Indicators of change facilitating the decision-making process remain to be identified, in order to anticipate the choices and the triggering factors of these strategies.

We do not find here the desire to replace human beings in their initiatives or decision-making processes. It is a question of understanding them in order to better relay them to other actors (new generation), whether they are doctoral students, technicians, research assistants involved in the deployment of research, or even administrators collaborating in the arrangement of an event, of a request for a European project or of the supervision of budgets allocated to a project. The challenge of this work for the analysis of digital aids is to support the actors-researchers in a disciplinary opening and to open their activities to a new profession or perhaps several professions that have not yet been defined (example: content curator) integrating a new approach of research in HSS and new digital resources.

All resources (integrated into the process of digital assistance) dedicated to the researcher's activity will take time to specify, prototype, test and distribute. However, they constitute an important contribution in the activity of the individual, who can thus be alleviated of some tedious and repetitive tasks, but especially can be opened up to new, more metacognitive tasks, integrating a longer-term vision of his/her daily actions, encouraging him/her in an innovative approach of his/her research methodologies and research object, but also the development of all his/her activities (not exclusively by his/her publications aimed at the research community).

Other points of view in connection with other needs (outside HSS-Language sciences) will perhaps modify, complete or adapt the digital resource proposals made in this book, while other concepts will confirm

these first investigations. Studies from other approaches will also examine, and certainly modify, the first results (expansion of zones, scientific scenario, action researcher model). This is one of our objectives in the years to come: to solicit other researchers interested in different approaches and visions of this digital assistance concept as part of the two fields of actions associated with digital humanities as well as with the third field, for the production of institutional networks. The reflections associated with this third field will certainly also modify our definition of digital assistance. A collaborative aspect (networking of actors involved) which links the different actors working in the framework of digital humanities has to be considered in this definition.

In any case, assistance (even without digital technology) remains an interesting concept to be scientifically examined, because, from the beginning of his/her activity (during the master's degree and later the PhD), the apprentice-researcher constructs and develops his/her work environment (temporal, technical and human organization) according to his/her problem, his/her investigation field, his/her methodology and expertise, in terms of the use of methodological and technical resources, which he/she adapts according to his/her capacity to enter into a social (search by project, participation in events, for example), individual (in the publications that he/she proposes) and dynamic (in the changes of the orientation of the addressed subject, people and solicited theoretical frameworks) approach. The challenge, through the study of this complex object, is to understand the expectations of the individuals involved in the world of research, so as to be able to utilize them appropriately, and to implement collective means which participate in the evolution of each individual's situation and which encourage research that is innovative in its principles and important from a point of view of its contributions to society.

This work on assistance also participates in an approach of personal learning procedures (with or without digital technology): to learn how to learn, to learn how to become a professional, to learn through peers, to learn through self-assessment. The objective is to assist, to learn how to assist, to learn how to be assisted and perhaps to assist in order to assist (in the case of training). The common feature of all these approaches is that they take into account the knowledge/skills, the actual/perceived/expected work and the actor's prediction for a personal professional activity, in the medium and long term. They are intended to measure the remaining distance to achieve

the targets that have been set by the researcher him/herself or which are submitted to him/her by the community.

In this context, we can say that digital humanities, as they are currently envisioned, participate in an evolution (in non-revolution). On the one hand, they appear as promises of scientific exchanges without a barrier, of worldwide access, open and free, opening the doors of a high-level research, which is recognized, shared and accessible to everyone. On the other hand, these humanities are defined as places of the pooling of needs, expectations, desires, which will motivate the individual actor of research professions in an activity that he/she has chosen and that he/she must make evolve.

> "The first need seems to revolve around the production of tools, or even formats that are useful to researchers without actually examining their potential uses. We remain in a logic of the provision of the tool by counting on the emerging uses and practices with an extension of the Web 2.0 effect but in research." (Le Deuff 2012, p. 5–6)

Like this author, we share the idea that the arrival of digital technology in the world of research constitutes an opportunity in this long historical scientific tradition. The objective is now to produce and disseminate the work which advances an explicit and reasoned representation of the world of research in HSS. Like Alexandre Gefen[1] (Gefen *et al.* 2015), we believe that digital humanities exhibit the effects of reconnection between very old and new practices. Therefore, we are not in a rupture, but in a continuity of practices, to which our reflections wish to contribute. The action researcher model (see Figure 5.1) provides a pedagogical dimension to the professional development of actors working in the scientific world: a measured and staggered career evolution (states of knowledge and stages) based on their uses and their involvement in the design process of digital resources integrated into the aids, will be proposed in the near future. Such a project raises several questions. First, the researcher's activity is put to the test of an unstable and complex professional reality, which includes a formal framework which is not specific from the perspective of research activities requested, in addition to teaching and administrative activities, which are

1 *Qu'est-ce que les humanités numériques*? Round table organized by the Institut français at the Paris Book Fair on March 21, 2014. http://institutfrancais.tv/channel/videos/video/salon-du-livre-de-paris-2014-qu-est-ce-que-les-humanites-numeriques/.

just as disparate. These institutional frameworks have to evolve, in the same way as the scientific practices. Secondly, the resources that we described in this book, even if they correspond to a non-exhaustive list, will need to be put to the test of an identified group, in order to be able to propose and study the assistance personalization process (beginner or experienced researcher) and their adaptation to several target disciplines.

To conclude, we can say that, even if no one knows how to predict the effects and consequences on the researcher's professional practices and his/her future, digital technology currently shines indisputably through its omnipresence, and effects transformations within our scientific, social, professional and cultural dynamics. It is up to us to engage in a desired and controlled direction.

Appendix 1

Researcher's Professional Standards[1]

R1: Construction of a research project

R11: Definition, positioning, termination of a research project/topic and/or a field of investigation

R111. Scientific monitoring (bibliography, documentation, patents, conference etc.)

R112. Analysis, conceptualization, anticipation

R113. Research hypotheses formulation

R114. Scientific feasibility examination

R11X. Other, specify:

R12: Development of methods of approaches, processes, protocols

R121. Consultation of competent people or specialists, search for partnerships

R122. Planning and negotiation of the conditions of the implementation of the project (platforms, technologies, devices, data acquisition, etc.)

R123. Experience plan development

R124. Preparation of platforms, products, techniques, etc.

1 Document made by CNRS2, Directorate of Human Resources, Observatory of Employment and Scientific Professions – 2003–2007. Official document: http://www.dgdr.cnrs.fr/drh/omes/publi/documents/mcpi/NoteMCPI-CP_OutilRH.pdf.

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R125. Preparation of the collection of data/samples, surveys etc.

R12X. Other(s), specify:

R2: Carrying out a research project

R21: Theoretical studies realization

R211. Theoretical model development

R212. Comparison of the theoretical model with the latest developments

R213. Development of modeling and/or experimentation concept

R214. Comparison of the model with the results of the experimentation or the results of the digital simulations

R21X. Other, specify:

R22: Experimentations

R221. Acquisition, preparation of data/samples

R222. Implementation, optimization of techniques, means of testing and measurement, etc.

R223. Carrying out, guiding of experiments, protocols, approaches, tests, trials, prototypes, etc.

R224. Follow-up of results, adaptation of protocols, approaches, tests, trials, prototypes, etc.

R22X. Other, specify:

R23: Digital simulations

R231. Translation of the theoretical model into algorithm

R232. Writing, implementation, follow-up of computer codes

R233. Digital simulations realization

R234. Storing, post-processing and transferring of data

R23X. Other, specify:

R24: Activities in support of the management of experiments

R241. Carrying out, development and maintenance of the experimental apparatus

R242. Maintenance, retention, monitoring of living organisms, materials and areas of research

R243. Creation, development, maintenance of a computer program, a database

R244. Research, study, adaptation, invention of new methods or techniques

R245. Technological monitoring

R24X. Other, specify:

R3: Exploitation and dissemination of results

R31: Exploitation, interpretation of results

R311. Results analysis

R312. Discussion/comment on the intermediate and final results

R313. Summary and formatting of results

R314. Ensuring of the traceability of results (laboratory notebook, etc.)

R315. Validation of results

R31X. Other, specify:

R32: Writing and dissemination of scientific knowledge produced

R321. Writing publications/articles

R322. Writing scientific reports

R323. Development of scientific communications (poster, oral presentation, etc.)

R324. Speaking at symposia, seminars, thematic days etc.

R32X. Other, specify:

R4: Coordination and scientific evaluation

R41: Scientific organization

R411. Organization of a project

R412. Collaboration with other teams

R413. Development, organization, coordination of a network of collaborations, expertise, association, in France or abroad, etc.

R414. Organization from a scientific point of view of symposia, congresses, conferences, seminars, etc.

R415. Organization from a scientific point of view of training activities: scientific workshops, thematic courses, etc.

R416. Organization of symposia, congresses, conferences, seminars, scientific workshops, thematic courses etc.

R41X. Other(s), specify:

R42: Academic expertise

R421. Membership in an evaluation body (scientific council, national committee etc.) in France or abroad

R422. Participation in the definition of the scientific orientations of establishments (advice etc.)

R423. Membership in a writing and/or reading committee of a scientific journal

R424. Evaluation of articles (reference)

R425. Membership in a selection committee for competitive exams, dissertations, rapporteur for a section

R426. Realization of an expert assessment and contribution in this capacity, within scientific bodies

R427. Translation of scientific work

R42X. Other(s), specify:

R5: Training through research and teaching

R51: Training for research

R511. Delegation, guidance, monitoring, counseling etc. of doctoral students, interns, young researchers

R512. Assistance for the construction of the professional project and professional integration

R513. Reading and/or correction of reports or master's theses

R514. Training of researchers, engineers, technicians (for equipment, instruments, laboratory analysis techniques, etc.)

R515. Implementation of personalized follow-up, tutoring, live or remotely

R51X. Other(s), specify:

R52: Teaching

R521. Course preparation

R522. Course teaching

R523. Organization of doctoral school seminars

R524. Correction of copies, exams, participation in committees

R525. Course evaluation and definition

R526. Organization of teaching programs, curriculum and/or courses

R52X. Other(s), specify:

R53: Self-education

R54: Training system management

R6: Scientific, economic and cultural development

R61: Partnership/development

R611. Promotion of the results, skills, etc. of the unit (with supervisory bodies, partners, socio-economic world, etc.)

R612. Promotion of the results, skills, etc. of CNRS internationally

R613. Research placement within industrial, health and service applications, in relation to the regional government

R614. Development of processes and methodologies in preparaton for transfer

R615. Engagement of processes for filing patents, licenses and transfer programs

R616. Occupation of an external consultancy activity

R617. Realization of an expert assessment and contribution in this capacity, with professional bodies

R618. Realization of an expert assessment and contribution in this capacity, for civil society

R61X. Other, specify:

R62: Dissemination of information in society

R621. Organization of exhibitions, forums, science cafés, etc.

R622. External presentation (scientific popularization to the general public: colleges, high schools, clubs)

R623. Speaking on radio/television programs

R624. Writing of articles for newspapers, consumer magazines

R625. Proofreading and correction of scientific popularization articles

R62X. Other, specify:

R7: Operation of the research system

R71: Activities related to the collective life of the unit

R711. Ensuring of a temporary function (ACMO, corresponding training, etc.)

R712. Assistance to users of IT stock

R713. Assistance to visitors on laboratory equipment

R714. Management of information systems

R715. Management of the use of the premises

R716. Management of the library and documentation

R717. Membership in a laboratory department

R71X. Other(s), specify:

R72: Budget/finance

R721. Negotiations with the supervisory agencies, partners, etc.

R722. Response to requests for proposals

R723. Research for other funding

R724. Evaluation and supervision of budgets for research projects/programs

R72X. Other(s), specify:

R73: Management

R731. Development of a recruitment and equipment policy

R732. Preparation and negotiation for the quadrennial contract

R733. Supervision of one (or more) team(s)

R734. Organization, coordination of team progress meetings

R735. Evaluation of personnel

R736. Carrying out of individual interviews

R73X. Other, specify:

R74: Organization/administration

R741. Management of personnel

R742. Assembly, writing, management of contracts (industrial, European, etc.)

R743. Development of administrative records

R744. Organization of logistics: thematic courses, seminars, conferences, etc.

R745. Organization and ensuring of visitors' reception

R746. Management of projects

R747. Management of orders, stocks, purchases

R74X. Other(s), specify:

Appendix 2

Portfolio 2017/2018 – Postgraduate School 58 (ED 58) – A Guide for Doctoral Students

PORTFOLIO

Decree of May 25, 2016 laying down the national framework of training and the methods leading to the awarding of the national doctoral diploma, excerpt:

"Article 15: A portfolio of the doctoral student comprising the individualized list of all the activities of the doctoral student during his/her training, including teaching, dissemination of scientific culture or transfer of technology, and enhancing the skills that he/she has developed during the preparation of the doctorate, is realized. It is regularly updated by the doctoral student."

A guide for doctoral students
It must be submitted before the dissertation defense.

LAST NAME FIRST NAME:

Date and place of birth:

Education history (High School Diploma, Bachelor's Degree, Master's Degree, other):

Status: employee, funded (type of funding), unfunded:

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Doctorate:

DISSERTATION TITLE:

Research supervisor(s):

Research unit:

Year of first registration:

Date of dissertation defense:

Committee:

I. Scientific productions

Publications

– Books

– Chapters in books

– Articles in journals *(Note: Refer to the HCERES glossary of the section)

– Symposium proceedings

– Edition, co-edition of books

– Reports

– Translations

– IT products and tools (software, databases, cohorts, corpora etc.)

– Other products specific to a discipline (theorized artistic creations, mise en scène, films, etc.)

Scientific communication

– Participation in a symposium or a study day with paper presentation

– Presentation of one's work in an ED reading workshop

– Presentation of one's work in a team seminar

– Participation in a seminar organized by ED

– Participation in a seminar organized by research teams or by another establishment

ORGANIZATION OF SCIENTIFIC EVENTS

– Organization of a scientific initiative (symposia, seminars, round tables, workshops)

– Writing in a scientific journal

Other productions

Development and dissemination of research

– Dissemination

– Popularization

II. DOCTORAL TRAINING PATHWAY

– ED scientific and professional training

– Foreign language training organized by ED

– Participation in a vocational training (computer science, mapping, field research, teaching professions, etc.)

III. MOBILITY

– Research trip abroad

– Participation in European and international projects

– Reception in other laboratories

– Visits to archives, museums

– Other

IV. EDUCATION ACTIVITIES

– Instructorship, ATER, part-time lecturer

– Teaching activity in secondary school

– Teaching activity in primary school

V. PROFESSIONAL ACTIVITIES RELATED TO THE DISSERTATION SUBJECT

– CIFRE contract

– Other activities

VI. COLLECTIVE RESPONSIBILITIES

– Within the university (member of a council, of a commission of the establishment, etc.)

– Within a unit or a research structure

– Other

VII. DEVELOPED SKILLS

– Software (computer science)

– Organizational

– Editorial

– Speaking

– Summary

VIII. PROFESSIONAL PROJECT

Glossary[1]

Action: subordinated to one or more activities, actions, whether individual or collective, are oriented by conscious goals. They are an intermediate state in relation to what motivates the assistance activity (the activity motive, the production of a response to a need for assistance), and the lower-level operations. We cannot understand the action (of assistance) outside of the activity in which it is integrated and the operations that comprise it.

Action researcher: the action researcher model consists of three levels. The first level specifies a researcher's macro-concerns regarding his/her professional activity. The second level refers to his/her needs related to one or more of these macro-concerns. The third level proposes technological solutions that meet the need with which he/she is associated, but triggers other intentions.

Activity: the activity of assistance is oriented by a motive, a conscious purpose, which satisfies a need or a motivation. It is carried out by the assistant through a chain of actions.

Assistance: the process (see "Process") and the result of this process involving an assistant (human or computer) and an assisted individual (human). Assistance process is defined as a cycle (five stages), whereas the result is defined as a deliverable provided in each stage of the cycle. It aims at enabling the assisted individual to resolve his/her problem and/or to advance/achieve his/her objectives in a longer-term approach.

1 These definitions are summaries. They are defined in the context of the approach to the digital assistance concept as it is presented in this book.

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Assistance future: the stage of the cycle that is characterized by the disappearance of the assistance, its archiving, its indexing, its dissemination or its integration into the IT environment.

Assistance orientation: the orientation of an aid is defined as the strategic reasons for which an aid has been produced. This orientation specifies the circumstances and the direction in which the knowledge has been selected and then implemented in the aid produced. Specifically, we identify three orientations: reflective, communicative and curricular.

Assistance status: status corresponds to a particular assistance state at a given time: proactive or reactive. This status changes according to the indicators that have not yet been constructed (example: the number of times the assistance is provided by an assistant).

Career path: digital assistance participates in the characterization of the career path, by stipulating the different contributions of the digital assistance implemented by the assisted individual or proposed by the assistant. This path is marked in particular by the states of knowledge and the stages.

Cognitively increased humanity: the integration into the assistance process of certain digital resources which are likely to deploy an augmented cognitive activity in the researcher, that is to facilitate the activity through the support provided: memory support, the implementation of a categorization, the implemented information monitoring or the reorganization of components depending on unforeseen events, etc.

Communicative orientation of the assistance: this orientation is related to the mediation process of the actions of an actor or a group of individuals, integrated (or not) into an institution (public or private). This process aims at formalizing, categorizing, disseminating information in connection with an identified knowledge and a particular target.

Content curation: the term "curation" is derived from the Latin word *curare* and designates initially the act of treating. It is a practice which is to select, edit, and share relevant scientific content. With this curation activity, an assistant supports one or several individuals in the carrying out of an activity. Example: bibliographic research is oriented by the current researcher's activity (scientific monitoring), and the researcher examines the librarian's practices in order to better orient his/her research.

Curricular orientation of the assistance: this orientation links the assistance to the mediatization process. It implements, in a pedagogical scenario, some disciplinary (or multidisciplinary) knowledge identified as intervening in the learning process, according to the presentation methods.

Digital assistance: the process (see "Process") and the result of this process involving an assistant (human or computer), an assisted individual (human) and a digital resource.

Digital humanities: digital humanities are defined simultaneously as a field of research, teaching and engineering. They are characterized by the convergence of the so-called scientific (production and dissemination of knowledge), educational (didactic transposition integrating the interpretation of knowledge produced and written in scientific articles), and instructional design (means of presentation and dissemination of this knowledge gained through IT applications/environments) activities. They are at the intersection of computer science and arts, letters and HSS.

Digital resource: a resource (Develotte and Pothier 2004) designating a digital means made available, making possible to deal with a situation. Thus, a documentary resource is a mobilizable means of solving an informational question, an educational resource is defined as a means of solving an educational problem and a scientific resource is defined as a means of making progress on scientific production questions.

Digitized assistance: first, it is defined as a process aimed at allowing the assisted individual to resolve his/her problem and/or to make progress in a longer-term approach, then, as a triggering factor in the implementation of new digital aids of the same type, and finally as a skill of interpretation and adaptation to different situations encountered.

Expansion of the autonomy zone: this expansion corresponds to what the learner or the researcher can do on his/her own (perform an action or activity). It participates in the evaluation of digital assistance (its contributions).

Expansion of the ZPD: this expansion corresponds to what the learner or the researcher can do, when he/she is supported by another actor (perform an action or activity). It participates in the evaluation of digital assistance (its contributions).

Individualized assistance: the result of the assistance individualization process. It is oriented towards one or several other actors (Duthoit *et al.* 2012). Example: an email sent to a group of assisted individuals.

Macro-concerns: concepts that make up the action researcher model: (1) production of results; (2) solicitation of other actors; (3) writing of material; (4) dissemination of the results and activities conducted; (5) adaptation; (6) categorization. We postulate that these six macro-concerns are the pillars around which the ordinary act of the researcher, professional knowledge, experience and skills are developed. Four of these macro-concerns aim at producing scientific knowledge (production, solicitation, planning and writing) and three macro-concerns aim at their development (dissemination, adaptation, categorization).

Operation: operations are "unconsciously executed". They are established through the experience which is built through contact with the actual conditions of the situations encountered and the materials left available. Operations refer to often-routinized behaviors. They are executed quicker than the action and are implemented automatically. Internalized, the operation is performed without the assistant necessarily being able to technically justify his/her role in the targeted action.

Personalized assistance: the result of the assistance personalization process. It is made in view of a single actor, who may be him/herself or another person (Duthoit *et al.* 2012). Example: arrangement of the personal desktop of the computer (wallpaper, icons, shortcuts), a set of data present at a particular place (favorites, history, databases).

Proactive assistance: this assistance is defined as given information or a document present at the beginning of the activity of the assisted individual. It can take the form of a help section (help?, assistance). It is most often unused, or used in an unadapted way.

Process: the entirety of a group, considered as having unity and organization, of events spread over time (Bloch *et al.* 1997).

Reactive assistance: it responds to a targeted need for a given individual, in a particular situation. This assistance tool is contextualized. Generally tailored for a specific individual (the assisted individual), in a unique situation, it can take the form of advice, a response to a question or even information that can guide the problem-solving strategy.

Reflective activity: reflective activity is not a spontaneous activity. It is a matter of an individual reflecting on his/her own personal and/or professional activities. The objective is to be trained through the analysis of his/her own practice, in addition to academic knowledge. The purpose of the aids in reflective activity is not to think about the place of the individual, but rather to assist him/her in thinking on his/her own (self-assessment, questioning, guide of reflection, of pooling entities).

Reflective orientation of the assistance: the reflective orientation of the assistance is to be related to a mental process of personal analysis of a situation (personal and/or professional). It takes the form of support for the actors in the creation of a PLE, for example. This support questions the student about the knowledge/skills that he/she has implemented in the fulfillment of one or several of his/her tasks, questions his/her choices in the selection and organization of the tools he/she chooses to implement in order to build his/her own knowledge and/or to make progress on tasks that are requested of him/her (Vayre *et al*. 2014).

Repetitive activity: a repetitive activity is defined as an activity occurring at a high frequency. It brings the actor to conduct the same tasks, activities, actions. The purpose of the aids to repetitive activity is not to replace the evaluator, but to facilitate his/her activity.

Researcher's position: the way in which we perceive the usefulness of the different activities carried out by the researcher. This effort aims at identifying regularities in the process of activities which can develop practices and thereby contribute to the advancement of new scientific dynamics.

Resource: resource carries intentions which shape the activity, the uses, the knowledge of the users (affordance, mode of destination, instrumentation). It is designed on the basis of a usage scenario.

Scientific engineering: it consists of studying, designing, conducting and adapting systems of research, mutual assistance, or training materials according to the expectations/needs of the research actors. It is also a matter of finding ways and means to develop the scientific activities carried out, to synthesize, to categorize or to disseminate them.

Scientific scenario: it is defined as a component of the professionalization process of the researcher and as an element of the decision-making process (on a research topic, for example). It integrates into a desire to better manage careers of scientists based on indicators enabling the measurement and development of the activities conducted, whether individual or collective.

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Chrysta Pélissier is Maître de Conferences in Language Sciences at the University of Montpellier, France. Her research focuses on the design of assistance technologies for digital learning environments.

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