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THE USE OF VIDEO RECORDED CLASSES TO DEVELOP TEACHER PROFESSIONALISM: THE EXPERIMENTATION OF A CURRICULUM

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The paper presents an investigation aimed at validating the hypothesis that the teaching workshops in teacher training degree courses, in which videos are used as a supporting strategy, can foster the development of students' professional vision.
Since several studies highlighting the advantages of the use of videos exist, yet there is less literature that describes the educational procedures to be used, the aim of the research is to present a tried-and-tested curriculum for teacher professionalization that involves, over the time span of 5 years of initial training, the alternation of theoretical lectures, internships, and

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workshops in which the use of videos has specific goals each year.
The research is framed within a qualitative approach using a control group, post-test only quasi-experimental method to address the effectiveness and the impact of the use of video recordings during a prospective teacher training program. The research involved students from the University of Macerata as the experimental group and students from different Italian universities as the control group.

1 Introduction

It has long been recognized that teacher training is a complex process, one that presents a recursive relationship between theory and practice. For this reason, mere theoretical knowledge is not sufficient to make prospective teachers become reflexive professionals (Altet, 2003; Borko, 2004).

Teachers need to rely on a rich pedagogical and educational reference framework (Merieu, 2007), that is, principles (Gagnè *et al.*, 1992; Merril & Twitchell, 1994; Wilson, 2005), approaches and strategies (Bonaiuti, 2014; Calvani, 2014; Hattie, 2008), knowledge that is referred to by Altet (2003) as "to teach"[1]; besides teachers need knowledge "of the teaching process" and knowledge of practice (*ibid*). This is the kind of knowledge that comes from experience and that allows individuals to organize what they know and take context into account. In the same way the recursivity theory-practice needs those processes that let you re-analyse the practices through the known theories. Seidel and Stürmer (2014) talk about "explanation" to mean the ability to "use what one knows to reason about a situation. This means linking classroom events to professional knowledge and classifying situations according to the components of teaching involved" (p. 746). Van Es and Sher talk about "annotation" that involves making connections between specific events and broader principles of teaching and learning (Van Es & Sherin, 2002). If it is true that this kind of knowledge "takes shape thanks to the situations"(*ibid*) it is necessary to understand if and how it can be learnt, or if and how it is possible to foster its learning (Blomberg *et al.*, 2013; Lampert & Graziani, 2009; Reay *et al.*, 2001).

In such a direction, in our view, a key concept is alternation (Vanhulle, 2007), a proteiform concept applicable to both the recursive relationship between theory and practice (alternation as concept), and to recursivity between reflection in the classroom and work done at school (alternation as tool). A research run by Altet (2003) shows the presence of three students' positions with respect to the relationship between theory and practice: "instrumental" (mechanical relationship), "professional" (knowledge is the result of a distancing from and a reflection on action and provides a support to make the action meaningful) and "intellectual" (the pleasure of knowing). The "professional" position is favored if "theoretical knowledge is proposed during the sequences

[1] "Scientific, educational and pedagogical knowledge, resulted from the research in the human sciences" (Altet, 2003).

of analysis of the practices to let students approach the situations and make them understandable" (Altet, 2003).

That practice can be an application of theory and that mere observation in practice can produce such knowledge are both outmoded notions. Durant & Filliettaz (2009), starting from an enactive approach, state the presence of two approaches. The first aims at building bridges to connect two distinct aspects, proposing intermediary concepts such as the "conceptualistion dans l'action" or "les savoirs d'action", the other aims at blurring the difference between theoretical and practical knowledge, so knowledge as a whole would be a knowledge of action and could be conceptualized "just" after the action has taken place, since it is incidental to it.

Such processes make it possible to produce generalizations of what is happening (from practice to theory) or to recognize the traces of more general processes in what is happening (from theory to practice). In this way, embodied theory can be captured in practice through intermediate artifacts, considering that the procedures in practice are not "pure" forms as in the theoretical statements. The process of identification is not, therefore, a mechanical process, but one of mediation. There are two reasons for this:

The constraints of any context modify and personalize the general principle in situated forms, so the situation gives shape to the principle and produces "a sequence of transformations of pedagogical/didactical theories so that they become applicable to decide the teaching activities" (Magnoler, 2012, p. 67);

A plurality of principles intertwine at the same time in the action, those principles are often opposite and they cooperate and interact.

Pastrè (2011), recalling Vergnaud, who had himself used Piagetian action schemas, refers to pragmatic and pragmatized concepts; Vinatier (2009) refers to the "organizational concepts" of the action. Passing from the Francophone world to the Anglophone one, patterns can be seen as mediation artifacts between the principles and their reification in action, that is, ways in which the procedures are conceptualized (Laurillard, 2014; Mor *et al.*, 2014). A contribution in this direction comes also from recent researches in the neurosciences (Iacoboni, 2008; Rizzolatti & Sinigaglia, 2006).

The process of alternation between theory and practice requires the explicitation of the procedure when it is common to a family of situations and when it is firmly rooted in practice, and this happens in the planning phase (Rossi, 2014) and in the action analysis phase. A fundamental step for teacher professionalization thus consists in the identification of the forms that are suitable to make the conceptualizations of the actions explicit.

Most authors agree that knowledge is required as a toolbox for teachers, but there is some disagreement on the concept of context. Some authors believe that it is possible to define prototypical situations and, so, to identify in what

context each principle works. According to other authors, however, context is a composite of the "state" and the event (Fechner, 2009) and, in this sense is not always possible to give a priori indications as to which principle to apply in a given context. If we take as valid this second option in teacher training there is a need for training courses that can implement the competences for observing, understanding and anticipating educational action (Seidel & Stürmer, 2014) and to make prospective teachers able to plan the pathway and make decisions in action.

Seidel & Stürmer (*ibid*) problematize the relationship between the act of observing, understanding and anticipating and wonder if the three processes are the three aspects of the same process or if they are distinct, even if interdependent. In our approach we believe that the three processes are strongly integrated and recursive, and they do not adhere to any predetermined diachronic sequence. The act of observation is not neutral, but "guided" by comprehension and by anticipation. In the same way, as neuroscience researches highlight, anticipation is embodied in the complex processes of analysis and decision. Berthoz (2012) refers to anticipation as one of the characteristics of "simplexity"[2] and Frith (2009), starting from the researches in neurosciences, connects anticipation to prediction and states that prediction is part of the process of knowledge. Finally, as reported by Rivoltella (2014), prediction is one of the characteristics of the complex process of learning.

In order to train prospective teachers to the process of observation-comprehension-anticipation the concept of alternation is central. Alternation is to be seen here as a tool and it implies the alternation between classes in university settings and internships at school.

Lampert (2010) had stressed the importance of the practice of internships in teacher training, but she also criticizes those who state that the mere presence in a classroom would be enough to highlight and comprehend significant techniques. She suggests that better results are obtained if students have developed "teaching behaviors" in lab settings before experimenting them during internships in real classrooms. To this end she proposes three dispositfs for alternation: actual setting (real classroom), designed setting (reconstructed environment) and virtual setting (digital environment) and among this last she mentions the use of classroom recorded videos.

[2] "The word connotes the remarkable fact that biological devices, or processes, appeared in the course of evolution to allow animals and people to survive on our planet. Given the complexity of natural processes, the developing and growing brain must find solutions based on simplifying principles. These solutions make it possible to process complex situations very rapidly, elegantly, and efficiently, taking past experience into account and anticipating the future". (Berthoz, 2012).

2 The use of recorded videos for teacher training

Videos can be watched by multiple subjects at the same time and create a potential context of dialogue among different observation points (Goldman, Roy Pea *et al.*, 2009).

The efficacy of videos depends on how they are integrated into the training pathway, intended as an curricular element (Saego, 2004); specifically it is important to pay attention to the objectives of the activities based upon the use of videos, the adopted approach (Blomberg *et al.*, 2013, Seidel *et al.*, 2013) and the modalities in which they are used, the different typologies, without losing sight of the constraints of their use and the need to align assessment to the objectives set (Blomberg *et al.*, 2013).

The first aspect to be taken into consideration is the objective, and we also need to consider if we want to choose our own video recorded classes or recordings of other teachers (Seidel *et al.*, 2011). Another aspect that can be relevant is the choice of using exemplary educational practices that could mediate new competences, or daily practices that actively involve prospective teachers since they can identify with the role. The range of choices is wide, encompassing "vidéos-vérité" (Carbonneau & Hétu, 2006), daily classes at school (Clarke *et al.*, 2008), examples of best practices rarely observed in class (Seago, 2004), and first teaching experiences (Santagata & Guarino, 2011).

It is also necessary to take into account the length of the video to be analyzed: videos of a whole class (Rosaen *et al.*, 2008; Santagata *et al.*, 2007), of a whole course (Lampert, 2001) or shorter clips (van Es & Sherin, 2002) can all be shown.

3 Teacher training for primary school: the use of videos in the workshops for initial training

The process described here is the result of different experiences that have been activated over the last 9 years and optimized at the Department of Education, Cultural Heritage and Tourism of University of Macerata (Italy) and the outcome of the debates on the role of educational action and the role of videos run for some years by different Italian universities (Catholic University of the Sacred Heart, Milan; Bicocca University, Milan; University of Turin; University of Genoa; University of Perugia; University of Bari; University Suor Orsola Benincasa, Naples; University of Salerno) developing an exchange with foreign, mainly Francophone realities.

In Italy the course in teacher training for primary school is organized around three patterns: theoretical lectures, workshops and internships at school. The workshops are meant as opportunities for the students to be actively involved in

assignments that imply a recursivity between theory and practice and a moment to reflect on the internship. At Macerata University the workshops in Didattica Generale – Educational Theory and Method– are included in the first, third and fourth years of the course of study, and in all of them videos are used as support for teacher training. The workshops are run under the guidance of professors and expert school teachers[3]. The first workshop is focused on professional vision, the second on educational action and on the planning of teaching action, the third on professional identity.

Here follow the objectives of the above-mentioned workshops:

- First year: Students will be able to identify the lexicon of educational theory and methods and the main techniques and principles present in the literature; they will also begin to appreciate the complexity of the classroom and will be able to identify the main rationales with which the teacher organizes and manages action;
- Third year: Students will be able to identify the elements that structure the pattern (objectives; disciplinary content; time; space; mediators; activities; assessment processes; etc.) and analyze the underlying rationale in order to understand how the teacher manages and modulates the teaching process to develop pupils' learning;
- Fourth year: While analyzing teaching practices, students will be able to identify "objects" with which they will conduct researches to extend and improve their professional and personal development perspective.

4 The research hypothesis

Since the implementation of the 2011-12 teacher training reform, only the first year workshop has arrived at a stable form since it has been tested in the current version four times. In the present contribution, attention is focused on this workshop and on experimental data. The study starts from the belief that there is a great deal of interdependence between the three processes (observe-comprehend-anticipate), and between the definition of explanation (Seidel & Stürmer, 2014) and annotation as reported in the introduction. The hypothesis that the experimentation aims at validating is that the laboratories of didactics in which videos are used as a supporting strategy, foster the following students' skills:

Hypothesis 1*: to connect theoretical knowledge to specific educational interaction events or to specific actions of the teacher;*

Hypothesis 2*: to capture the teaching/learning process as an interactive process rather than having a causalist perspective;*

[3] Professor is the faculty in charge of both the theoretical course in didactics and the laboratory. Teachers, instead, are primary school teachers who applied to have a part-time commitment at University to support the reflection on practices.

Hypothesis 3*: to identify the goals and objectives that the teacher's actions could achieve, anticipating the possible results of the activities.*

5 The first year workshop: the syllabus at the University of Macerata

The workshop is organized in six meetings each of 4 hours duration. The first meeting is focused on students' naive conceptions on teaching and learning. Students are required to create a collage that represents a metaphor to reify the twin concepts of teaching and learning. This artifact will not be commented upon by professors.

The following four meetings start with a viewing of a recorded video about a school class activity. Firstly, the video is analyzed by the professor and the expert teachers. The teacher who was video recorded is also present to make her/his motivation explicit and to reflect on the actions taken. In a second part of the meetings students analyze another video working in small groups (4 students) and then discuss their analysis in a bigger group (20 students) with the presence of the teachers. "Vidéos-vérité" are used and each video lasts about 10 minutes. The Conversational Framework (Laurillard, 2014) is used as a theoretical framework and some concepts that are connected to it such as the TLA (Teaching Learning Activities) and patterns (*ibid*). Moreover four axes have been identified (tied to epistemology, value, didactic engineering and learning development) (Rossi & Pezzimenti, 2012) that are interwoven in the teacher's actions.

Each meeting is dedicated to the analysis of a different typology of class: the lecture, the conversational class and the group work class.

In the last meeting, finally, the collages created by the students during the first class of the workshop will be modified. The last hour is dedicated to assessment and consists of the analysis of a "vidéos-vérité", a new ten minute video that students are required to comment upon following given questions:

1. What characteristics of the environment did you notice? What kind of class is the teacher running?
2. What are the goals of the class? What objectives can you identify?
3. How is the class organized, that is, how many activities/patterns can you identify in the video? List them and find interactions among them:
    - elements tied to epistemology
    - elements tied to values;
    - elements tied to didactic engineering;
    - elements tied to learning development.

6 The research design

Sindelar *et al.* (2014) presents a review of the literature on instructional pedagogies in teacher education, an area in which research has developed from studies whose main objective was to identify discrete and measurable teaching behaviours that could affect learning to current trends of investigation where the complexity of the teacher/student interaction becomes the focus.

This conceptual change has affected the choice of the research methodological approaches and, specifically, "empirical findings on the use of video technology and hypermedia were derived from qualitative, quasi-experimental and mixed methods research design" (p. 166).

The investigation is framed in a qualitative approach using a nonequivalent control group, post-test only quasi-experimental method to address the effectiveness and the impact of the use of video recordings during a prospective teacher training program.

A two-group design involved the use of a control group and of an experimental/treatment group.

The experimental group is formed by students attending the first year Educational Theory and Methods workshop at University of Macerata who followed the learning pathway described in the previous section; the participants in the control group were students who are enrolled in either the first or the second year of the same degree course in different Italian universities.

In our case the control and the treatment group differ not only in terms of teaching methodology used during the Educational Theory and Methods workshop (the wide use of video recordings as an independent variable), but also in other aspects, known differences consisting in the different professors the groups had and, consequently different training content, and unknown/unknowable aspects such as students' prerequisites and attitudes (Campbell & Stanley, 1966; Cook & Campbell, 1979, Creswell, 1998).

Researchers attempted to control differences using the "matching method" (Grey, 2014), that is, using similar groups on variables that can be controlled such as the number of participants in each group (about 70 people both in the experimental and control group), the year of the course (students in both groups are in the first/second year of the primary school education degree program.

As a method of data gathering an open-ended questionnaire, consisting of the first two questions reported in the previous section, was submitted to the control group after viewing a 10 minute video, a "vidéos-vérité" showing an extract of a primary school history class.

Textual documents were subjected to a content analysis that consisted in a process of progressive coding and triangulation of data.

Triangulation is here to be understood as a procedure that involved the use

of two different techniques: triangulation between the different sources and triangulation between the researchers and involved both the experimental and control group data. Regarding the triangulation between researchers, it is to be stressed that just two of the researchers involved in the analysis were also involved as teacher/tutor of the course in the experimental group while the others had no role in the training.

A qualitative data analysis software was used to perform the coding process, the triangulation and interpretation of data (WebQDA software: https://www.webqda.com/).

The use of triangulation among researchers with a different level of involvement with the experimental group (teacher, tutors, no role) along with the use of a software contributed to maintaining the required balance between two contrasting attitudes: "go native" (embracing the perspective of the participants) and "feel strange" (keeping a detached point of view).

The data were coded with both a descriptive classification and interpretative categorization of each document.

The descriptive coding embraced the whole "source" document connected with a single student and had one level of classification: be part of either the experimental or the control group (see Figure 1).

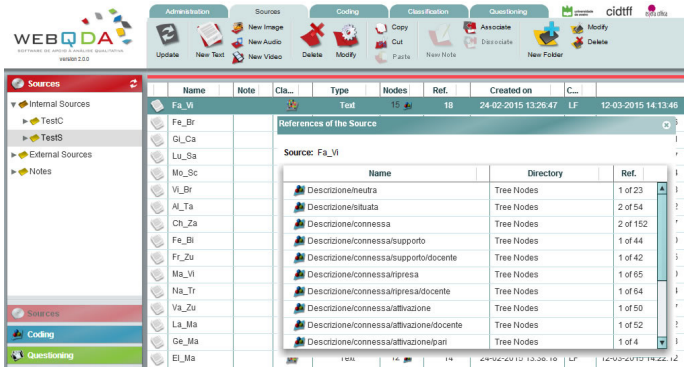

Fig. 1 - Screenshot of the data of the experimental group with a zoom on a single coded source.

The interpretative coding involved the creation of categories that were identified and negotiated between the researchers during the process. The categories were applied to single portions of documents such as single open answers in the test or single paragraphs in the same answer. Those portions of text were the unit of analysis (Bardin, 2000) with a global qualitative approach (Losito, 2002). The units were coded into different categories described in the data

analysis.

7 The data analysis

The analysis will focus on the three hypotheses.

Hypothesis 1: connecting theoretical knowledge to specific educational interaction events or with the teacher's actions

In order to validate this hypothesis we analyzed the first question: "what characteristics of the environment did you notice? What kind of class is the teacher running? ". Three main categories were identified: "neutral description", "situated description" and "connected description" (with different sub categories) (Figure 2).

Fig. 2 - Screenshot of the software interface: the "tree nodes", that is, the interpretative categories.

Specifically:

- the neutral description is related to the description of the classroom and of the activities that is not connected to the specific context of the class even if it can be detailed. Example: "the classroom is rather narrow, long and well-lit. The students' desks are arranged in two rows (in each row there are two or three desks) and the teacher's desk is located on the right. There's a blackboard and a set of posters hung on the wall" [Vi_Br];

- the situated description is the description of the environment and of the activities connected to the specific context of the class and it stresses the elements that are useful to understand it. Example: "The video shows a history class run in a classroom in which students' desks are organized into two rows with 3 children each. Hung on the wall we can see a timeline to approach the history topic, a geographical map, and a poster about the civilization of the XXI century, etc." [Ba_Ma];
- the connected description is the description of the environment and of the activities connected to the specific context of the class when the respondent uses theoretical principles to interpret the actions in the video. Example: "This is a lecture in which the students are actively involved. In fact the class is based on ad hoc questions asked by the teacher and on the students' replies which are used to develop the topic addressed in the class." [Lu_Sa].

Data of the experimental group highlight a high number of occurrences (216) for the "connected description" in its different sub-categories (see Figure 2: *supporto*/support; *ripresa*/recall; *attivazione*/activation; *gestione spazio*/space management; *mediatori*/mediators; *clima d'aula*/atmosphere) and a smaller number for the "neutral description" (23) and "situated description" (54).

In the data of the control group we have the biggest number of occurrences (37) for the category "connected description" and then we have "neutral description" (20) and "situated description" (14).

It is interesting to show the different theoretical references addressed in the connected descriptions. The sentences in which the teacher's action is explained with a theoretical reference or with the indication of strategies reported as cornerstones in the literature have been coded through three different indicators:

- recall: when it is stressed how the action produces the connection to knowledge or practical modalities that the student already has. Example: "The teacher along with students reorganizes and synthesizes the topic in order to develop a new topic." [Fe_Bi];
- support: when it is stressed how the action produces useful strategies to provide extrinsic and intrinsic feedback; when the action is made to organize the pupils' knowledge; when the action offers support to optimize the pupils' knowledge. Example: "The teacher embraces the different definitions provided by the students and, finally, he gives back a definition of civilization." [Mo_Sc];
- activation: when it is stressed if there occur strategies able to activate the pupils and foster active participation. Example: "The teacher has organized a lecture-dialogic class making the student active through dialogue." [Ch_Mi].

Data show that the situations mostly coded as a "connected description" in the experimental group are the ones related to strategies of "recall" (65) followed by "activation" (50) and "support" (44): in the control group we have a significantly lower number of occurrences where most used here are also "recall" (11) followed by "activation" (8) and support (4).

In the analysis, we have also highlighted the linguistic connectors with which the participant makes explicit the connection between the act and the related theoretical principle.

From a linguistic search (argumentative connectives which implies adverbs, conjunctions and phrases) and a contextual analysis of their occurrences in the whole portions of texts submitted by the two groups (experimental and control) a significant difference emerges: a large percentage of the experimental group students' data demonstrates that students describe the actions made by the teacher in the video offering connotations which show a tentative contextualization of the action itself. The action is framed in a specific time and space of the class and students try to interpret them as teaching strategies activated by the teacher linking them to the potential advantage for the pupils' learning.

Some examples are the following:

"The teacher, thus, reorders the concepts expressed by children so that they appear clearer and, thus, understandable." [So_De];

"The class is a lecture but also interactive, the contributions of children are, in fact, relevant and the teacher uses them as a basis for his class. He directs children towards the objectives that he had previously planned." [Il_Pe].

Hypothesis 2: appreciating the teaching/learning process as interactive rather than causalistic

The data show the presence of both exemplifications of causalistic relationship between teaching and learning, and descriptions that can highlight an interactive relationship between the two processes. Expressions such as "the teacher makes students understand what civilization is"; "the teacher acts so that children cooperate in the discussion"; "the teacher makes significant learning possible"; "the teacher makes children acquire basic concepts on the topic" are examples of the first case (causalistic).

Expressions such as "the teacher asks questions about the topic activating in this way the students who reply and he reorganizes their answers correcting them and/or confirming them"; "the teacher asks questions to students to involve them and recall the topics of the previous class"; "the time was used in a balanced way between contributions by the teacher and by the students; several times the teachers' statements are completed by students" can be associated to the concept of mediation. In this case, the action is described by

highlighting what each actor does. Reciprocal interaction is not negated, but the two processes of teaching and learning are seen as autonomous and not deterministically related.

In the experimental group, sentences characterized by statements such as "the teacher makes students learn/understand; etc" showing a causalistic relation are present in just 15 documents out of 71, while in the control group's data we have 32 occurrences in 65 documents.

Hypothesis 3: identifying the goals and objectives of the teacher's actions anticipating the possible results of those actions

With regard to the third hypothesis, the data gathered with the second question of the questionnaire about goals and objectives were analyzed.

The approach used in the workshop run at the University of Macerata, in which the four axes (epistemological, value, didactic engineering and learning) were approached, also let students identify objectives and goals not connected with contents. Specifically, students stressed that some teacher actions were aimed at the social and civil development of students (respect for the other and of diversity, civil responsibility, democracy) and their personal development (autonomy, responsibility, orientation). They also identified, along with objectives connected with knowledge of the topic and disciplinary epistemology (for example: be able to build a timeline, to be able to locate events in the timeline, to comprehend the role of water in the development of society, to know the definition of society), other objectives connected with social competencies (the student waits for his turn in the conversation, he is able to listen, he respects the rules in class).

In relation to this hypothesis it is more difficult to compare the two groups' data (experimental and control group) since the definitions of what an aim and an objective is could be different. Data from the control group show that the two elements are often used as synonyms and many students failed to provide a full answer to the question. However, it is possible to state that often the content itself of the class is seen as a goal/objective, in most cases epistemological aspects are stressed. Finally, while none of the documents of the experimental group reveal judgments about the teacher's behavior, in some cases of the control group responses (about 10%) there are statements related to judgment/evaluation of the action itself.

In other words the use of videos seems to have promoted an attitude to try to comprehend the motivation behind the teacher's decisions based on the specific context and situation rather than expressing evaluations about the teacher (Example: "the teachers shows difficulties in managing the students' contributions, his posture shows insecurity and hesitation, we could define his behavior

nervous, not available to satisfy the students' needs).

Conclusion

The data confirm what is present in literature about the use of video-recorded classes for teacher training and professional vision. Even if the control and the experimental group are non equivalent, as commonly happens in quasi- experimental research, the data let the authors identify as well some differences in respect to training typologies in which videos are not used: an interactive relation between teaching and learning versus a causalistic vision; the identification in the educational action of processes connected to social competencies and individual development, and not only epistemological aspects; an analysis that could lead to the comprehension of the teacher's thinking (that is understanding how teachers have designed and have taken decisions) versus a judgment approach (teachers did well or not).To summarize, what seems to be relevant from the data is that the use of videos, from the first years of teacher training, makes it possible to capture the holistic aspects of the educational action.

The work on metaphors addressed in a different contribution (Rossi & Pezzimenti, 2012) to acquire awareness of naive conceptions about teaching and learning when students start the degree course is not secondary.

The development of the research aims at two processes: comparison with the results from international scientific research, and on the other hand a continuous process of optimization of the curriculum. To this end, a longitudinal analysis will be run involving students in their five years of study at the University of Macerata. How does the students' professional vision evolve while they start their internship at school, face the disciplinary courses and follow all the classes and workshops?

What tools should be activated reconcile the different educational approaches that students will encounter? How could reflections and reflexivity pathways be activated so that the differences in the approaches are seen as a rich opportunity and not as an aspect of confusion? Students are now asked to complete an e-portfolio from their first year in which they record their learning pathway and can reflect upon it. A final seminar will also be organized to reflect on the whole process and to try to understand what kind of professional teachers they wish to become.

At the same time, the continuous reorganization of the curriculum will be necessary, mainly in terms of spaces in which professors, the university context, and the school context (where internships occur) can share visions. This opportunity is meant not to delete differences in the approaches of the different professors, but surely to acquire a common language on the key themes and to focus on the concept of professionalism as a competence that allows the situated

educational action to be articulate in a profound and complex way, having a theoretical framework as a reference.

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