

Accompanying training professionalization processes, using didactic and research in a complex perspective

Accompagnare i processi di professionalizzazione attraverso una prospettiva complessa di formazione e ricerca

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Abstract

The lack of reference to didactics obscures the perspective on the relationship to knowledge. It seems to us, however, that professionalization through training and a complex skills-based approach both imply integrating knowledge, knowledge constructions and devices; connecting elements together and reflecting on conceptualization processes in order to learn more dynamically without neglecting didactic innovations. How could new forms of complexity be re-established in pedagogy while bridging training-research with didactic research? Which frameworks and teaching tools would be needed to enable progress? In this article, after contextualizing our theoretical work and frameworks, we will present the emergence of a complex model connecting *information-savoir* and *connaissance* with *pratiques-expérience-expérimentation-exploration-expertise-compétence-(re)-connaissance*; a feedback on the concept of *contre-transposition* and the problematization approach for the purpose of (re)constructing professional skills. We will then use a flipped classroom method to try to understand how a teacher-in-training builds construction indices of his or her professionalism in interaction with pupils and teachers' actions.

Keywords: didactics; professionalization; complexity; models; counter-transposition.

Abstract

I mancati riferimenti alla didattica impediscono di mettere in luce la prospettiva legata al rapporto con la conoscenza. Ci sembra, tuttavia, che la professionalizzazione attraverso la formazione e un approccio complesso basato sulle competenze implichi l'integrazione di conoscenze, costruzioni di conoscenze e dispositivi da un lato, ed il collegamento, dall'altro, di elementi di riflessione sui processi di concettualizzazione che supportino un apprendimento dinamico senza trascurare le innovazioni didattiche. Come possono essere ristabilite nuove forme di complessità in pedagogia attraverso l'interazione tra ricerca-formazione e ricerca legata alla didattica? Quali framework e strumenti didattici sono necessari per promuovere il progresso? Nel presente articolo, dopo aver contestualizzato il quadro teorico di riferimento, illustriamo un modello complesso che collega *informazioni-conoscenza* e *comprensione* con *pratiche-esperienza-sperimentazione-esplorazione-expertise-compétence-(re)-conoscenza*. Forniamo inoltre alcune riflessioni sul concetto di *contrasposizione* e sull'approccio che problematizza la (ri)costruzione delle competenze professionali. Utilizzeremo quindi un metodo di flipped classroom per comprendere come un docente in formazione possa costruire indici per la definizione della sua professionalità nell'interazione con gli allievi e con le azioni degli altri docenti.

Parole chiave: didattica; professionalizzazione; complessità; modelli; contrasposizione.

1. Introduction and problematization

In recent years, we have seen a proliferation of reference systems (regarding professionals, training, education, etc.) that list skills and content without always taking into account the complexity of the work situations to which they relate and the analysis of what is really happening there. The notion of competence dominated; it was often linked to that of performance, and has been quickly defined with this famous trilogy: *savoir, savoir-faire, savoir-être*, which is the French adaptation of the expression *knowledge, skills and attitudes* used by English-speaking educators. This expression has been spread massively and remains ambiguous, according to Guilbert (2001). In addition, emphasis has often been placed on types of behavioural and operational skills, with an observable work situations approach. Many references neither refer to practice, nor to knowledge as such and amalgamate *knowledge and understanding*¹. They proceed more by *listing* than by *interacting elements*, and not by *integrated diagnosis* of the problems encountered by the learners, which would nevertheless give meaning to the activities. If we add to this the drift of *standard procedures* as an ordered method of resolution and the illusion of *good practices*, we risk falling into forms of applicationism, without any real intellectual construction.

Professionalization processes are sometimes reduced to a form of *professional knowledge* based on a logic of reference systems that proceed by listing and not by interacting elements, nor by integrated diagnosis of the problems encountered by learners. It seems to us, however, that professionalization through training and a complex skills-based approach both imply integrating knowledge, knowledge constructions and devices; connecting elements together and reflecting on conceptualization processes in order to learn more dynamically without neglecting didactic innovations.

The use of the Internet has reinforced the fact that we can all *easily* access information. In a way, this has also contributed to the trivialization of research methods, by using even more simplified instruction manuals. We persist in believing in the myth of having access to the whole of human knowledge without necessarily taking the measure of the gap that is being established between mass culture and *basic information* for all, and a world of knowledge in the sense of *erudition* (with a certain elitist conception that still persists). And, in the end, less and less space is given to the time of elaboration, of personal construction. Efficiency seems, more and more, to rhyme with speed. In addition, focusing research and policy on tools, and not on action, has consequences. Focusing exclusively on the tool does not allow the comprehensive study of the relationship to knowledge, which requires an interest in the human acting within context. This lack of references to didactics suggests that the integration of tools into practices is self-evident. Hiding this is obscuring the perspective of the relation to knowledge.

We no longer take the time to connect elements together. However, within digital environments, “the trainer is expected to become an expert on human environment and to compose or recompose links to facilitate learning”, says Cristol (2014, p. 27), who refers in particular to Morin’s (2004) theory of reliance, well known today. “Complexus [meaning]: what is woven together” (Morin & Le Moigne, 1999, p. 17). “To tackle this complexity, the researcher, using different viewpoints, must be interested in the contributions of other research disciplines, each bringing its light of what it knows to build an operational understanding of the didactic process. Didactics, like research disciplines,

¹ In French: *savoir and connaissance*.

cannot escape this development, for as long as we keep old tools, we only produce old ones” (Astolfi, Cornaz & Drouilly, 1989, p. 57).

Several recent surveys conducted at the initiative of the Direction Générale de l’Enseignement Supérieur et de l’Insertion Professionnelle (DGESIP) have underlined the importance of accompanying teachers and teacher-researchers in the transformation of their teaching practices (Cosnefroy, 2015); to connect teaching practices with services that offer innovative spaces such as common documentation services and learning centres contributing to the renewal of practices (Paivandi, 2016). The report, entitled “For a learning society. Proposals for a national strategy for higher education” (Béjean, & Monthebert, 2015), presents 40 proposals for building a learning society. It refers to “inventing higher education for the XXIst century” (ivi, p. 89) in particular, “making the training-research link one of the levers of educational transformation” (ivi, p. 94) by “developing innovative practices and training teacher-researchers in pedagogy” (ivi, p. 95) and by “overcoming the fragmentation of our higher education and promoting a logic of cooperation” (ivi, p. 120).

How could new forms of complexity be re-established in pedagogy while bridging training-research with didactic research? Which kind of frameworks and teaching tools would be needed to enable progress?

In this article, after contextualizing our theoretical work and frameworks, we will present the emergence of a complex model connecting *information-knowledge and understanding*² with *practice-experience-experimentation-exploration-expertise-competence-acknowledgment*³; a feedback on the concept of *counter-transposition*⁴ and the problematization approach for the purpose of (re)constructing professional skills. We will then use a flipped classroom⁵ method to try to understand how a teacher-in-training⁶ builds construction indices of his or her professionalism in interaction with pupils and teachers’ actions.

2. Contextualization of our works and theoretical frameworks

In our work, which is rooted in the didactics of information-documentation, we seek to accompany professional transformations and evolutions by taking into account scientific advances through various spaces and devices; to bring *the other* to be trained, to learn with research, without levelling, in a context of multiple reforms and prescriptions of different (explicit, implicit) natures. We want *to think* the other with his representations, his life course and his constraints in reception (Liquète, 2015); to make worlds, communities, disciplines and domains interact and communicate with each other beyond compartmentalization; to develop a systemic and dynamic vision of training-education-learning.

² In French: information-savoir et connaissance.

³ In French: pratiques-expérience-expérimentation-exploration-expertise-compétence-(re)-connaissance.

⁴ In French: contre-transposition.

⁵ In French: classe inversée.

⁶ In French: stagiaire en formation.

We try to propose a renewed conception of didactics and dynamic models, promoting movement, paths⁷, constructions. “The risk would be that a militant will to better establish the social and institutional recognition of info-documentation as a discipline will impose on it the academic form and its usual type of didactic transposition” (Astolfi, 2008, p. 116). We have thus produced new professional paradigms for scientific research and professions (Frish, 2016a).

2.1. Interdisciplinary and inter-didactic approach

The interdisciplinary and inter-didactic approach, although distinct, complement each other and feed our thinking. Bishop (2012) explains that the inter-didactic approach differs from the interdisciplinary approach in that it consists in bringing together and integrating the knowledge from different disciplines. It is not just a question of reinvesting them into a common object.

Regarding an inter-didactic approach more specifically, we are developing interconnections and porosity between different didactics (disciplinary, disciplines and professional didactics).

The didactics of disciplines establishes a comparative view in research. It is also by studying what is *at stake* in other didactics, such as science for example, that we can develop our very own field of investigation. This is how we initially proceeded with what we call *didactic captures*⁸, notably with the concepts, to look at them through the lens of information-documentation didactics. As is the case with *social reference practices* Martinand (1989), the knowledge taught is not strictly derived from a learned source. The didactics of the information-documentation discipline, in connection with mobilizing situations of reference, help us analyze the transition from information to knowledge and understanding, taking into account the experience of the actors, the context of intervention, the experimental nature of the proposed system, the exploration approaches invested by the subjects, the skills acquired.

Professional didactics analyses work in light of professional training⁹; it also uses work situations as an instrument of learning. Pastré, Mayen and Vergnaud (2006) explain that “there is a deep connexion between activity and learning, between the analysis of the activity and the use of the work situation for training” (p. 155). It allows us, in our work, to conceive professionalization in its relation to knowledge and the exploration of the link between activity, practice and learning. And to analyse, with certain methods, certain tools from this field of research, the work of teachers, trainers and their *action* in order to accompany the evolution of the practices.

In a contemporary way, we propose a new *definition* of didactic(s) such as: “The study of the conditions of *transmissions*, *mediations*, *appropriations* and the *constructions* of teachings and apprenticeships in disciplines, emergent fields and technologies (TICE/TUIC¹⁰), educations, professional fields, by taking into account certain crossroads

⁷ In French: cheminements.

⁸ In French: captations didactiques.

⁹ In French: formateur.

¹⁰ Technologies de l’Information et de la Communication pour l’Enseignement (TICE); Technologies Usuelles de l’Information et de la Communication (TUIC).

and confluences, the reality of the activity and the professional practices of Human Professions” (Frisch, 2016b, p. 49).

2.2. Collective Intelligence Input Approach

The interdisciplinary and inter-didactic approach also underlines the need for cooperative work and helps us making a link between these approaches and the input of collective intelligence that we favour. The latter can refer to the intelligence of working groups (Levy, 1997); the cognitive capacities of a community resulting from multiple interactions between its members (Rogalski, 2005); an approach that can consist in contributing to the organization of knowledge, the construction of knowledge and skills (Frisch, 2014). It is also defined by social psychologists as being “an assembly bonus”, i.e. that bringing many people to think, reason, solve a problem and make a decision together can be an advantage for the quality of what is produced. On the condition that we overcome several obstacles that can reduce a group’s intelligence: the compliance bias that pushes us to adopt the point of view of the majority, the lack of sharing of information that we alone possess, the confirmation bias that leads us to select, among the information and arguments exchanged, only those that support and confirm our point of view (Oberlé, 2016). For Olfa Zaïbet (2007) “Starting from the principle that collective intelligence is a system, we can say that it is the sum of the individual intelligences of team members, plus their relationship. [...] The organization constitutes the link between individual intelligence and collective intelligence. Even for individuals, intelligence is indisputably part of a broader organizational perspective than simply the scope of an individual’s work. It is not only a question of an actor’s ability to cope with a particularly complex work situation, but incidentally of the organization’s ability to promote the construction of appropriate and efficient behaviour” (p. 43).

2.3. An approach around emergences and the conceptualization of the professional action

The work around *emergences* (which includes hatching¹¹, innovating, creating, characterizing) can contribute to the renewal of didactic analyses and contribute to professionalization and to the construction of professionalism. We use existing models and develop our own models to analyze professional *action* to take into account the relationship to knowledge which is being built in these singular integrative situations. We thus set out our intentions to analyze what could be learned from this *action* with professionals, taking into account this set of interacting elements. We conceive modeling as “a dynamic process of reflection and formalization of knowledge based on conscious, thoughtful and integrated actions” (Clenet, 2008, p. 33) and that it is aimed towards the production of knowledge.

We conduct a theorization of movement with the actors involved, trying to elucidate the nature of what has been implemented at the learners’ and at the trainers’ level in relation to training situations. The entries that we have brought to light (Frisch, 2016a) are part of didactics as a science, not general didactics, but a science that makes it possible to understand the practices of didactics and that allows research to renew its stock of questions in education sciences and, might we add, in professional training. It is then a matter of bringing didactic viewpoints on the professional practices which are constantly evolving.

¹¹ Or blooming.

It is a systemic framework, from which novelty can emerge, and we must let that novelty arise.

2.4. Emergence of complex modeling

We have built the model and developed the system that we are now presenting to the reader. This modeling allows us to reflect on the question of the organization of the complexity of tensions and reciprocal influences between the different elements. It is a question of analyzing how the didactic interactions between information-knowledge and understanding¹² and the other elements of the system *play out* in relation to integrative mobilizing situations. Several combinations are possible and help us in reading and analyzing the activity, the action. Using the modeling process in a systemic framework means making oneself capable of producing meaning and thus, gaining access to the understanding of complex situations. Considering that “the whole is greater than the sum of its parts” (Aristotle, *Metaphysics*), the proposed system is not constituted solely for all the objects it contains, but includes everything that links these objects together to make a coherent whole in equilibrium (interactions). The nature of these interactions then indicates how the system works (Figure1).

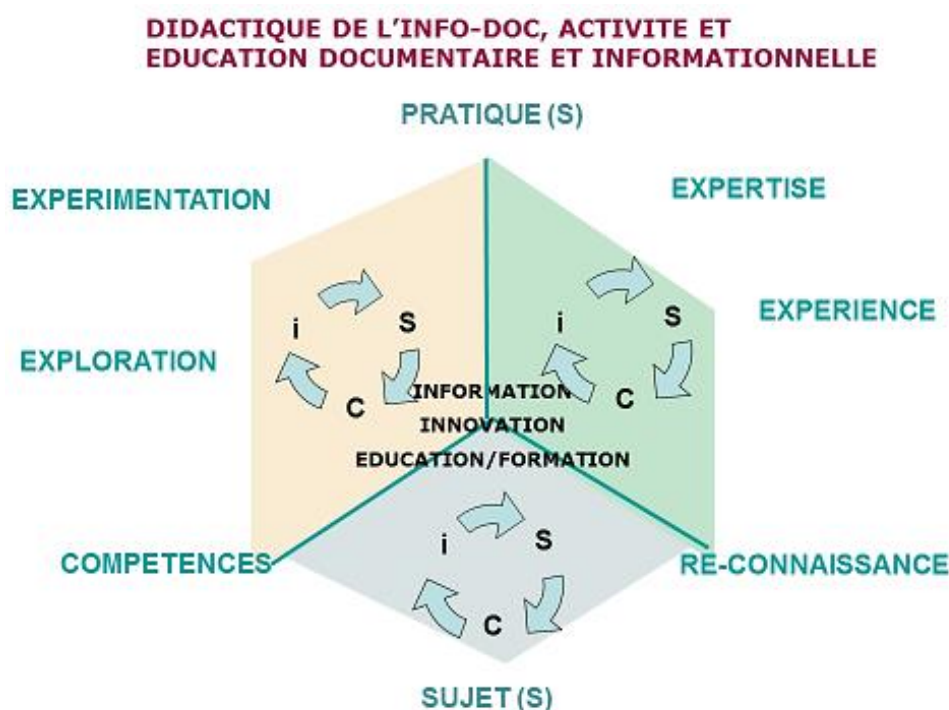


Figure 1. Articulation of a model connecting information-knowledge and understanding with practice-experience-experimentation-exploration-expertise-competence-aknowledgment¹³ (Frisch, 2016c).

¹² In French: information-savoir et connaissance (ISC).

¹³ In French: information-savoir et connaissance avec pratiques-expérience-expérimentation-exploration-expertise-compétence-(re)-connaissance (P-4^E-S-2^C).

Originally, the model of the conceptualization loop from Astolfi (1992) *information-connaissance et savoir* (ICS) raises the problem of notions that are not seen as concepts by the learners. In our model, we have changed the order of the concepts, favouring the ISC model. We focus our analyses on the way learners process information, develop knowledge and appropriate knowledge, with all kinds of media, including the document. Information, of course, as developed by cognitive sciences, can only become knowledge when it has been treated by a subject and incorporated into a network of knowledge which is already present. But the information is no longer totally external to the subject, it becomes its own object, it becomes familiar because of this treatment. It helps in building cognition and in appropriating knowledge. We then connect our loop to another system, P-4^E-S-2^C, in a complex approach to the analysis of the activity's learnings (Frisch, 2017).

With this model and in a counter-transposition, we take into account the contexts of emergence, the extraction of knowledge from an action in relation to the activity of the learning subject and of the professional (Frisch, 2016a). This helps us create a curriculum that is not disconnected from daily professional practice. It is therefore a matter of understanding the complexity of what is at work. So what are the knowledge development processes that are based on a subject category? How do they handle information? Is there a construction of knowledge of information? How does it appropriate knowledge?

From a teaching professional didactic perspective, the analysis of the activity starts from the study of the subject's action, from his point of view, then towards its appropriation of professional knowledge, which goes through a conceptualization phase.

3. Acting in *counter-transposition* and by problematization

We designed this concept of *counter-transposition* by *tensioning* it against the transposition concept. It finds its origin in the initial project to characterize a documentation didactic by taking into account the social and training practices of college pupils and teacher-documentalists in their everyday practices, in addition to the scholarly reference knowledge. In our work of didactization of information-documentation, it was essential for us to think of the notion of competence in its connection to the actual practice. The didactic counter-transposition makes it possible to apprehend the environment as a generator of knowledge and practices. Whereas transposition leads to a set of adaptive transformations of reference knowledge, to a work of appropriation of theoretical elements to be acted in practice (Frisch, 2016).

The counter-transposition approach also invites us *to get away* from the perception that learning is the exclusive way of acquiring knowledge, by taking into account the formative goals as well as the active role of the learner, and thus to go beyond the conception which presupposes that prior established knowledge is an absolute for the learner. The difficulty is to consider the material, the traces and the documentation that are really *laid down* by the learner, the teacher, the trainer, and not only what discourse was declared, or even prior knowledge of the prescribed text. It is a matter of taking into account the problems that users are confronted with, for example, in a documentary and information system, in order to move from naive questioning to the construction of a problem. The problem is not an issue to be resolved. In the common sense, the problem is, in this acceptance, "a defect, a gap, an obstacle, a difficulty where only the answer that makes it disappear counts" (Meyer, 1997, p. 23 quoted by Golloubieff, 2018, p. 158). A problematic approach or study of

Michel Meyer's questioning provides interesting keys to address the problem from a professional point of view.

Didactization work through counter-transposition requires an analysis of the question of the knowledge at stake in professional practices, the problems encountered, the questions raised in the course of action and activity. It also consists of building elements of knowledge, some forms of conceptualization that come from the complexity inherent in the practice, in the professional activity within an organization (Frisch, 2016).

Today, professionals, learners and *users* invest in a variety of skills: technical, technological, documentary, informational, media, mediation, cognitive, conceptual and constructivist skills. Introducing technologies, digital technologies, modifies the interactions between the subjects, between the subjects and the objects of knowledge, as well as the interactions in teaching-learning situations.

4. The flipped classroom in question and construction indices of teaching professionalism¹⁴

The flipped classroom is currently the centre of attention for educators around the world. Bishop and Verleger (2013) talk about an incredible number of new dedicated web sites and development of the production of new scientific articles.

In a comprehensive approach, we observe the dimensions of teaching work, its organization and the meaning that teachers and students give to their actions based on their relationship to the profession, knowledge and tools/digital content in professional situations and diversified learning.

Our research device proposes to observe experimental flipped classroom from the Greater Region, including two institutions in urban areas: Nancy and Metz. Our observations and analyses focus on the activity of pupils from the second to the final year, on the teachers involved in the transformation of their professional practices. Future teachers were also involved in the research training process. Regarding teachers and future teachers, it is a matter of constructing and analyzing how reflective practices are built on the exercise of the profession and the uses of the digital world, to analyze the resources and the mediations that were used, to contribute to the reflection on the development of skills and the critical attitude towards digital uses.

Some analyses we supervised (Pfeffer-Meyer, 2016¹⁵), while seeking, among other things, to show how the confrontation of a professional to his own activity will enable him to rebuild some skills, and even to develop new ones, also reveal that the challenge of professional development lies in the fact that the proposed system is partly based on the analysis of data elaborated by the professionals themselves. It is through the learning processes implemented by trainee teachers at work that their research methods originate. The challenge is to try to understand how and which professional knowledge is being constructed in these training situations.

¹⁴ In French: construction indices de professionnalisation.

¹⁵ We refer to a master thesis in Engineering Training of Trainers on the *transposition/counter-transposition* model that was put forward in relation to a research-intervention-training device entitled *Documentation et Ulis* that we have implemented.

We have accompanied A., a trainee teacher¹⁶ in research initiation on the flipped classroom theme, in the Métiers de l'Éducation et de la Formation (MEF) Enseignement Professionnel et Technologique training programme. At the same time, we initiated an action-research¹⁷ with the teachers in the experimental establishment that had agreed to open its doors to A. so that he could carry out his data collection.

During a study day¹⁸, we proposed to the collective some traces made by the trainee teacher in his professionalization process (with his agreement). Some teachers had agreed to open their classrooms to this student. Our analysis is now based on the traces produced by the trainee teachers A. by focusing on the perception that he builds on the work he is doing and through his own analysis of this flipped classroom method.

4.1. Focus on the flipped classroom as a method

A. talks about a flipped classroom method. He writes: “I was able to attend classes in flipped classroom at the high-school where I met the teaching team who initially set up this method. It is a pilot high-school since it has been implementing the flipped classroom method for several years by producing videos containing new knowledge that the pupils must appropriate for themselves before the session begins”.

We will see, with the group of teachers, that the question is not settled, some using the term of *method*, while others prefer *pedagogical form*. This phenomenon can be found in the scientific literature. It must be said that at this level, there is a whole body of literature around Bloom's taxonomy (1982), the flipped classroom model being often designed in relation to Bloom's pyramid, which is then *inverted* (Williams, 2013).

It should be remembered that the primary purpose of Bloom's taxonomy on educational objectives is to categorize the levels of intellectual activity sought by the objective. By following the progression of Bloom's pyramid levels, from the simplest to the most complicated, we logically organize the succession of learning sequences. This vision is very open to criticism. Is it easy to distinguish the complex from that which is not? If something applies to one subject, does it apply all the same for another? Staying with a *level* logic is a problem (Frisch, 2016b). This raises the question of the choice of reference models that we make for our daily practice. And it should be an object of training for professionalization.

4.2 Focus on the synoptic of a flipped classroom in a history course on romanization

A. proceeds in stages. For example, he shows us the synoptic he has developed, which he calls “synoptic of a flipped classroom in a history course on romanization”, along with a video overlay. For each stage of the work he describes, there is a draft analysis (Figure 2).

¹⁶ In French: enseignant stagiaire.

¹⁷ Since 2017, we have been supervising a team of teachers in a high-school action-research entitled *Digital technology and education: knowledge, devices, pedagogical and didactic practices in and for the reverse classroom*.

¹⁸ Held on November 21, 2017 at MSH Lorraine (House of Human Sciences).

Synoptic of an flipped classroom session in a history course on romanization		
Step	Picture	Designation
1. Room organization Contextualizing. (video 1)		Traditional room, not adapted to the flipped classroom. Group work should be facilitated by organizing the space so that pupils can exchange more easily. The teacher arrives first in the room and prepares the pupils' entrance.
2. Creating the work stations (video 1)		A pupil enters first to organize the room in several work stations (islands) of four tables (10 mn). The space is designed to bring pupils together; the teacher can move more easily from one group to another.
3. Pupils settling in (see video 0 to understand the room organization and how people are seated)		The pupils enter the room, settle in the work stations, by affinity. They take their stuff out to work, including the digital tablets (10 mn).
4. Presentation of the activity (video 2)		The teacher introduces the activity to the class. He/she projects the instructions on the board and tests the pupils' prerequisites to allow the activity to begin.
5. The activity (videos 3, 9).		The pupils engage in the activity, the teacher goes from work stations to work stations to help them. He also ensures the progress of the activity.
6. End of the session (video 10).		The teacher ends the session with an oral summary of the topic discussed during the session. Pupils take notes in their notebooks.

Figure 2. Synoptic table of a flipped classroom.

4.3. Focus on the interviews conducted by the intern with his pupils

We took three video recordings made by A., which includes a corpus of eight pupils, then we transcribed them in their entirety. The working theme is the romanization of the empire. On the first two video recordings, which last about three minutes, we stay with the same pupils. A group of high-school pupils are working in groups of four. They have paper documents in front of them, and a computer. Two boys essentially took the floor. And this time, we focused our researcher eyes on the pupils' understanding of the activity, on their use of digital technology, on their interest of the method proposed to them by the teacher, and their relationship to knowledge. We are inside the flipped classroom, in a history lesson. A. is the intern, E1 is pupil 1, E2 is pupil 2. On almost all the video recordings, we note that the pupils are globally motivated and trying to do well.

How the trainee teacher (intern) builds his analysis indicators	Exchange between trainee teacher and pupils' understanding of the activity
Examples of appropriation of the instruction:	A: "Go ahead whenever you want" E1: "For this activity, we have a debate to do, a debate of one citizen who is against romanization and a citizen who is for romanization, and we must recreate a debate, invent the words, tell the arguments against and for romanization."
Examples of appropriation of knowledge in relation to the themes which were worked on:	A: "We asked you to look at some contents before you came in today." E1: "Yes, we were asked to watch <i>Romanization in the Empire</i> . We learned a lot about what Romanization is, like Emperor Caracalla in 212 that allowed all free men to become citizens." A: "Was that a video capsule?" E1: "Yes, it's a video capsule."
Example of mediatized knowledge, and appropriation of the device: The pupil sitting next to another pupil takes the computer and shows A. the web address.	E2: "As we can see on the <i>essalc.fr</i> website, we can see that the teacher has shared a video that we can watch at home at any time if we have memory gaps or something like that."
Example of interest of collective work: Pupils underline the interest of collective work. Pupil 1 takes the floor again.	E1: "We had a multiple choice question to do on this video, which allowed us to get ahead of ourselves on the knowledge, on today's activity. So now we come in here, we already know." A: "And working in a group like this, how do you experience it compared to a traditional class?" E2: "I think it's much better because there are already four brains working so we have a lot more knowledge. I think it's going faster in activity than on our own." E1: "For example, people who are not very fluent in speaking or expressing themselves or in doing things on paper. Some people would be better able to do it, it would help them like that." A: "Ok, fine."

Figure 3. Interviews conducted by the intern with his pupils.

5. Conclusion

Our approach remains human-centered. It is complex insofar as it conceives the evolution of professional practices, whatever they may be, by making different elements interact together, in a constructive and integrative way. It is not a matter of privileging a way in, but of linking several different ones to try and make sense. It is therefore necessary to develop skills for characterizing different types of knowledge, of understanding, to have to use models and concepts, including emerging ones, in order to be able to think and analyze one's own activity or that of others.

Today, within universities, the expression "pedagogical innovation" has taken over. Very little is said about "didactic innovation". However, it is also the teacher, including at the university level, who questions his didactic repertoire to support the learner in his/her process of learning. If school teachers and teacher-researchers are to be working in teams to help advance questions on the evolution of practices, particularly regarding digital technology, media and information, it must not only be about spreading good practices. It must be about reconsidering the different professional paradigms and the complexity of the work which connects research-action-training.

Bibliography

- Astolfi, J. P. (1992). *L'école pour apprendre*. Paris: ESF.
- Astolfi, J. P. (2008). *La saveur des savoirs. Discipline et plaisir d'apprendre*. Paris: ESF.
- Astolfi, J. P., Cornaz, L., & Drouilly, F. (1989). *Existe-t-il des révolutions en pédagogie?: Actes de la session d'été de l'Institut supérieur de pédagogie, les 3, 4, 5 juillet 1989*. Paris: Institut supérieur de pédagogie.
- Béjean, S., & Monthebert, B. - Ministry of National Education, Higher Education and Research (2015). *Pour une société apprenante. Propositions pour une stratégie nationale de l'enseignement supérieur*. <http://www.enssib.fr/bibliotheque-numerique/documents/65855-pour-une-societe-apprenante.pdf> (ver. 15.07.2018).
- Bishop, M. F. (ed.). (2012). *Approches interdisciplinaires et intelligibilité des contenus. In Les Didactiques en question(s). Etat des lieux et perspectives pour la recherche et la formation* (pp. 240-258). Bruxelles: De Boeck.
- Bishop, J. L., & Verleger, M. A. (2013). *The flipped classroom: A survey of the research*. Paper presented at the 120th American Society for Engineering Education Annual Conference and Exposition, Atlanta, GA.
- Bloom, B. S. (1982). *Taxonomie des objectifs pédagogiques*. Montréal Qué.: Presses de l'Université du Québec.
- Clenet, J. (2008). *Modèles et modélisations en recherches qualitatives, quelles conceptions? Quelle(s) scientificité(s)? Recherche qualitative*, 6, 24-43. http://www.recherche-qualitative.qc.ca/documents/files/revue/hors_serie/hors_serie_v6/hs6_clenet.pdf (ver. 15.07.2018).
- Cosnefroy, L. (2015). *Etat des lieux de la formation et de l'accompagnement des enseignants du supérieur*. Lyon: ENSLyon/Institut Français de L'Éducation. <http://ife.ens-lyon.fr/ife/recherche/enseignement-superieur/enseigner-et->

[apprendre-dans-l2019enseignement-superieur/rapports-et-etudes/etat-des-lieux-de-la-formation-et-de-l2019accompagnement-des-enseignants-du-supe301rieur](#) (ver. 15.07.2018).

- Cristol, D. (2014). *Former, se former et apprendre à l'ère du numérique. Le social learning*. Paris: ESF.
- Frisch, M. (ed.) (2014). Conclusion. In M. Frisch *Le réseau IDEKI. Objets de recherche d'éducation et de formation émergents, problématisés, mis en tension, réélaborés* (pp. 377–379). Paris: L'Harmattan.
- Frisch, M. (2016a). *Emergences en didactiques pour les métiers de l'humain*. Paris: L'Harmattan.
- Frisch, M. (2016b). Démarches, modèles et concepts en didactique de l'information-documentation. *Tréma, Modèles et didactiques*, 45, 43–57.
- Frisch, M. (2016c). *Didactique de l'information-documentation et développement d'une posture de recherche: émergences-cheminements-constructions de savoirs et didactiques pour l'éducation. L'apprentissage et la formation, dans les métiers de l'humain et en intelligence collective*. Mémoire d'Habilitation à Diriger des Recherches. Université de Haute-Alsace, France.
- Frisch, M. (2017). Didactique de l'information-documentation: émergences, interaction et convergences avec les environnements informatiques pour l'apprentissage et les métiers de l'humain. *Conférence sur les Environnements Informatiques pour l'Apprentissage Humain 2017*, 388–390. Strasbourg: EIAH, <http://eiah2017.unistra.fr/wp-content/uploads/2016/10/Actes.pdf> (ver. 15.07.2018).
- Golloubieff, B. (2018). La pré-problématisation, un instrument pour accompagner le processus de professionnalisation en formation dans les métiers de l'humain. In M. Frisch (ed.). *Constructions de savoirs et de dispositifs* (pp. 155-174). Paris: L'Harmattan.
- Guilbert, J. J. (2001). L'ensorcelante ambiguïté de savoir, savoir-être et savoir-faire. *Pédagogie médicale*, 2(1), 23–25.
- Levy, P. (1997). *L'intelligence collective: pour une anthropologie du cyberspace*. Paris: La Découverte.
- Liquète, V. (2015). *Pre-report concerning our habilitation to conduct research. Didactics of information-Documentation and development of a research posture*. Mémoire d'Habilitation à Diriger des Recherches. Université de Haute-Alsace, France.
- Martinand, J. L. (1989). Pratiques de référence, transposition didactique et savoirs professionnels en sciences et techniques. *Les sciences de l'éducation*, 2, 23–29.
- Morin, E. (2004). *La méthode*. Paris: Le Seuil.
- Morin, E., & Le Moigne, J. L. (1999). *L'intelligence de la complexité*. Paris: L'Harmattan.
- Oberle, D. (2016). Bien raisonner ensemble s'apprend. *Cerveau & Psycho*, 78, 44–47.
- Pastré, P., Mayen, P., & Vergnaud, G. (2006). La didactique professionnelle. *Revue française de pédagogie*, 154, 145–198. <http://dx.doi.org/10.4000/rfp.157> (ver. 15.07.2018).

- Paivandi, S. (2016). *Articulation et collaboration entre les équipes pédagogiques et les services de documentation au cœur de la transformation pédagogique de l'enseignement supérieur*. Laboratoire interuniversitaire des sciences de l'éducation et de la communication (LISEC). <http://www.enssib.fr/bibliotheque-numerique/notices/67094-articulation-et-collaboration-entre-les-equipes-pedagogiques-et-les-services-de-documentation-conclusions-du-groupe-de-travail-juillet-2016> (ver. 15.07.2018).
- Pfeffer-Meyer, V. (2016). *Professional and didactic development: characterization of professional knowledge resulting from the practice of teacher-documentalists*. Master Thesis, Université de Reims Champagne Ardenne, France.
- Rogalski, J. (2005). Le travail coopératif dans la résolution des tâches collectives. In J. Lautrey & J.F. Richard, *Traité des sciences cognitives: l'intelligence* (pp. 147-159). Paris: Hermès.
- Olfa Zaïbet, G. (2007). Vers l'intelligence collective des équipes de travail: une étude de cas. *Management & Avenir*, 14(4), 41–59. <http://dx.doi.org/10.3917/mav.014.0041> (ver. 15.07.2018).
- Williams, B. (2013). Picture “*How I flipped my classroom*”. NNNC Conference, Norfolk (NE). <https://nextgenerationextension.org/2013/10/01/blooms-and-the-flipped-classroom/> (ver. 15.07.2018).