Teacher training contexts
Study of specific sociological characteristics

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INTRODUCTION

This study is part of a broader project, developed by the ESSA Group (Sociological Studies of the Classroom), which involved the training and analysis of the professional development of primary school teachers (Afonso, 2002) and the influence of their pedagogic practices on children's scientific development (Pires 2001). It further explores the relations which occur in contexts of in-service training (Rocha and Morais 2000), following an action-research methodology. Its main objectives were to investigate the reasons underlying the teaching performances of teachers with diverse experiences and life histories and to analyze how these performances may be influenced by training contexts with given characteristics. We wanted to ask:

a) what is the extent to which the personal, social and professional characteristics of teachers relate to each other and influence their teaching performance?

b) which modalities of teacher training have the potential to lead teachers with diverse experiences, life histories and school performances to implement pedagogic practices favourable to a higher scientific achievement among children of different social backgrounds?

c) which aspects of pedagogic practice do teachers feel are more difficult to change and/or implement in the classroom and why?

d) to what extent are teachers' professional development and teaching performance related to the acquisition of recognition and realization rules requisite to the implementation of pedagogic practices with a given scientific and pedagogic profile?

The article centres on the modalities of teacher training developed in the project. It describes how sociological relations can be characterized in teacher training contexts and extends our model for its analysis based on the same concepts that characterize our analysis of relations within classroom contexts of teaching- learning.

THEORETICAL FRAMEWORK

Conceptual frameworks of teacher training and professional development are mostly based on psychology and epistemology. Sociological literature is rare and quite superficial. Liston and Zeichner (1993) and Wilson and Berne (1999) advocate that trainers and researchers in these fields should focus on teaching as contextualized practice, highlighting its social and political contexts, paying attention to the dynamics of gender, race and social class. Focus should be upon the *what* of teacher learning and *how* teaching knowledge is held, assessed, evolves and enables practice, using clear the conceptual frameworks which identify the relation of teachers' learning to their teaching and children's achievement. We agree with authors like Anderson and Mitchener (1994) who assert that many studies have neither a consistent nor deep conceptual framework, tending to neglect school and system contexts in which teachers move and act.

Given the complexity, multiplicity and interdependence of the factors involved, we used Bernstein's (1990; 2000) model of pedagogic discourse which, with its strong, internal language of description, contains conceptual instruments applicable to distinct levels of analysis and their inter-relations. It was also possible, through the concepts of classification (power) and framing (control), to use Bernstein's theory to analyze and describe distinct processes of action-research and also to discuss their significance in teachers' development and performance.

We, therefore, start from the idea that teaching-learning processes in classrooms and teacher training involving action-research processes both represent given modalities of pedagogic practice. It is possible to use the same characterization of the power and control relations that regulate the instructional and regulative contexts of classrooms in analyses of teacher training.

We started from the assumption that power relations between teacher trainers and teachers are characterized by strong classification, given the trainer has a higher status. Their interaction is limited by their control of communication in both instructional (discursive rules selection, sequence, pacing and evaluation criteria) and regulative contexts (hierarchical rules). Framing characterizes distinct control relations. In the case of discursive rules, strong framing values indicate a training modality centred on teacher

trainers (the transmitters) and weak ones a training modality centred on teachers (the acquirers). In the case of the hierarchical rules, strong framing indicates communication controlled of teacher trainers and weak indicates more open communication where teachers have some form of control.

The nature of the discourses present in teacher training (involving intra-disciplinary and inter-disciplinary and academic and non-academic relations) must also be analyzed. Inter-disciplinary relations refer to integration of the various areas of knowledge usually present in the pedagogic and scientific training of teachers (psychology of education, sociology of education, epistemology of natural sciences, science methods). Intra-disciplinary relations refer to integration of the various contents and this reflects the level of conceptual demand required in the training process. 'Academic and non-academic' knowledge relates to the knowledges that teacher trainers present to teachers and that which teachers already have from their everyday practice. Classification will be strong whenever boundaries between discourses are well defined and will be weak whenever they are blurred, as will the relations between teacher trainers'-teachers' spaces and teachers'-teachers' spaces.

The characterization of the teacher training context should also consider power and control relations between teachers, the presence of distinct statuses between teachers, translating the legitimation of distinct 'voices', representing strong classification, their absence a weak one. With respect of hierarchical rules, communicative relations based on positional forms of control represents strong framing, open, personal forms of control weak framing.

Bernstein's concepts and theory were complemented by Vygotsky's ideas, in order to ground the options taken in the conception and concretization of the teacher training modalities. Vygotsky's (1978; 1992) ideas (Hasan 1995) about the importance of social interaction in the social construction of knowledge, together with Bernstein's theory, point out up the importance of the social relations between teacher trainers and teachers and to the need of creating social contexts favourable to them. Jones, Rua and Carter (1998) suggest the importance of working in a Vygotskian manner in the direction of teachers' level of potential development to obtain higher levels of competence.

Vygotsky's ideas are also congenial to teacher training following an action-research approach. Schon (1988) and Crawley (1998) defend the promotion of human relations which manifest creativity, critical spirit and capacity for group integration in which action-research processes serve as a continuous and dialectical experience of spiral learning where participants discover, re-discover, exchange view points, learn and teach because they investigate.

PLANNING TEACHER TRAINING

The study involved four female teachers in two primary schools located in two country towns in Portugal. Their fourth year classes (age 9–10) were socially heterogeneous in terms of gender and social class. Training was undertaken by two researchers, one in each school. We had intended to develop a joint training, in order to control the variables 'researcher' and 'scientific contents and competences to be developed' but were unable to do so. However, the researchers had followed similar academic paths in their initial and in-service training, had similar academic positions[1] and jointly developed, analyzed and discussed a training plan (the *what* and the *how*).

The implementation of the plan was preceded by a selection of themes/contents for exploration (the *what* of training) and by definition of the modality of the pedagogic code underlying the training context (the *how*). In terms of themes/contents, training included the learning of both scientific content and investigative processes and the learning of pedagogic contents of the fields of epistemology, psychology and sociology, particularly Bernstein's theory. All these procedures were discussed with teachers.

Earlier studies of the ESSA Group concerning modalities of training and teachers' performance (Rocha and Morais 2000; 2001) and pedagogic practice and children's learning (Morais *et al*, 1993, 2000, 2001) revealed the existence of parallels between the teacher training modalities most favourable to professional development and those of pedagogic practice most favourable to the scientific and socio-affective development of children of differing social backgrounds. Since one of the objectives of the research was to lead teachers to develop practices shown to be favourable to children's learning, it was important to arrange training processes with such characteristics to facilitate transfer of

knowledges, competences and attitudes. We used the same conceptual and methodological structure in the conception and analysis of the training modality and of pedagogic practice.

Our theoretical profile of the training was similar to that of the pedagogic practice to be implemented by the teachers, entailing a model of both weak and strong classification and framing. Many action-research protagonists value only the former.

This reflected also the importance we give to theorizing and jointly constructing common languages and conceptual frameworks with teachers. The difficulty of communication between teachers and researchers has been pointed out by many authors (e.g. Fullan and Hargreaves 1992; Fullan 1994; Broadfoot 1992). We believe it crucial that researchers start by sharing knowledges with teachers so that, later on, they can 'speak' the same language in the exploration of subjects, themes and problems.

The training took two years and involved two stages, more structured and intensive in the first year and more flexible and extended in the second. In the first stage we piloted the pedagogic practice to be implemented by teachers in a science teaching unit. In the second stage, the teachers implemented it over two science teaching units (State changes and Experiments with air), one at the beginning of the year and the second at the end.

The theoretical profiles of the modality of pedagogic code which characterized the first and second stages of teacher training are presented in Figures 12.1 and 12.2 for instructional and regulative contexts respectively. Power relations refer to a two degree scale of classification (C^+ and C^-) and control relations to a four degree scale of framing (F^{++}, F^+, F^-, F^{--}). We intended teachers in the second stage to have greater control over the selection and sequence of scientific and pedagogic themes/contents. We believed that we could not expect them, at the beginning, to have enough knowledge to intervene in them. In the second stage, after a period of implementing, discussing, and reflecting on practice on the basis of theoretical frameworks newly accessed, we expected macro selection and sequence to be controlled by teachers also in ways that met their motivations, interests and particular needs. In summary, then:

1. researcher/teacher trainers would have higher status than teachers, defining the characteristics of the instructional and regulative contexts of training;

2. in the first stage of training, teacher trainers would select the themes, sub-themes, activities and materials for each session, exploring them in a previously determined order. Teacher discussion would give some control at the level of micro selection and sequence. On a four degree scale, these discursive rules would be characterized by a very strong framing (F^{++}) at the macro level and by a weak framing (F^-) at the micro level;

3. in the second stage of training, more control would be given to teachers in the selection of themes, sub-themes, activities and materials for each session and in the order these would follow, that meaning a weakening of framing of these;

4. during the whole process of training, researchers would respect the pace of learning of each teacher by not setting time limits;

5. researchers would explicate evaluation criteria throughout training processes, making clear the knowledges to be acquired through discussion and detailed explanation, illustration and co-construction with teachers;

6. themes across all training sessions would be inter-related and works and activities would involve broad conceptual knowledges;

7. knowledges of diverse fields studied would be equally valued and inter-related and articulated during realization of the diverse tasks;

8. teachers' theoretical and practical knowledges would be systematically related and articulated with the scientific and pedagogic theoretical knowledge to be learned in the training process;

9. during discussion of texts and activities and consequent processes of construction of knowleges, an open relation of communication between researcher and teachers would be established;

10. all teachers would be regarded as having equal status and participation in the pedagogic relation, establishing open relations of communication between them; and

11. researchers' and teachers' spaces would be organized with no boundaries between them.

CHARACTERISATION OF TEACHER TRAINING CONTEXT

Instrument of analysis

The instrument was developed following a constructive research methodology that started with observational data collected in the teacher training context and kept a dialectical relation between these data and our conceptual framework. We constructed indicators for each one of the relations to be analyzed, with respective descriptors. Some indicators were reformulated and others created to achieve the most detailed analysis possible, selecting those most in evidence and appropriate across the analysis of the various relations. We are aware that the development and selection of observational instruments involved underlying assumptions about teaching-learning processes and about those aspects selected for analysis. We agree with Stodolsky's view (1990: 175) that '(P)rocedures are not neutral…It is better to explicitly recognize these choices' than court false objectivity '.

The indicators can be grouped in terms to the relations they measure:

i.   researcher-teacher relations concerning discursive rules (selection, sequence, pacing and evaluation criteria): learning contents; doing tasks; exploring texts/materials; assessing teachers' lessons;

ii.   intra-disciplinary and inter-disciplinary relations and relations between researcher's and teachers' knowledges: exploring/discussing themes under study; doing tasks;

iii.   researcher-teacher and teacher-teacher relations concerning hierarchical rules: communicating with others; and

iv.   relations between researchers' and teachers' and teacher-teacher spaces: organizing space; organizing materials (books, lab material, etc.); using space during activities; using materials (books, lab material, etc.).

Indicators were scaled for classification or framing by two or four relative values.

We illustrate the instrument [2] with extracts for both instructional and regulative contexts. Each is followed by excerpts from real situations that occurred in the training context

where it is indicated what degree of classification or framing was attributed to them. They may illustrate several indicators and/or several relations but should be read in the concrete context that is being evidenced.[3]

Instructional context

Table 12.1 - *Discursive rules: Selection*

INDICATOR	F^{++}	F^{+}	F^{-}	F^{--}
LEARNING CONTENTS	Researchers indicate the aspects to be studied in each session	Researchers give the contents considered to be most important, accepting teachers' suggestions	Researchers make a list of contents that can be studied, without referring priorities and asks the teachers to make a selection	Researcher ask teachers to suggest contents to be studied

Excerpts

F^{++} At the beginning of the session, the researcher states that in following sessions they are going to study various aspects of scientific processes and the competences associated with them, such as observation, experimental planning, experimenting, control of variables, formulation of problems and hypothesis, prediction … […]. She begins the theme of the first session about 'observation' […].

F^{--} Start of the second year. The researcher starts by telling teachers to indicate themes/subjects/materials/texts which they would like to explore, which may be focused on new subjects or material that they would like to see clarified or broadened. Teachers say that they are going to think about themes/subjects and will then inform the researcher.

Instructional context

Table 12.2 - *Discursive rules: Sequence*

INDICATOR	F^{++}	F^{+}	F^{-}	F^{--}
DOING TASKS	The realization of tasks follows a rigid order determined by researchers	The realization of tasks follows an order determined by researchers but which can be altered in minor aspects	The realization of tasks follows an order planned by teachers with the researcher's guidance	The realisation of tasks follows an order planned by teachers

Excerpts

F^{++} Tasks and questions were explored according to an order planned by the researcher. On the basis of a text previously given to them *Which science in the primary school?* teachers answered to some questions in small groups then carried out two tasks, identifying and observing the fluctuation of

objects in water. After the tasks were finished, the concepts involved were clarified and their adequacy to primary school children was discussed.

F $^-$ Using Bernstein's concepts, teachers characterize the relations present in the teacher training context filling in a table given to them. During the general discussion, the teachers intervene, comment, justify various aspects of the characterizing they had made. The researcher lets the teachers intervene when they wish but guides the discussion so that space relations are firstly discussed, then discourse relations and, finally, subject relations.

Instructional context

Table 12.3 - *Discursive rules: Pacing*

INDICATOR	F $^{++}$	F $^+$	F $^-$	F $^{--}$
EXPLORING TEXTS/ MATERIALS	The time planned for the analysis of texts is rigorously adhered to	Researchers indicate the time for exploring texts, but may accept justified extensions	The time needed in exploring texts is determined by teachers, but the researcher presses them to finish the work	No time determined in the exploring of texts; time depends on teachers' pacing and there is no pressure from the researcher

Excerpts

F $^{++}$, F $^+$, F $^-$ Did not occur

F $^{--}$ Teachers were to have read *Which science in primary school?* in advance and answer questions. However, before discussion started they asked for and were given time to revise and clarify some points. During the discussion, they presented doubts, discussed divergent opinions, reflected on their pedagogic practice, gave examples … The researcher did not try at any time to accelerate the pace of activities.

Instructional context

Table 12.4 - *Discursive rules: Evaluation criteria*

INDICATOR	F $^{++}$	F $^+$	F $^-$	F $^{--}$
LEARNING CONTENTS	Explanations/ discussions are very detailed and illustrated. Teachers take notes on all aspects	Explanations/ discussions are detailed and illustrated. Teachers take only notes on main aspects	Explanations/ discussions are not very detailed or illustrated and teachers take some notes	Explanations/ discussions are not detailed and illustrated and teachers do not take notes

Excerpts

F^{++} One of the teachers experienced many difficulties in correcting and classifying assessment test questions. Teachers and researcher met to analyze them. The discussion started with the classification of each of the questions in A (Acquisition of knowledge) and U (Use of knowledge). This was followed by reading the directions that had been given to teachers about answers considered to be complete and correct. Researcher and teachers discuss, for various test questions, the information more and less relevant and the mark which should be given to each one of possible children's answers. The researcher gives out a text about school assessment, so that teachers can consolidate and broaden the ideas discussed.

F^{--} The session starts with a reflection to be continued in following sessions about the issue of school success/ failure. Before starting work, teachers had read Bernstein's *Code and social class*, presenting a number of his concepts and exemplifying the concepts of code and recognition and realization rules that would be used in the sociological exploration and grounding of causes of children's success/failure experienced by teachers throughout their professional life. Discussion of the issue of school success/failure occurs but without clear reference to Bernstein's theory and concepts. Teachers did not take any notes.

Instructional context

Table 12.5 - *Relation between discourses: Intra-disciplinary relations*

INDICATOR	C^+	C^-
EXPLORING/ DISCUSSING THEMES UNDER STUDY	Subjects are studied in a non-inter-related way	Subjects are studied in an inter-related way

Excerpts

C^+ Did not occur

C^- The session was intended to lead teachers to a broader analysis of the reasons of school success/ failure and to look for lines of action to lead to the school success of all children. To do so, new concepts were introduced, such as specific coding orientation and recognition and realization rules. However, to reach an effective analysis and discussion, it was necessary to bring to the discussion other concepts like classification, framing, teachers' conceptual demand, science, simple cognitive competences, complex cognitive competences, studied in former work sessions.

Instructional context

Table 12.6 - *Relation between discourses: Inter-disciplinary relations*

INDICATOR	C^+	C^-
DOING TASKS	Tasks involve a single, specific area of knowledge	Tasks involve the articulation of distinct areas of knowledge

Excerpts

C^+ Did not occur

C^- Teachers analyzed syllabuses and textbooks in order to apply ideas developed during various work sessions and to broaden their ideas about distinct fields of knowledge (sociology, psychology, philosophy), using specific instruments.

Instructional context

Table 12.7 - *Relation between discourses: Researcher's knowledges– teachers' knowledges*

INDICATOR	C^+	C^-
EXPLORING/ DISCUSSING THEMES UNDER STUDY	There is no relation between the teachers practical knowledge and the new knowledges to be learned	Teachers' practical knowledge is frequently related with new knowledges

Excerpts

C^+ Did not occur

C^- The researcher starts the work session by asking teachers to "Reflect on the science teaching they had promoted along their professional career", suggesting "Refer to aspects you have valued and how you have valued them in science teaching. Why do you consider it important or not to teach science? What is the status you give to science when compared with other areas of knowledge, for example Portuguese and mathematics? What is the extent to which your pedagogic work has contributed to the promotion of learning of scientific knowledges by children of distinct social groups?"

Regulative context

Table 12.8 - *Hierarchical rules: Researcher-Teachers*

INDICATOR	F^{++}	F^+	F^-	F^{--}
COMMUNICATING WITH OTHERS	Privileges a vertical and uni–directional relation of communication	Privileges a vertical and uni–directional relation of communication, with some interaction between researchers and teachers	Privileges an interaction between researcher and teachers although a vertical relation also occurs	Privileges a permanent interaction between researcher and teachers

Excerpts

F^{++} Teachers and researcher analyze the subject of school success/ failure. The researcher shows a transparency with three graphs and teachers follow their description attentively.

F^{--} Teachers are doing experiments they are going to use in the classroom. They talk with each other and with the researcher, commenting on results: "The candle is very high"; "a straight balloon may give a better result"; "it is difficult to work with the clip". "I am not sure if they [the children] will be able to open it". They also ask questions: "Why is it that it functions better with some funnels than with others?" "There are water drops still falling down –Is it well sealed?"; "Will the rubber be ruined by the heating of the balloon?". They also ask the researcher for more material: "This knife does not cut well – Is there another one?"; "Are there lower tripods? They may work better".

Regulative context

Table 12.9 - *Hierarchical rules: Teacher-Teacher*

INDICATOR	F^{++}	F^{+}	F^{-}	F^{--}
COMMUNICATING WITH OTHERS	Some teachers polarise and dominate the talk	All teachers may intervene but only the interventions of some are valued	All teachers intervene but intervention of some are more frequent	There is an open and intense communication between teachers

Excerpts

F^{++}, F^{+}, F^{--} Did not occur

F^{-} The two teachers participated systematically but Inácia's interventions are more frequent than Rita's.

Regulative context

Table 12.10 - *Relation between spaces: Researcher-Teachers*

INDICATOR	C^{+}	C^{-}
ORGANISING SPACE	Clear boundaries between the spaces of researcher and teachers, evident by a different and separate working table 12. for researcher	Blurred boundaries between the spaces of researcher and teachers, evident by a researcher's working table 12. similar and next to teachers'

Only C^{-} situations occurred

Table 12.11 - *Relation between spaces: Teacher-Teacher*

INDICATOR	C $^+$	C $^-$
ORGANISING MATERIALS (BOOKS, LAB MATERIAL, ETC.)	Each teacher has her materials in a space of her own	The teachers have their materials next to those of their colleagues

Only C $^-$ situations occurred

The modalities of teacher training implemented

We measured teachers' performance at the ends of the first and second years of training on the basis of the observation records completed by the researchers during the whole process of training. They were validated by two other researchers.

Researchers' characterizations of the teacher training context were cross-checked with teachers' characterizations and with teachers' opinions[4]. On the basis of these data we characterized the training processes which actually occurred. Figures 12.1 and 12.2 show, for each set of two teachers (Rita-Inácia and Dulce-Céu[5]), across the various relations analyzed, the characteristics of their training contexts, by instructional and regulative dimensions, derived by these means and set against the theoretical profiles previously defined.

RELATION BETWEEN SUBJECTS (Researcher-Teachers) (Ci Fi)						RELATION BETWEEN DISCOURSES (Cie)		
	Power relations	Control relations (Fi) - Discursive rules				Intra-disciplinar Knowledge	Inter-disciplinar knowledge	Researcher knowledge-teacher knowledge
	(Ci)	Selection	Sequence	Pacing	Criteria	(Ci)	(Ci)	(Ce)
1st stage THEORETICAL MODEL	C^+	F^+	F^+	F^{--}	F^{++}	C^-	C^-	C^-
Rita - Inácia	C^+	F^+	F^+	F^{--}	F^{++}	C^-	C^-	C^-
Dulce - Céu	C^+	F^+	F^+	F^{--}	F^{++}	C^-	C^-	C^-
2nd stage THEORETICAL MODEL	C^+	F^-	F^-	F^{--}	F^{++}	C^-	C^-	C^-
Rita - Inácia	C^+	F^+/F^-	F^+/F^-	F^{--}	F^{++}	C^-	C^-	C^-
Dulce - Céu	C^+	F^+/F^-	F^+/F^-	F^{--}	F^{++}	C^-	C^-	C^-

Figure 12.1 – *Actual characteristics of the teacher training context in the instructional dimension (1st and 2nd stages) and comparison with the theoretical model*

RELATION BETWEEN SUBJECTS				RELATION BETWEEN SPACES (Ci)	
Researcher-Teacher (Ci Fi)		Teacher-Teacher (Ci Fi)			
Power relations (Ci)	Control relations (Fi) Hierarchical rules	Power relations (Ci)	Control relations (Fi) Hierarchical rules	Space researcher-teacher	Space teacher-teacher
1st stage THEORETICAL MODEL	C^+	F^{--}	C^-	F^{--}	C^-	C^-
Rita -Inácia	C^+	F^{--}	C^+	F^-	C^-	C^-
Dulce -Céu	C^+	F^{--}	C^-	F^{--}	C^-	C^-
2nd stage THEORETICAL MODEL	C^+	F^{--}	C^-	F^{--}	C^-	C^-
Rita -Inácia	C^+	F^{--}	C^+	F^-	C^-	C^-
Dulce -Céu	C^+	F^{--}	C^-	F^{--}	C^-	C^-

Figure 12.2 – *Actual characteristics of the teacher training context in the regulative dimension (1st and 2nd stages) and comparison with the theoretical model*

Space precludes our drawing attention other than to discrepancies between planning and actuality. In the instructional dimension (Figure 12.1), in the second stage, selection and sequence did not achieve the weak framing values planned. Despite researchers' efforts, teachers had difficulty selecting subjects, activities, materials and identifying problems to be explored and in sequencing their training paths. These aspects contradict, to a certain

extent, some lines of action-research which see teachers as a practice professionals, totally autonomous, protagonists of their own research, controlling their options, determining in an efficient way their own choices and training routes and managing without the support of external persons. We think that, at least in initial stages, particularly with respect to selection and sequence, values should be relatively strong to avoid long periods of discouragement and indecision. Our data values the role of the researcher, particularly in the initial stage of action-research, when teachers considered it important that they selected the subjects to be learned.

With respect to the regulative dimension (Figure 12.2), in the case of Rita and Inácia power and control relations were different from those intended in either training stage. Inácia evinced higher status than Rita through the frequency of her interventions and the knowledges she displayed. The action-research literature makes no reference to the possible effects of distinct teacher social statuses evident here. This was, at least partially, responsible for Rita's inferior positioning, less positive socio-affective dispositions and her greater difficulty in producing the pedagogic practice planned in the theoretical profile (Pires 2001).

FINAL CONSIDERATIONS

In any plan of teacher training variations in power (classification) and control relations (framing) may be present, giving teachers greater or smaller degrees of control of their professional development. The modality we implemented represented mixed pedagogic practice, such has been shown to be favourable to the learning of children socially varied backgrounds. It was characterized generally by weak framing and classification except for very strong framing of evaluation criteria and macroselection and sequence. This modality allowed teachers to evolve, more or less, in terms of their acquisition of recognition and realization rules requisite to the implementation of pedagogic practice favourable to their children's learning (Morais, Neves and Afonso 2004)[6].These results lead us to question some current ideas on action-research processes which, in terms of Bernstein's theory, would imply training contexts characterized by weak classifications and framings. Our research suggests that this idea needs to be rethought.

Contrary to what some action-research approaches contend, strong classification always characterizes the researcher-teacher relation. Researchers and teachers perform distinct social roles, they are part of distinct institutions, they have distinct knowledges and these aspects are intrinsic to the training context. It is the participative, collaborative and reflexive nature of action-research which corresponds to a researcher-teacher interaction characterized by open relations of communication (weak framing at the level of hierarchical rules) that masks existent hierarchies, making power relations implicit or invisible. Analysis of action-research processes that considers Bernstein's concepts of classification and framing calls attention to the crucial importance of the distinction between power and control.

The idea that teachers should have control upon all aspects of their training fails to consider the distinction between its instructional and regulative components, leading to a lack of clarification of the distinction that may exist in researcher-teacher relations between discursive and hierarchical rules. If a weakening of framing at the level of the hierarchical rules seems to be clearly favourable to teachers' performance (in discussing and confronting ideas, giving opinions, etc.), at the level of the discursive rules, evaluation criteria and even selection (at least at the macro- level), it leaves teachers without an understanding of the legitimate text to be produced, making difficult the acquisition of a specific coding orientation to that text. We conclude that control should be centred on teachers in some aspects of teacher training (e.g. pacing and hierarchical rules) and teacher trainers in others (e.g. macro-selection and evaluation criteria),

We also think that our instrument of analysis of the modality of teacher training has conceptual and methodological potential for analysis of other training contexts, based, as it is, on other instruments constructed to analyze pedagogic practices in the classroom, at various levels of schooling. It highlights the value of a research methodology based on a constant, dialectic relation between the theoretical and the empirical and reinforces the applicability and transference of the theory in which our research has been based.

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Notes

1. Both researchers had done their initial teacher training in the same university, they finished the same academic degree, they did in another but the same university for both the same master's course and their dissertation used Bernstein's theory as the reference conceptual framework for studying questions related with scientific learning. Both are teachers at Colleges of Education.

2. The whole instrument is available from Afonso (2002).

3. For example, when we present an excerpt showing a situation which corresponds to the discursive rule selection, this means that in this moment we are focusing on this aspect, although that same excerpt may be analysed in the perspective of another rule.

4. As an example, we are giving some opinions of the teachers which illustrate the values given to some of the relations analysed, supporting the characterisation made by researchers.

"Yes, I think we had the time we needed… in fact, the pace was ours"
Pacing-Teacher Rita, researcher's record.

"I think it was quite clear what was intended in each session… in the observation… in scientific rigour… in classifying leaves was not quite clear what was intended?... Sure, it was!"
Evaluation criteria – Teacher Inácia, researcher's record.

"We are always coming back… we have just done it… it is what we have been doing! For example, now… we were always coming back… when we talked about teachers' conceptual demand we related it with the level of demand the teacher sets, for example, with planning and doing experiments… it is not "to pour some drops"… it is not "to observe anything""
Intra-disciplinary relations – Teachers Inácia and Rita, 1ˢᵗ stage, researcher's record.

"In the analysis of the competences to be developed by children in the context of scientific learning, are discussed aspects related with psychology (which competences require a higher level of abstraction? Children in the concrete stage are able of higher level reasoning?), with sociology (children of lower social groups are able to attain objectives of high level? And children of higher social groups? Why? Which are the modalities of family and school pedagogic practices more favourable to lead children to attain objectives of a higher level of abstraction?), with scientific contents and processes (classification of competences and concepts involved in some of the questions which were part of the work sheets of the first experimental teaching unit)"
Inter-disciplinary relations – 2ⁿᵈ stage, researcher's record.

"Many examples were given, we introduced examples in all sessions… when we talked about that child with difficulties to learn by heart the theatre play… those student-teachers who come to the classroom and accept everything children say, do not reformulate nor add anything and just end up the subject […]"
Relation between researcher's knowledges and teachers' knowledges – Teacher Inácia, 1ˢᵗ stage, researcher's record.

Researcher – […] Why is it that in the relation […] between the two teachers and the researcher, you indicate a weak framing? Why?
Teacher – I think we got on very well… each of us said what she thought…
Researcher – We got on very well… yes…, but how was that relation of communication?
Teacher – Very open.
Researcher – Do you think there was or there was not a predominantly uni-directional vertical relation or was it an open relation of sharing of ideas? […]
Teacher – A sharing… yes, a sharing
Hierarchical rules researcher-teachers – Teacher Dulce, 2ⁿᵈ stage, interview.

The researcher Laurinda, in one of the interviews she made to teacher Dulce, asked her how she would classify the relation between the spaces of the various intervenients in the training process.
Teacher – There was no isolation, as there is not now. We are at the same level, it was always like this […]
Researcher – Were the materials also used by everybody?
Teacher – Exact.
Teachers' training – teachers spaces – Teacher Dulce, 2nd stage, interview.

"It is also weak [classification], we all have exactly the same space… even the working table is the same!"
Teacher-teacher space – Teacher Inácia, 1st stage, researcher's record.

"I think you know more than I do, I only know to be a teacher… you surely know much more than I do… Your work at the college [of education]"
Researcher-teachers power relations – Teacher Rita, 1st stage, researcher's record.

5. The names of the teachers are fictitious.

6. As showed by another study, also part of the broader research where the present study is included (Morais, & Pires, 2002), whenever teachers' pedagogic practice approximated the theoretical profile, children's learning improved.

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