Qualitative Psychology Nexus XIV

Günter L. Huber (Ed.)

Qualitative Approaches to Actual Problems in Education

Qualitative Psychology Nexus: Vol. 14

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Proceedings of the XVII. Workshop
of the Center of Qualitative Psychology,
University of Jaén, April 01-02, 2016

Center for
Qualitative
Psychology

Content

Introduction

Volume XIV of the "Qualitative Psychology Nexus" presents selected contributions to the 17th workshop of the Center for Qualitative Psychology, which was held from April 1st-2nd at the University of Jaén, Spain. Karin Schweizer from the University of Education at Weingarten, Germany, the president of the association "Center for Qualitative Psychology, and the communication chair Tiberio Feliz (UNED, Madrid) were assisted in organizing the meeting by Eufrasio Pérez-Navío and the other members of the Spanish organization committee, José Antonio Torres González, Javier Rodríguez Moreno, Raúl González Fernández, Blas Campos Barrionuevo, Ernesto López Gómez, José María Santoro Moreno, Sálvora Feliz Ricoy, José Carlos Cabrera Linares y Benjamín Mejías Ibáñez.

The 17th workshop was dedicated to "Qualitative Approaches to Actual Problems in Education". The contributions to this topic are arranged in this publication in two main sections. The first part deals with general methodological considerations, the second part presents answers to actual educational questions.

In the contribution on *Research Questions, Data Collection, and Data Analysis* Günter L. Huber gives an overview on five widely used textbooks (in English language) on qualitative methods and comments how they treat the logical interrelations between research question, data collection and analysis. How to choose approaches appropriate to the actual researach question is then outlined in this article.

In their article on *Improving Research on Pre-School Teachers' Training by Collecting Life Histories/Autobiographies* Mª Concepción Domínguez, María Medina and Antonio Medina describe the qualitative method of having student teachers report life histories and narrate auto-biographies in which they identify and reflect critical moments in their career. Analysis and interpretation of these reports will help to improve the models of initial teacher training.

Roswitha Klepser, Holger Weitzel and Anne-Rose Barth present in their contribution on *The Structure-formation Technique as a Tool for Exploring,*

Analyzing, and Promoting Students' Conceptions of Scientific Inquiry also a qualitative approach to improve teacher training. Teaching the standards of scientific research to student teachers in science subjects often proves a challenge, since the students often considerably lack conceptual knowledge about scientific methods as well as laboratory skills. By means of the structure-formation technique, on the one hand, the researchers get access to students' subjective theories of content skills and process skills. On the other hand, this technique can be used as an instrument to support learning that allows student teachers of science to reflect on their subjective theories and their development in the course of their studies.

In her contribution on *Qualitative Assessment of Interpersonal Competencies in Higher Education: A Case Study on Criterion-based Evaluation* Mª del Carmen Pegalajar Palomino describes a criterion-based instrument for assessing collaborative work, understood as a tool used to evaluate higher education students' skills and the development of their interpersonal competencies. Since this development is related to progress in students' critical and self-critical abilities, teamwork, interpersonal relationship skills, interdisciplinary communication, appreciation of diversity and multiculturalism, the ability to work in an international context and ethical commitment, this assessment approach is highly interesting to qualitative educational research at large.

In the section on "Answers to Actual Questions in Education" Vânia Ferreira and María-Carmen Ricoy are interested in *The Sound Sources from Musical Education Textbooks as Multicultural Reinforcers*, concentrating on the question: What is presented to students as regards the sound? Among various other aspects elaborated to answer this question, the authors tried to find out what kind of sound material is offered to students and whether these materials meet the demands of multiculturalism, whether the sound of textbooks is supported by new technologies. As to the multicultural dimension, the analyzed textbooks neither meet the requirements of current cultural diversity present in schools and society, nor the values represented in curriculum guidelines.

Amador Jiménez Garrido, Eufrasio Pérez Navío and Alberto Chamorro Gámez analyze the effects of a program to promote multi-lingualism in Spanish schools. In their article on *US Foreign Language Assistants in Bilingual Schools in Spain: Performance and Preparedness Estimation by Local Teachers*

the authors describe two important measures to support this goal: (1) the creation of schools with bilingual curriculum and (2) the inclusion of native speakers of the foreign language. The investigation presented here takes a closer look at the opinion of the local teachers on the assistants and on characteristics of a training that helps the assistants to be more valued among regular teachers and hence, more helpful in bilingual schools.

The article on *Mini-video Teaching Mathematics in Economics: A New Stimulus for Students and Teachers* by Beatriz Rodríguez Díaz, Alfonso González Pareja and Susana Calderón Montero takes into account that mathematics is not a primary goal for students of Economics, but a tool for them in other disciplines. Additionally, the students enter their classrooms with poor and very heterogeneous levels of mathematical knowledge. The authors are looking for a quick and effective solution for their students as future economists and have found it in the teaching innovation of mini-videos.

Beatriz Rodríguez Díaz and Francisca García Lopera describe in their contribution on *A MOOC Experience in Financial Education* the development and application of a Massive Online Open Course (MOOC) on Financial Education. This course aims to increase the capacity and personal autonomy of people with average education in this field to face financial problems. It affects the financial decision-making in the family budget, in the supply of instruments for saving and investment, and the use of credit.

The article *An Approach to Teacher Collaboration in Higher Education through an Analysis of Current Research* by Ernesto López Gómez and Celia Camilli Trujillo demand special training for university teachers in their main academic tasks of teaching and research to prevent that they are over-whelmed by their additional administrative tasks. Based on a review of current publications the authors recommend cooperation-oriented trainings that will help teachers to reflect in collaboration on their practice and to conduct student centered teaching: "If universities consider teaching and learning important, they should provide policies that encourage support for reflective and collaborative practice in teaching".

Part I: Qualitative Methods in Educational Research

Research Questions, Data Collection and Data Analysis in Qualitative Studies

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1. Introduction

In the first issue of "fqs" (Forum Qualitative Social Research), Mruck and Mey (2000, [5]) described the state of the art of qualitative research in Germany at this time, but we may generalize their findings without running into problems. They stated that "... qualitative research is represented by a large spectrum of research approaches, data collection and interpretation methods..." referring to a publication by von Kardorff, who complained a research situation characterized by "very different theoretical, methodo-logical and methodical accesses to social reality" (1991, p. 3).

The third workshop of the Center for Qualitative Psychology in 2002 also addressed the juxtaposition of approaches, methods of capturing data and analytic procedures in its title "Research Questions and Matching Methods of Analysis" (see Kiegelmann & Gürtler, 2003). In the opening section of this workshop several authors illustrated their approach by analyzing one and the same data set, namely the first chapter of Cervantes' *Don Quixote*. The various methods and research results provided an illuminating start for the ongoing discussions of how to apply research methods that are appropriate to the research question chosen.

However, still today in the literature introducing to qualitative social research we find either pronounced emphasis on the three concepts in the title of this contribution, i.e. how to formulate research questions, how to collect data, and how to analyze qualitative data, or we find on the other

hand introductions to particular "scientific schools" recommending specific combinations of data capturing and analysis to answer specific research questions, for instance, biographical approaches to answer a question like "What motivates students to participate in distant education?" by narrative interviews. But not only beginners should be well aware that methods are specific tools for specific purposes. Or in other words: If we have a box labeled, let's say "Case Study", then we should be aware for which questions it will be suited and for which not, what belongs inside the box and what will better stay outside. It is indispensable for a genuine understanding of qualitative research not only to gather differentiated knowledge about the methodological components and stages of the research process, but above all about their logical interrelations.

Differentiating between general introductions to qualitative research and highly specialized ones, in the first case the the reader is usually supplied with extensive descriptions of components of the research process, while specialized introductions usually focus their attention on particular interrelations of research question, data collection and analysis. That is, general introductions to qualitative methods treat the logical linkages between question or objective of a study, its approach to data collection and its analytical methods only superfluously. In presentations and discussions of approaches of a particular scientific subculture within the realm of its determining norms and rules, the relations of cause and consequences between research question and subsequent decisions about the design of a study usually are explained clearly, but rarely compared to conditions valid within different methodological orientations. Usually, particular methods of data collection are suggested combined with particular strategies of analyzing the data. For instance, Schütze (1983) suggested narrative interviews in biographical research and explained how to interpret them.

In both cases – general and specific introductions – the understanding of appropriate or less appropriate relations between the three main components of a study design is impeded. The reader has to construct general insights by him/herself. In addition, since the members of specialized scientific communities or formulated more sharply "parallel subsocieties" within the scientific community quote mostly above all from their members' publications, the beginner in qualitative social research is more endangered to develop orientations of a disciple than to be supported to

become an independent, critically reflective researcher. Unfortunately, both content structures – just listing and describing methodological components in juxtaposition or concentrating on just one specific research approach – are still widespread in recent publications on qualitative research. I will give you some examples.

2. Typical introductions to qualitative research

The books described subsequently are chosen from the

- "Goodreads" (www.goodreads.com) webpage and summarized also on
- Penn State University's website (https://www2.med.psu.edu/humanities/research/top-five-books-on-qualitative-research/) "Qualitative Research: When counting isn't enough".

Goodreads is a "social cataloging" website founded in December 2006. The website allows individuals to freely search Goodreads' extensive database. Users can sign up and register books to generate library catalogs and reading lists. On July 23, 2013, it was announced that the user base had grown to 20 million members. (Meanwhile it is owned by Amazon.)

(1) John W. Creswell (2014). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. Thousand Oaks, CA: Sage Publications

This book received in 682 ratings an average of 3.59 points (out of maximally 5). As the title is telling us, the content covers the whole range of methodological approaches in social research.

The first part of this book presents preliminary considerations such as how to select a research approach, how to run a literature review or why and how to use theory. The second part is dedicated to the design of a scientific study, that is how to introduce the study, state its purpose and formulate the questions and hypotheses of research. Methodological issues are discussed in three chapters within this part. The reader gets overviews

on quantitative methods, qualitative methods, and various "mixed-method" approaches. Most illustrative for beginners is the great number of research examples that are added to the different chapters.

As regards qualitative methods, the author describes general characteristics of qualitative research and specifics of qualitative designs, elaborating on the role of the researcher in qualitative studies, procedures of data collection and recording, data analysis and interpretation, and finally questions arising about the issues of validity and reliability of the findings. Advice how to write a qualitative research report completes this chapter.

However, the main purpose of this book is to give a general overview on the design o scientific studies. Therefore, we must not expect too differentiated information about linkages between research question, data collection and data analysis particularly in qualitative studies.

(2) John W. Creswell (2012). Qualitative Inquiry and Research Design: Choosing Among Five Approaches. Thousand Oaks, CA: Sage Publications.

This book received in 299 ratings an average of 3.83 points (out of maximally 5). It is dedicated to qualitative studies only, differentiated by five approaches: narrative, phenomenological, grounded theory, ethnographic, and case studies, each illustrated by an example from the research literature.

Each of these five approaches is presented following the same structure. First, the approach is defined and explained with reference to its background. Then, the characteristic features are the outlined, followed by a differentiated description of types of studies based on this particular approach. In detail the reader learns about the procedures for conducting a study appropriate to the selected approach and finally its typical challenges. In the appendix more detailed examples can be found.

Obviously this book is focused on qualitative research. While the author in the following chapters again lists the stages of the research process (finding and formulating a research question, data collection, data analysis) one after another, the examples offer opportunities to discuss and gain insight into logical relations between particular types of questions, methods

of collecting appropriate types of data and matching methods of analyzing these data.

(3) Michael Quinn Patton (2015). Qualitative Research & Evaluation Methods. Thousand Oaks, CA: Sage Publications.

This book received in 93 ratings an average of 3.89 points (out of maximally 5). It is focused exclusively on qualitative studies and organized in three main parts: (1) Framing qualitative inquiry: Theory informs practice, practice informs theory, (2) qualitative designs and data collection, and (3) analysis, interpretation, and reporting.

The first part deals in four chapters with the topics of "The nature, niche, value, and fruit of qualitative inquiry", "Strategic themes in qualitative inquiry", the "Variety of qualitative inquiry frameworks: Paradigmatic, philosophical, and theoretical orientations", and "Practical and actionable qualitative applications". The second part informs in three chapters about qualitative designs and data collection. It starts with the design of qualitative studies, goes into details of fieldwork strategies and observation methods, and elaborates on qualitative interviewing. The third part treats in two chapters questions of "Qualitative analysis and interpretation" and "Enhancing the quality and credibility of qualitative studies".

As regards the interrelations of research question, data collection and analysis the chapter on designing qualitative studies (part 2) starts with a most interesting module on the design of thinking not only in this particular field: "Questions derive from purpose, design answers questions". In addition, the reader gets in this chapter information about decisions of data collection and an overview of strategies and options of purposeful sampling and case selection. Generally, the text is very detailed and offers varied perspectives, particularly on ways of analyzing and interpreting qualitative data.

(4) Johnny Saldaña (2016). The Coding Manual for Qualitative Researchers. London: Sage Publications.

This book received in 92 ratings an average of 4.18 points (out of maximally 5). As can be concluded already from the title, it is dedicated to a particular approach of qualitative analysis, namely the coding paradigm. It introduces the reader in the first chapter generally to the use of codes or categories and their role in qualitative research as well as general procedures and techniques for the analysis of qualitative data based on the principles of the coding paradigm. The second chapter elaborates on a most important, however often neglected aspect of interpretative approaches to data analysis, namely the purposes and ways of analytic memo writing.

The remaining four chapters describe methods of coding during the first coding cycle and what to do after this phase as well as coding during the second cycle and how to continue afterwards. Four appendices containing glossaries, examples and exercises complement the text. The first of these chapters explains the coding cycles and how to select appropriate coding methods. Above all, the reader learns here about various perspectives on decision making during coding, how to align the procedures with the research question, and paradigmatic, conceptual, and methodological considerations.

The overview on the first cycle methods describes the profiles of various coding methods and describes subsequently six principal approaches to coding: Grammatical methods (for instance, attribute coding), elemental methods (for instance, structural coding), affective methods, literary and language methods, exploratory methods, and procedural methods.

(5) Sharan B. Merriam (2009). Qualitative Research: A Guide to Design and Implementation. San Francisco: Jossey-Bass.

This book received in 87 ratings an average of 3.68 points (out of maximally 5). The content of this general introduction to qualitative research is structured into three parts: The design of qualitative research, collecting qualitative data, and analyzing these data and reporting the findings.

In part I the second chapter gives an overview on characteristics and

differences of six types of qualitative studies: Basic studies, phenomenology, grounded theory, ethnography, narrative analysis and critical studies. The main accent of this book is on analyzing qualitative data. Based on 30 years of teaching, the author states that the fundamentals of qualitative research are more or less easy to understand, but the real challenge starts once a beginner is confronted with his/her own data and trying to make sense of them.

3. Types of Qualitative Research

In the literature often five types of or approaches to qualitative research are mentioned:
- narrative,
- phenomenological,
- grounded theory,
- ethnographic, and
- case studies.

By the way, in the volumes of "Qualitative Psychology Nexus", which contain the contributions to our workshops over the last 16 years, you will find excellent examples of studies following these approaches.

3.1 The narrative approach

On the website of the atlas.ti-group (software for qualitative analysis) we read: "Narrative research is a term that subsumes a group of approaches that in turn rely on the written or spoken words or visual representation of individuals. These approaches typically focus on the lives of individuals as told through their own stories. The emphasis in such approaches is on the story, typically both what and how is narrated." And Wikipedia summarizes: "Narrative inquiry uses field texts, such as stories, autobiography, journals, field notes, letters, conversations, interviews, family stories, photos (and other artifacts), and life experience, as the units of analysis to research and understand *the way people create meaning in their lives as narratives*."

3.2 The phenomenological approach

The "Research Methods Knowledge Base" describes phenomenology as "a school of thought that emphasizes a focus on people's subjective experiences and interpretations of the world. That is, the phenomenologist wants to understand *how the world appears to others*." That is, a phenomenological researcher is not interested in theories about causal explanations of the phenomena or how the objective reality can be described as compared to the subjective reality and world views of people. Instead, s/he tries to understand *how people construct meaning*.

3.3 The grounded theory approach

Grounded Theory is an approach for developing theory that is "grounded in data systematically gathered and analyzed" (Strauss & Corbin, 1990). The approach is characterized by a systematic generation of theory or at least hypothesis from data and is built upon both inductive and deductive thinking. A main goal of a grounded theory study is to discover the participants' main concern and how they continually try to resolve it. The questions the researcher repeatedly asks in grounded theory are *"What's going on?"* and *"What is the main problem of the participants, and how are they trying to solve it?"*

Because of the combination of inductive and deductive processes, the fundamental method of grounded theory is called the *constant comparative method*. This is a process in which any newly collected data is compared with previous data that was collected in one or more earlier interviews, observations, etc. This is a continuous ongoing procedure, because theories are formed, enhanced, confirmed, or even discounted as a result of any new interpretation that emerges from the data base.

3.4 The ethnographic approach

The ethnographic approach to qualitative research comes largely from the field of anthropology. The emphasis in ethnography is on studying an entire culture. Originally, the idea of a culture was tied to the notion of ethnicity and geographic location (e.g., the culture of the Hudson Bay Inuits), but it has been broadened to include virtually any group or organization. That is,

we can study the "culture" of a business or defined group (e.g., a rifle club or a team of players of a particular video game).

Ethnography is an extremely broad area with a great variety of practitioners and methods. However, the common denominator is that the researcher becomes immersed in the culture as an active participant and records extensive field notes. As in grounded theory, there is no preset limiting of what will be observed and no real ending point in an ethnographic study.

3.5 The case study

Yin (1989, p. 23) defines a case study " as an empirical inquiry that :

> - investigates a contemporary phenomenon within its real-life context, when
> - the boundaries between phenomenon and context are not clearly evident; and
> - multiple sources of evidence are used."

Thus, for instance, many classroom studies fall into this category, above all since the critical phenomenon, for instance how teachers deal with disruption, and the context factors are usually intermingled.

In doing case study research, the "case" being studied may be an individual, organization, event, or action, existing in a specific time and place. If the case study is about a group, it describes the behavior of the group as a whole, not behavior of each individual in the group. Case studies can be produced by following a formal research method. The resulting body of 'case study research' has long had a prominent place in many disciplines and professions, ranging from psychology, anthropology, sociology (Jahoda, Lazarsfeld & Zeisel, 1933: Die Arbeitslosen von Marienthal; Whyte, 1955: Street Corner Society), and political science to education, clinical science, social work, and administrative science.

Already the descriptions of these approaches demonstrate that there is a defined area of combining research questions, data collection and data analysis – always depending on the particular research question. Since it is

mostly unknown outside the German speaking countries, I add another approach used in sociology and educational research. This approach is interested in the reconstruction of structures, which generate interpretation and action. Often it is differentiated between "manifest structures (subjective meaning, intention) and ... latent structures of meaning" (Lüders & Reichertz, 1986, p. 95). Of particular interest in this field is the approach of Objective Hermeneutics. Researchers try to explore the "objective" meaning of concrete statements through "sequence analysis", that is the meaning specific statements convey generally, at least for all people in a specific socio-cultural setting. Another example would be psychoanalytical methods trying to encode the collective unconscious.

Why did we elaborate on these details? An overview on these approaches illustrates convincingly what was stated in the beginning, that is "qualitative research is represented by a large spectrum of research approaches, data collection and interpretation methods...". In every approach there are logical threads connecting the initial question and methods applied to answer them. Although some methods may appear most appealing not only to the beginners in qualitative research, researchers must always tie the actual thread connecting their methodological decisions and their research question.

4. Three components of qualitative research and their interrelations

4.1 The research question

Unfortunately, some recommendations may be more confusing for beginners than assisting in developing a concise qualitative research design. For instance the Duke University's "Thompson Writing Program" (http://twp.duke.edu/writing-studio) informs that "there are two types of data that can help shape research questions in the sciences and social sciences: quantitative and qualitative data." But then it gives people interested in trying to understand a phenomenon or discover something to explain it – i.e. to apply qualitative approaches – an absolutely misleading advice, namely to test hypotheses about the phenomenon under study:

"In essence, the research question that guides the sciences and social sciences should do the following three things:

1) Post a problem.
2) Shape the problem into a testable hypothesis.
3) Report the results of the tested hypothesis."

On the other hand, most helpful appear to be Cresswell's (2009) proposals. In the 2009 edition of his already mentioned book of 2014, he elaborated rules for the wording of qualitative research questions, which are widely accepted and repeated in numerous guidelines for novice investigators. He starts with a general rule for using particular interrogative particles in qualitative research questions:

> "Begin the research questions with the words *what* or *how* [italics by Huber] to convey an open and emerging design. The word why often implies that the researcher is trying to explain why something occurs, and this suggests to me a cause-and-effect type of thinking that I associate with quantitative research instead of the more open and emerging stance of qualitative research" (Cresswell 2009, p. 130).

In further parts of his guideline, Cresswell (2009, p. 130f) goes into more details of the formulation of questions and suggests that more exploratory verbs should be used on the way from stating a problem to its exploration. These verbs "convey the language of emerging design" and therefore are most important for linking question, data collection and analysis. Cresswell advices to

> "tell the reader that the study will
> • Discover (e.g., grounded theory)
> • Seek to understand (e.g., ethnography)
> • Explore a process (e.g., case study)
> • Describe the experiences (e.g., phenomenology)
> • Report the stories (e.g., narrative research)."

Finally, Cresswell (2009, p. 131) offers a script for constructing central questions for qualitative research, that is, he suggests a standard formulation with blanks that must be filled in depending on research topic and further methodological orientation:

_____ (How or what) is the _____
          ("story for" for narrative research;
          "meaning of " the phenomenon for phenomenology;
          "theory that explains the process of " for grounded theory;
          "culture-sharing pattern" for ethnography;
          "issue" in the "case" for case study) of
_____ (central phenomenon)
for _____ (participants) at
_____ (research site).

As we see, the appropriate steps from the research question to procedures of data collection and analysis are well outlined by this form of wording.

4.2 Appropriate methods of data collection

The research question within its type of scientific approach determines quite clearly which ways of data collection are appropriate and which not. However, there is no one-to-one assignment of questions - approach - methods possible. In examples of qualitative research, we often find the following combinations:

Narrative studies

As we already have heard "the emphasis in such approaches is on the story, typically both what and how is narrated", when people create meaning. The typical instrument is the interview, preferably in an unstructured or only lightly structured version as, for instance, a narrative interview. However, life experiences of people and their constructions of meaning may be accessed in a number of different ways, for instance in biographical texts, autobiographies, observations of people in their context recorded in field notes, family photos and artifacts together with accompanying stories, etc. To find out what people talk about and how they do it, a correspondingly open, unstructured approach of interpreting their talks is appropriate.

Phenomenological studies

If we want to find out how the world appears to other people or more specific, what the meaning of a particular phenomenon is for them, then every method is suitable that gives access to people's subjective experiences and interpretations of the world or specific events. Obviously, questionnaires and structured interviews will not offer the research participants many opportunities to unfold their personal world views. However, interview and observation methods as well as diaries, letters and other written materials, photos and videos produced by the focal person may be most valuable sources of information. Again, the openness of data collection should be matched by open methods of data analysis.

Grounded theory approaches

Again, any source of information is helpful to develop explanations of a phenomenon, if the flow of information is not focused from the very beginning by the researcher's interests. An unstructured interview or open focus group discussions, participant or non-participant observations in a social setting, videos of social actions (for instance, mothers and kids on a playground) are well suited ways of acquiring data for grounding an emerging theory. On the other hand, a structured or semi-structured interview, which is by definition constructed to yield information according to the researcher's interest or hypothesis and limits the participants' space of expressing themselves, should not be used for grounded theory. These instruments are well suited to provide differentiated information about what a researcher already knows about ongoing events or people's main problems. Of course, the analysis must be open and allow that meaning emerges from the data set in contrast to enforce hypothetic meaning on the data.

Ethnographic studies

Besides a broad variety of methods the main approach to data in this type of research are observations, mostly by participant observers, and their recordings. As in grounded theory there are no rules or limits as to what should be observed. Of course, all artifacts, actions, events of the culture under study can be objects of methodological scrutinizing, but again, the

process of data analysis should not search for particular meanings of the events, but allow that the observations "talk" to the observer and s/he is able to unravel their meanings.

Case studies

Yin (1989, p. 85) differentiates between six sources of data for case studies: "documentation, archival records, interviews, direct observations, participant-observation, and physical artifacts." And he adds: "Of course, not all sources will be relevant for all case studies" (p. 95). Because of the complexity of methodological approaches to the case, Yin (1989, p. 95 ff.) suggests to follow three principles:
>   - Use multiple sources of evidence.
>   - Create a case study data base.
>   - Maintain a chain of evidence allowing "to follow the derivation of any evidence from initial research questions to ultimate case study conclusions."

Obviously computer assistance will be most helpful in case studies and assist the researcher in "deriving evidence".

4.3 Methods of data analysis - an overview

Depending on the research question, two principal methodological approaches to the analysis of non-numeric, i.e. qualitative data are offered, the coding paradigm and the reconstruction paradigm of data analysis. Let me start with a short description of the latter, until now not very frequently applied approach and then describe in more detail the usual procedures of interpreting qualitative data by coding or categorizing.

If the goal of a study based on just a few cases is to reconstruct the general structure of action or experience revealed in these data, sequential analysis of the available data following the "reconstruction paradigm" is appropriate. The researcher does not read or view the complete data set, for instance, a letter of application, but starts the interpretation just with the first meaningful segment and generates hypotheses about its meaning, that is, s/he (preferably assisted by a group of colleagues) tries to tell stories, in which the particular segment plays an important role. It is important to ignore everything that follows later in the text – until it is time to proceed

to the next segment. Based on the knowledge of this next part of the material some of the stories may now already be "falsified" and excluded from further considerations, but additional ideas may emerge, and so on to the next segment. Once no more new stories can be produced, the still available stories are ordered and tested against the content of the remaining (i.e., not yet segmented and analyzed) data material. The stories or hypotheses that are finally kept up define the general structure of action, experience, etc. revealed in this case.

If researchers analyze their qualitative data by coding or categorizing, i.e. substituting more or less lengthy, verbose parts by clear defined categories or codes, they analyze the content of their material according to methods of the coding paradigm. Here we have to differentiate between analysis of the latent content or methods of "qualitative" content analysis, and analysis of the manifest content or methods of "quantitative" content analysis. However, both methodological families are based on processes of careful data interpretation. While a qualitative content analysis usually develops a system of categories or codes during the process of data interpretation, a quantitative content analysis applies a set of keywords as indicators of specific meanings to count their frequencies in the data given. However, these keywords – comparable to the codes in analyses of latent content – do not appear out of nothing, but are the end product of preceding, often theoretically informed interpretations and analytical endeavors. There is a clear convergence between both types of content analysis: Quantitative content analysis applies a set of ready-made inter-pretations represented by a list of critical key-words or a "dictionary of meaning"; in the same way a qualitative content analysis can be built upon a coding system constructed and validated in earlier studies. For instance, in the beginnings of empirical educational research on teacher-student-interactions thousands of studies applied one and the same category system to analyze classroom observations, namely the "Flanders Interaction Analysis Categories" (1971).

We see, the coding approach may be characterized by varying degrees of structure, sometimes even by phases of different structuredness within one and the same study. How open or how structured a researcher has to attach codes to parts of the data depends again on the research question and the methods of data collection. Grounded theory approaches start with

"open coding", that is the researcher reacts to everything potentially related to the research question and invents a category for these emerging "units of meaning". Only in a later phase, after s/he is more familiar with the data material, s/he will focus the attention to one or several axis of meaning and apply what is called "axial coding". Logically, this strategy matches only broad research questions and unstructured methods of data collection. In an analysis of semi-structured interviews, the researchers are well advised to concentrate on the axis of meaning already determined by their interview questions and additionally keep an open mind for surprising, unexpected answers. A totally structured coding approach was already mentioned – the application of ready-made coding systems, for instance in replication studies.

Usually, above all the findings of quantitative content analyses, i.e. tables of keyword frequencies, but also the results of qualitative content analyses invite to further analysis with complementary quantitative methods. The approach of "exploratory data analysis" (EDA; Tukey, 1977) has recently received again much interest, because it applies statistical procedures that observe the spirit of qualitative research: they are not meant to test hypotheses, but to assist in revealing more or less hidden meaning in the data, above all by methods of graphic representation. Unfortunately I cannot find again neither the announcement of a seminar on EDA at a Latin-American university nor its internet address, but this text conveys perfectly the function of EDA and its gist in mixed methods research: "The exploratory data analysis is a set of strategies for the analysis of data with the goal to *permit that the data speak and we find patterns in the data*" and "... may serve as a useful tool for the generation of hypotheses, conjectures, and questions regarding the phenomena the data came from."

Summarizing we can claim that any methodological preferences or prejudices not only in qualitative research have to be strictly scrutinized: Do they fulfill the requests determined by the research question? Tukey (1962, p. 13) stated this as follows: "Far better an approximate answer to the right question, which is often vague, than the exact answer to the wrong question, which can always be made precise."

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Improving Research on the Training of Pre-School Teachers by Collecting Life Histories/Autobiographies

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1. Introduction

By analyzing, understanding and interpreting the reports obtained from life histories and above all autobiographies of teachers a methodological qualitative approach to their professional development is consolidated. In their reports they identify and reflect critical areas of their career, which determined their progress and the improvement of their teaching.

The goal of this study is to improve the models of initial teacher training, basing this endeavor on what pre-school teachers tell us in their autobiographic narrations during the phase of initial training and professional practice.

The approach of teacher training based on autobiographies has been subject of numerous investigations, which we have coordinated (Medina et al., 1991, 1992, 1996, 2002, 2016). Under the condition that critical key elements were shared with the teachers, they were able

- to convert the line of their life and their professional practice in an essential basis for their own knowledge and to make decisions for continuous improvement as teachers of early childhood education.
- to understand the strong and weak points of their own career based on self-knowledge and a deep personal insight into their educational practice.
- to bring out the texts, discourses, perceptions and most relevant beliefs the teachers have experienced by sharing in the narration of their autobiography the most relevant aspects of their professional life.

2. Research Objectives

In detail, this study intends

- to demonstrate the potential of narratives and auto-ethnographies to design models of initial training for preschool teachers.
- to analyze the relevance and potential of narrative studies for gaining knowledge and new research data on the training of educators in early childhood education.
- to bring out data and interpretations derived from new ways of understanding and analyzing the stories and relevant experiences of teachers in early childhood education.
- to transfer the findings of autobiographies and narrations to new forms of knowledge about the initial training of educators in early childhood education.
- to identify the bases of professional development in the narrations of educators and students of childhood education in the State of Sonora, Mexico.
- to propose some approach that may improve the initial training of teachers of early childhood education by producing new competencies and beliefs.

3. State of the Art

3.1 Initial training of pre-school educators

The training of pre-school teachers is the main basis for the transformation of educational systems and provides the keys for early childhood educators to acquire the necessary basic competencies including values, attitudes, emotional styles and new ways of learning to learn. These competencies influence the development of human beings on a level and in a framework maximally communicative and related to real life.

The initial training of teachers in early childhood education has been the subject of numerous investigations including:

- Domínguez, González, Medina and Medina (2015), González and Medina (2017).
- Valenzuela, Dominguez, González and Medina (in press), who have synthesized the model of integral development of teachers on this level taking into account the complementarity of the training of professional competencies at this stage and in the self-analysis of the beliefs that characterize preschool teachers.

The "autobiographical perspective" addressed by Medina (1996), Goodson and Crick (2009), Wilcox and Herzog (2015), Dominguez et al. (2015) stands out among the perspectives for initial teacher training and advancement of knowledge and understanding of professional practices. These authors underline the effects of autobiographies on the development of models of pre-service teacher training as an essential approach. It is perfected by advancements in professional identity and encompasses both an approach to teacher training and to the development of qualitative methods.

The effects of this methodology on the construction of new processes and practices ensuring an appropriate efficiency of preschool education are consolidated as a fruitful mode to respond to scenarios of teaching innovation, which enlarges progressively the nature of the narrations, thus promoting the development of research models. The initial teacher education for pre-school education should be dedicated to

- a training focused on knowledge about children as unique individuals with great potentiality.
- sensitivity, empathy and enthusiasm for supporting children's personal or family projects.
- the interpretation and diagnosis of the personal and institutional realization of multiple potentials.
- the anticipation of the challenges, demands and multiple needs in pre-school education.
- the adaptation of educational style to the diversity of human beings.
- a commitment to comprehensive education and equal treatment and respect for the rights of all people.

The complexity of globalization and cultural diversity have been important for pre-school teachers as a big wealth that confronts them with new challenges, since they have to qualify people within the scenarios growing complexity of multiculturalism and progress in human ecosystems. Therefore, it is necessary

- to identify the values and challenges of each person from the very beginning.
- to strengthen a new framework of respect, dialogue and encounter between all people and cultures (Borghi, 2011).
- to share with families and communities an intense process of integral development of every human being.
- to create a framework for dialogue and understanding.

Among the publications on the effects of globalization on teacher training for pre-school education the works of Farrell (2005), Comber (2011) and Kim (2013) stand out. Farrell (2005, p. 9) points out: " The study of the life histories and course experience of students in early childhood education in Queensland, highlights the need for communities of learners that recognize the life histories, experiences and aspirations of its students to work as teachers with young children and families. It is necessary examine the impact of globalization on students in their early childhood teacher education programs".

Comber (2011, p. 343) explains: "In an era of normative standardized literacy curriculum continuing to make space for culturally responsive literacy, pedagogy is ongoing challenge for early childhood educators" … " Collaborative participatory research and ethnographic studies of teachers who accomplish innovative and inclusive early childhood education in culturally diverse high poverty communities is urgent for the profession" … "When teachers work with children as core searchers through the study of people's lives in particular places and times, the community and its complex histories become a rich resource for young people's literacy repertoires''.

Kim (2013, p. 309) states: "These seven female teachers exhibited an unique concept of professionalism: passion, dedication, and commitment to ECE field (early childhood education (ECE) settings). Love, care, and other nurturing behaviors are privileged attributes in pre-school teaching

context" (Ayers, 1989; Goldstein, 1997; Biklen, 1995): "Thus, they believed that being pre-school teacher is a professional job".

3.2 State of models of teacher training for pre-school education

The initial and ongoing training of teachers in early childhood education has been an essential focus of teacher education institutions all over the world. These institutions have dedicated their highest capacities to the needs of the actual world, that is:

- A knowledge society that requires better and better preparation of tpeople and a new training of teachers to understand the plurality of cultures, institutions and educational experiences.
- Diversity of families, homes, communities and human groups that require innovative, creative and imaginative responses.
- The effects of technology, labor and socio-political decisions cause new questions, continuously challenging situations, and a style of construction of cultures generating more and more urgent demands.

The initial training of pre-school teachers has been the object and basis of numerous trends and training programs for teaching and the acceptance of the great challenge to develop new visions and practices of construction and support of a new style of being educator in the basic stage of the educational system.

The Italian researchers Montessori 2003), the Agazzi sisters (1926) and pedagogues such as Baldacci and Frabboni (2013), Borghi (2011), Baldacci (2014), among others, have introduced a scientist-inquirer view with an axiological, creative, ecosystemic, contextual and harmonic perspective of the initial training of teachers of this stage. This perspective will give pre-school teachers new ways of understanding the complexity of their training and the future task to be performed.

Froebel (1837) proposed an integral formation based on the ludic principle and the anticipated socialization of human beings, combined with a fruitful individualization of each person from the first year on. This approach has been broadened by the visions of Goodson and Crick (2009)

and Wilcox-Herzog et al. (2015), who have addressed an exceeding perspective of teacher training in teaching competencies, awareness of beliefs and knowledge of biographical experiences, which are narrated completely from a researcher's point of view.

Dominguez et al. (2015, 2016, 2017) underline the importance of a fundamental training of pre-school teachers from a scientific point of view of education and the utility of an elaborate practice, aware of the potential of every human being and the responsibility of teachers to convert this stage of education into the base of integral education. We propose the following comprehensive training model:

Effective educational experiences of central importance
(Dominguez et al., 2015)

Professional   Professional
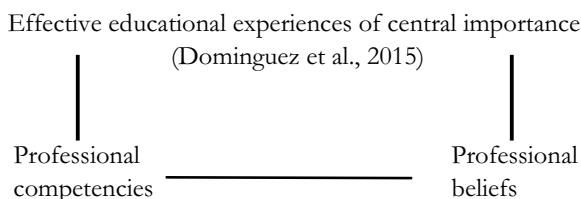competencies   beliefs

Figure 1: Training model

We assumed and experienced that the training for early childhood is a process of maximum involvement for all participants and has established itself as the basic and decisive core of the education system and of individual persons.

3.3 Training of teachers in early childhood education

Dominguez (2015), González and Medina (2017) show a broad and complementary view of teacher training models in their pre-service phase, since the teacher of this initial stage (preschool) is the professional par excellence who marks the real possibilities and effects of the formal and non-formal education system, meeting the demands of fundamental modes of educating children in an integral and just way.

The model that constitutes the core of this research harmonizes the three substantive visions and options of training and professional development of teachers of this stage:

- Training and improvement of relevant teaching skills in this educational framework including maximal collaboration with family, community and cultural environment.
- Becoming aware of and perceiving the most valuable skills that give meaning to the thinking and practices of full professional performance.
- The biographical-narrative vision that characterizes the way of perceiving, living and sharing the thoughts, feelings and selected scenarios to advance in the most relevant contexts of individual and collective action with schools, families and multicultural communities.

This complementarity between the broader point of view of competencies, profound thinking about beliefs and narration of teachers' experiences is essential for an educational innovation.

3.4 Analysis of previous formative experiences and their influence on teacher training models

Goodson (1995), Huber (2010), Medina (1992, 1996), Medina and Dominguez (1992) have highlighted the value of:

- Identifying relevant previous learning experiences.
- Underlining training processes of professional value.
- Sharing creative actions and transformative decisions.
- Strengthening directions and projects of professional development.
- Getting involved in projects and actions of intense personal and professional impact.

The training of pre-school teachers based on the selection, identification and narration of previous professional experiences is an approach of great influence and adequate transformation of teaching practices. On the other hand, this approach is very suitable to promote models and programs of initial and continuos teacher training. Thus, it has been considered that

- professional learning from the identification and justification of previous training experiences enriches the vision and development of professional identity.
- the selection of previous experiences of high educational value consolidates new and future experiences and turns them into the most valuable forms of professional learning.
- harmonizing historical knowledge and anticipating future challenges strengthens professional identity and is the base of various styles of decision making, assuming teaching as a modality of authentic personal and institutional improvement.
- Sharing valuable learning experiences among professionals increases our achievements and knowledge.
- Reflection and research on the quality and influence of formative experiences affects the consolidation of one's own line of professional development.
- Discovering aspects and the most relevant elements of formative experiences is the best training to innovate future educational practices.

The training of pre-school teachers is explicated in

- the actual challenge to improve and adapt the models of initial pre-school teacher training.
- a challenge to transform the current education system from scratch.
- an opportunity to rethink the integral improvement of children's education from the point of view of the formative protagonist.
- the design and foundation of a model of initial pre-school teacher training.
- the identification of initial formative situations, experienced and valued by teachers and students.
- contributions to the "Narrative Inquiry" for the construction of new training models.
- the potential of reflective and training experiences to improve pre-school education.
- a fundamental meaning of these three years of teacher training in the lives of the student-teachers.

4. Groundwork of Biographical Research

The training of pre-school teachers has been consolidated using bio-narratives as a method and a style of improvement and advancement of awareness of the moment of training and performance of professional practices carried out by student teachers in the crucial phase of their formation as well as the stories of real actions and practices that experienced teachers have carried out.

The impact of reflections and self-perceptions becomes reality when teachers assume the search for their own training, collaboration in design and development of models that guide practices and improve the culture of educational institutions. Thus, numerous investigations highlight the following issues:

Fernandez Cruz (2012, p. 31) "The biographical-narrative approach provides us with a method of diagnose of personal situations in their socio-professional contexts, illustrators of collective behaviors and ways of understanding and engaging with the teaching profession". … "It is an effective method of training intervention by revealing to the actors the essential core of experience-based training, the construction of teacher knowledge, the objectification of personal practice and the consolidation of collective professional knowledge". Fernandez (2012, p. 32) continues expressing that "the teacher does not have to give up to maintain (generate) a knowledge of superior order on his professional activity ... to investigate his practice ...". "By advancing in the domain of reflective competencies for teaching: inquiry, self-evaluation, systematic observation, simulation and collaboration for the improvement of practice".

Denzin (2006, p. 422), explains that "Ethnography is not an innocent practice. Our research practices are performative, pedagogical, and political. Through our writing and our talk, we enact the worlds we study. These performances are messy and pedagogical. The pedagogical is always moral and political".

Similarly, Spry (2011, p. 53) states: "The autobiographical subject is not an intact coherent self-waiting within the body to be recorded through language; rather, she is a conflation of effects, a 'constellation of resources'

created through a performative process of critical narration that resists notions of individual coherence".

And Gatson (2011, p. 521) underlines: "The ethnographic experiences discussed herein both ground themselves in the traditions of the method and are generative of explicit exploring the meaning of 'empirical' versus the meaning of 'objective' in the practice of the social sciences" … "The ethnographers are eminently exposable as but one in a host of voices telling the stories, and we are un-removable subjects those stories, perhaps waiting for someone else to tell our story for us".

Chase (2011, p. 430) proposes understanding and interpretation of narrative inquiry: "Because narrative inquiries are still a field in the making, I suspect that narrative researchers will continue to ask these questions about colleagues, conversations, and communities" … "Combining interviews and ethnographic observation, photographs and autobiographical writing, maps and geographical information systems, content analysis of documents".

Narrations have a great influence on the training of kindergarten teachers and demonstrate the power and quality of the discourses expressed in them. These aspects are specified in the following scheme:
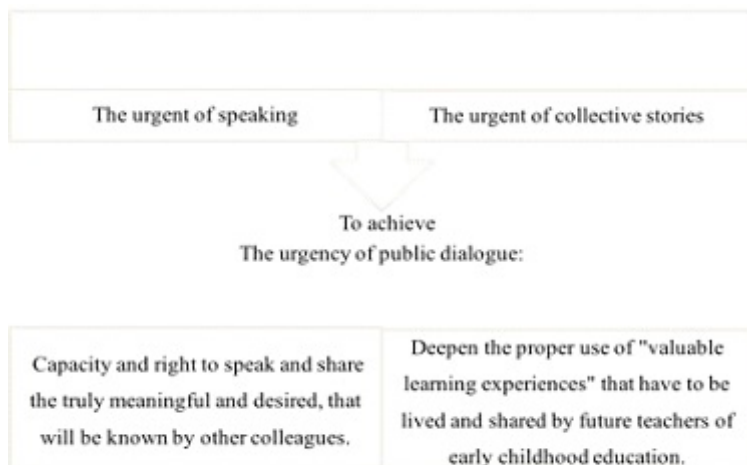
| The urgent of speaking | The urgent of collective stories |

To achieve
The urgency of public dialogue:

| Capacity and right to speak and share the truly meaningful and desired, that will be known by other colleagues. | Deepen the proper use of "valuable learning experiences" that have to be lived and shared by future teachers of early childhood education. |

Figure 2: Double urgency of the narrative inquiry

In addition we have to intensify the analysis of the discourses of bio-narratives (Huber, 2014) with new approaches and more intense and general methods typical of meta-analysis:

- Comparison of the narrator's language structures.
- Topic, patterns and differences (same topic).
- Creation of criteria for a pattern or a difference.
- The practical implications of narrative studies.
- How people act in the social world.
- The kind of social world we all are creating.
- Conversation among researchers of narrations.

The bio-narration is a transformational method of self-training according to De Souza (2011), coinciding in this perspective with Pineau (1983, p. 67), who considers that the meaning of self-training is to take one's training into one's own hands and to be object of the own professional development. "Educational biographies are essential in the training of trainers and in their relationships with devices constitute an adequate training device, supported by the historicity and subjectivity of the subject (De Souza, 2011, p. 50).

De Souza (2011, p. 50) explains that we should "understand the formation as an initiation and process to unveil the connections with the experiences that are constructed throughout life, through the singularities of life stories and the passing of the training".

Passegui (2008, p. 43) emphasizes "the role of training experiences and the research in training memories and the importance of writing about the narratives with the help of the trainer". Likewise, Passegui (2008, p. 45) considers that biographical mediation has three dimensions: initiatory, maieutic and hermeneutic, thus configuring biographical research when carried out as: "co-presence, accompaniment, sharing experiencies and life trajectories", which constitute a basis and the appropriate way to train as a teacher.

Catani (2001, p. 65) adds: "The autobiographical accounts of training have possibilities of transforming the ways of understanding the relations with the knowledge, teaching, school life and the same social reality", which affect the personal and professional development of each teacher, particularly in the period of initial formation. De Souza (2011, p. 53) emphasizes initial training as "a state of training in reflection, initiative and creativity in professional development given that the bio-narrative forms the teacher on a broad theoretical basis to solve the problems of teaching".

5. Design and Methodological Treatment of Bio-narrations

This research is mostly located on the qualitative dimension, using the narration (life history and autobiography) to

- build a process of permanent advancement, harmonizing innovative experiences, but open to the creative exchange between those involved.
- find harmony between the styles and more valuable training practices of the past, with the commitment of the new generations of students in the programs and processes of pre-service teacher training.

Context of participating teachers

Teachers who have written their bio-narratives were mostly from the Mexico Normal School of Hermosillo (State of Sonora) and the Normal School of Zamora (State of Michoacán):

- Kindergarten teachers (last year).
- Students in practices associated with their training in the Superior Normal School.
- Teachers in preschools in indigenous areas.
- Contexts of cultural marginalization, attention to diversity (students / families), i.e. different potentialities of people, students and families).

Spain:

- Childhood educational centers.
- Grouped rural centers.
- Mobility experiences in USA.

Malabo (Equatorial Guinea)

- Kindergarten and primary teachers.
- Rural and urban contexts.

With whom?

- Children participating in compensatory education programs. emigrants, etc.
- Students in complex and difficult situations: ADHD / in foster care (Spain).
- Students with diverse potentials and different experiences (highly gifted children, mute children, etc.)
- Students of four and five years with limited maternal care (Mexico).
- Children of different ethnic groups: TRIQUI / emigrants (Nebraska), Fan, Bubi, Ndowé Bisíos (Equatorial Guinea).

6. Results

The content analysis of the most relevant characterizations of the biographical facts presented in the experiences narrated by the teachers and their universal experiences has been carried out following the methodology of Huber (2014) and previous research cited above, especially Domínguez

et al. (2015). We triangulated experts' analyses and applied software for qualitative analysis such as Atlas ti and Aquad 7.

The maps emerging from the analyses highlight some of the most relevant dimensions of the self-training perspectives of the teachers participating in this research. We confronted them with questions such as:

6.1 WHAT for?

- Achieving positive outcomes in early childhood education.
- Comprehensive training of children in thinking and optimal perceptions.
- Generating a good working environment
- Fostering the development and differentiation of emotional intelligence.
- Achieving ecellent teaching performance.
- Improving preschool education.
- Creating a favourable environment to acquire learning about education.

The participants explained this with a series of experiences and perceptions related to their practice as shown in figure 3:
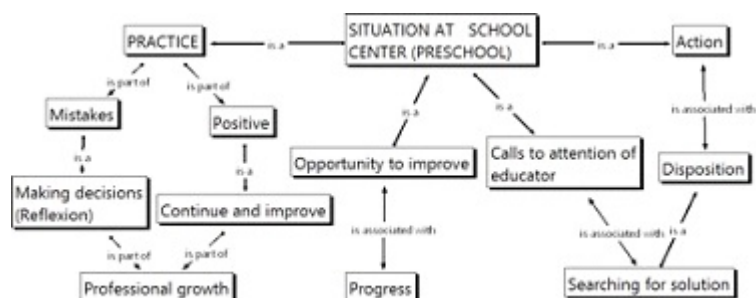
Figure 3: Teachers' personal progress

This picture emerging from autobiographical practice reflects the great value of progress in improvement and professional knowledge, especially linked to continuous personal improvement, responsibility in decision-making and possible errors in the performance of pre-school education.

In their narrations of teaching in pre-school education, teachers consider the development of competencies such as professional identity, empathy, playfulness, innovation, communication and trust, since advancing in those competencies helps them to understand the beliefs and expand knowledge through autobiographies. In other words, knowing one's own characteristics optimizes teaching and learning processes.

6.2 Perceptions and experiences

Among the findings of the analysis of bio-narrations stand out different aspects that mark the perceptions and experiences shared by students and teachers in the full development of their complex profession. These aspects are summarized in figure 4:
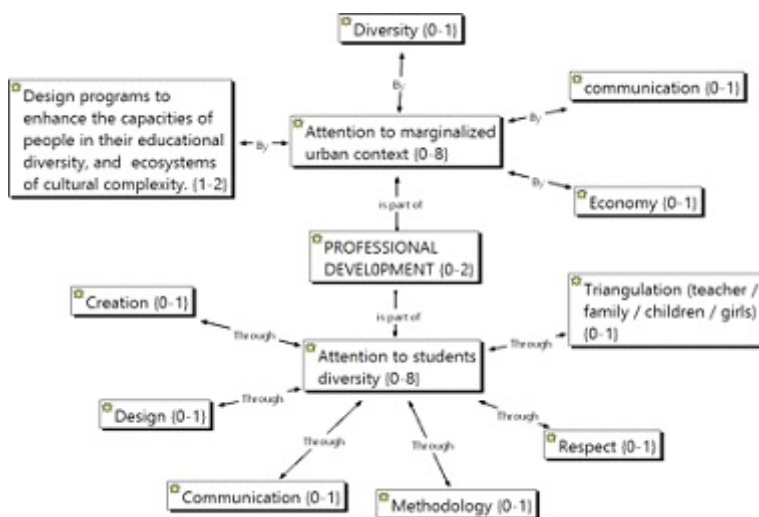
Figure 4: Teachers' perceptions and experiences

These expressions emphasize the relationship between professional development and the core concepts of attention to the diversity of students and families in contexts of social vulnerability.

Figure 4 presents some outstanding findings, which we want to mention in particular:

- Training in competencies through activities shared and discussed among the teaching community.
- Achieving the involvement of the entire educational community.
- Realizing a practice adapted to educational diversity.
- Involving families, supporting them and expanding the interest of children.

These contributions are realized by training the teachers in awareness of diversity and knowledge of the expectations, needs and co-responsibility of vulnerable communities. Thus the teachers will become aware of the effects of curricular design considering above all:

- Improving the environment of coexistence between school and families.
- To make all persons present in early intervention centers interested and sensitize them.
- Supporting families and needy students.
- Motivating for and advancing profoundly into one's profession as a teacher.

Preschools are an unique context and have to attend to the plurality of people and diverse cultures, committed to update knowledge, new values and expectations of students.

6.3 Methods to promote mathematic competencies

Thus, an analysis of what teachers told us about where education takes place and which knowledge has to be elaborated related to the intellectual development of students and the application of playful methods to promote mathematical competence and the use of games as a more relevant procedure, rendered the following findings (see fig. 5):

Figure 5: Teachers' methodologies to promote mathematics competencies

To explain the findings in figure 5 we chose some of the most significant and frequent phrases expressed in the different narrations and had a group of experts check them:

- Improving mathematical thinking.
- Encouraging and recognizing the attention of all children.
- Developing curiosity, imagination and interest of children.
- Caring for the environment, plants, animals and developing new forms of ecological respect.
- Including scientific approaches and contents: dinosaurs, experiments, games and activities of pragmatic learning.
- Applying various forms of art, painting, sculpture, collages, etc.

Teachers present the most relevant contents for the training programs, which prepare them to give adequate answers to a new and more appropriate pre-school education. Thus, the issues most relevant for pre-school teacher training are identified, among them:

- Coping with disruptive behaviors.
- Representing a maternal figure and re-establishing good relations among classmates.
- Studying which ideas, perceptions and experiences are meaningful for the students.
- Serving as a model of religious and integral development of individuals.
- Teaching and learning life.
- Openness for cultures, languages, ethnic groups and diversity of groups and individuals.
- Programs for attention to migrants.
- Course of methodology and evaluation of teaching and learning.
- Visiting other places, "Walking in the shoes of others."
- Mobilizing the entire educational community to overcome violent behaviors.
- Various seminars for advanced training.

6.4 Didactic methods

The topics of the training of pre-school teachers must be continually updated in the following didactic areas:

- Courses in new methods.
- Active methodology.

- Globalized methods in primary education.
- Knowledge of theories and outstanding approaches: Montessori, Froebel, Decroly, Agazzi sisters, Modena, Reggio Emilia, projects, Spectrum, Borghi, etc.

In the bio-narrations teachers emphasize some of their experiences more linked to the mastery of didactic methods and adaptation to the new family and community scenarios. They express their high involvement with the interests and needs of students and their homes, particularly the most vulnerable.

The analysis of the texts has led to the following figure (see fig. 6), which identifies the most important training methods and scenarios for the participating teachers:

HOW?

Figure 6: Training methods and scenarios

The methodology highlighted by the teachers is linked to local activities, the experiences of the students and families and the level of significance of such experiences for the participants in the classroom.

6.5 WHY? Progress in education and training experiences.

The most valuable experiences have been linked to the greatest and most justified progress in personal and professional development and are summarized in the following expressions of teachers:

- Promoting the integral development of every student and in particular of students with special needs an new potentials.
- Achieving the best knowledge of the profession and its challenges in continuous improvement (research and innovation).
- Recognition of the value and impact of teaching materials made within the educational community with special involvement of children.
- We love our profession.
- Evaluating the progress of students and their training by applying innovative activities.
- Intensive professional learning when accompanying diverse (personal, cultural, physiological, etc.) students and their families in their general and their educational progress..

On the dimension of professional development progress in the following aspects is highlighted:

- Strengthening new institutions for pre-school education in neighbourhoods and for families in personally complex situations, unemployment, etc.
- Progress in self-analysis and reflection of practice and the base / theoretical framework that supports what I teach.
- Improving relations with students by helping them in the discovery and construction of themselves.
- Reaching a new awareness for students, teachers and the educational community.
- Option of life and value formation, "you have to let them be and grow without constraining them".
- Adapting what we know to the expectations and realities of children.
- Empathy with children, families and the educational community.

As regards the processes of integral improvement of teacher education, progress in self-analysis and reflection on practice are emphasized, followed by the approach and advancement of new values linked to training and expectations of children. Important in this context is an intense empathy with students and communities, giving families a share in new educational processes.

6.6 Integration of competencies and beliefs in bio-narrations.

The dimension corresponding to progress in the competencies has been updated in relation to teachers' beliefs and multiple expectations regarding the challenge of their continuous improvement and their optimal training for the teaching.

The map representing the integration of competencies and beliefs is constructed based on the interpretation and complementarity of the texts options expressed by the teachers:

Integration of competencies and beliefs / autobiographies

Figure 7: Teachers' competencies and beliefs

Figure 7 shows the interrelation of competencies and beliefs expressed by teachers in their autobiographies. It also makes aware of the value of each competency for improving professional achievement and of the new culture of pre-school education. The teachers' responses are related to innovative processes and the mastery of competencies that are explicit in:

- Promote the competencies to understand the beliefs in a critical way, placing them in our experience.
- The creative process developed at the Normal School has been oriented towards mastery of competencies to improve the teaching practice.

- Learning with diverse students has led to improvement and mobilization: knowledge, attitudes, values, competencies that promote decision making, facilitating the development of research competencies, communication, dialogue, methodology, planning, digital skills, play, perseverance, resilience, empathy, etc.
- Integration between competencies and beliefs, respect and solidarity, research and innovation, digital skills, media design.
- When professional experience is narrated by autobiographies, the experiences foster advancement and development of competencies to improve student learning.
- Responsibility to the demands of families, students and maximal learning as a professional.
- The competencies should be implemented in accordance with personal beliefs considering various educational situations.
- Autobiography represents a real experience in which both competencies and beliefs are compared with a teaching practice that we want to improve.
- Permanent update and comprehensive improvement in a constant and innovative learning.
- Advancing in personal and professional development, improving knowledge, skills, competencies, attitudes in a positive climate, in a process of responsible and continuous self-renewal.
- Developing competencies that integrate knowledge, skills, abilities and values.
- Expansion of new knowledge to improve the educational practice.

The most important learning experiences of professional character in the autobiographies are focused on:

- Satisfaction with preschool. Teachers recognize that the school context is a crucial stage for becoming a preschool professional.
- The richness of the community, the families and cultures with which they interact both in their own country (Mexico, Spain) and the experiences with vulnerable communities of Mexican students in the United States, particularly in the city of Chicago, as well as with those vulnerable communities interested in school culture and in a new framework of actions and relations with such communities.
- Most students and experienced teachers assume that the role of

teachers and their involvement in the new culture of kindergarten school is the basis of educational innovation and collaboration with families and the environment authorities. They are aware of the complexity of the comprehensive education of children.

- In their narrations teachers agree that one of the most important training contents are didactic methods, which highlights the most relevant aspects of teaching in pre-school.

- The teachers emphasize that among the competencies, which must be cultivated by the pre-school teacher, playfulness stands out; this implies a different way of perceiving reality, sharing the spaces of interaction between colleagues, families and students. They consider that it is important to be open to a creative process of openness and meaningful search of people and human groups in collaboration.

- The diversity of people, communities, cultures and families is a great challenge for pre-school teachers, for which they have to be prepared. They have to learn to discover the creative wealth of each person and human group with which they interact, acquiring knowledge and profound mastery of new practices that every student and team demand.

- Several participants consider that it is necessary to have at one's disposal the most valuable aspects and fundamental knowledge about pre-school education, highlighting the area of communication, problem solving in various social and personal situations, and an approach to the artistic aspect of education.

The contributions of the training of professional competencies are essential to understand the complexity of the teaching task and educational practices based on reflective inquiry, the study of each training action and the challenge of a culture of permanent innovation.

Thus, among the most valued competencies in early childhood education are:

- Empathy, communication, playfulness, artistic understanding, emotional harmony, collaboration, etc., are stated by teachers as the most characteristic and determining competencies of a professional of education.

The practical and applied vision of competencies is amplified by the identification of beliefs and thoughts that teachers construct during educational action and performance of the teaching. Thus, among such beliefs and as a complement to such competencies, new beliefs about educational practice have been generated, for instance:

- Feeling of equality among all people.
- Continuous opening to the diversity of all students and families.
- Sense of belonging to the school community and involvement with families.
- Positive impact of school education on the training and preparation for the life of each student.
- Commitment to community and school.

The competencies and beliefs show the main forms of professionalization and progress of the educational institution.

7. Discussion and Proposals for the Reflection and Development of the Biographical-Narrative Methodology

- The findings of this research are consistent with previous studies on the value of the uniqueness of training scenarios and styles of professional advancement (Day and Quin, 2012; Dominguez, González, Medina and Medina, 2015), as well as advances in life stories (Huber, 2010; Borghi, 2011; Gervilla, 2014).
- Student teachers need for their training institutions of practice to confront them with the challenges of diverse students, which need the recognition of their specific ways of being and have to be supported in their full development.
- Families have to be incorporated in a climate of collaboration between pre-school and various social scenarios to promote the full training and education.
- Generate a model of pre-school teacher that corresponds to the most representative models of the last century (Montessori, Agazzi sisters, experiences of Modena, Reggio-Emilia, Turin (Borghi), Schools open to the community, scenarios of the Universidad del Norte (Colombia).

- Elaborate the educational models and develop a dialogue with teachers of the area and assume the challenge of "master teacher" to generate genuine communities with a climate of constant improvement of relations (between teachers, students, families, social environment, and cities).
- Define monthly projects, tasks, processes, scenarios, etc. that synthesize the true meaning of the actions that are undertaken and which are realized by the educational community as an integral plan for an education that generates new values, styles and areas of advancement between teachers and students.

We highlight the findings of this research and its coincidences in the necessary combination and complementarity between the development of professional competencies, the emergence of beliefs and the use of findings derived from bio-narrations, to generate creative and integrated models of training of preschool teachers. We are aware of the innovative role of authentic teacher training and the impact of such a training on the integral improvement of professional thinking and the performance of educated practice of justified quality.

The vision of Kim (2013), who underlines "the unique concept of professionalism: passion, dedication, and commitment" is consolidated, taking up again some of the experiential bio-narrations, the urgency of professionalization and the full training of teachers of preschool education because of its impact on the personality and family and community ecosystems of children.

The contributions of Ayers (1989), Goldstein (1997), Biklen (1995) are confirmed in the texts of the samples of this research, in particular "love, care and other nurturing behaviors are privileged attributes in preschool teaching context", underlining the "professional job" that is consolidated in the numerous phrases expressed by the protagonists of this research. We emphasize the importance of work, the validity of the second-degree reflections of professional knowledge, assuming a deep and creative line of meaning of reflective practices, teaching meta-thinking and active collaboration between teachers who are moving forward in an intense personal and institutional commitment (Fernandez Cruz, 2012, Correa 2014).

The meaning and keys of narrative inquiry as stated by (Chase, 2011) "because narrative inquiries are still a field in the making, I suspect that narrative researchers will continue to ask these questions about colleagues, conversations, and communities" and Spry (2011), "the autobiographical subject…created through a performative process of critical narration" have been confirmed by the current research. They have also been converted into a process of criticism of educational practices, providing unique data that demonstrate how bio-narrations support the development of awareness of the processes and improvements in pre-school education.

We highlight some final reflections that anticipate advances in research and in the most adequate ways to respond to the enormous problems that are experienced in educational institutions of pre-service teacher training in various countries:

- The pre-service training of pre-school teachers will be improved and intensify the experiences, situations and most relevant methods that experts have experienced as positive for teachers and students from former career courses.
- Teacher trainers must be charaxcterized by a deep commitment to each student teacher to help him/her to identify the model, methods and relevant tasks to achieve his own line of professional and comprehensive learning.
- Narrations / life stories of teachers are an innovative methodology that consolidates the most relevant situations, methods and training actions for teachers, who have reflected and shared their pedagogical models.
- The conceptual map of training focuses on two modalities:
    - *Professional Development:* through the performance and realization of reflective and creative practices of an innovative teaching style.
    - *Training Agenda* that shows that the situation of progress and consolidation of initial training are especially PERIODS OF PRACTICE that students have experienced; and on the other hand, they are investigative and reflective practices, which have consolidated the professional line of each specialized teacher (teachers of Normal Schools).
- It had beeen detected that the integrated training, from the progress in competencies on, the emergence of creative beliefs,

the self-reflection and the narratives / stories of life are closely complementary and enriching.

- We emphasize the potencies, confidentiality and data quality of concept maps and reflections in narrative inquiries of students and teachers in the final year of pre-service training. Particularly important are they for identifying and developing authentic training situations.

- The new education is a comprehensive project, vital, shared and assumed throughout the community and educational sector, aware of the innovative role that every human being must take, share and enjoy, promoting divergent thinking, harmony, emotionality and collaborative empathy.

- The initial training of pre-school teachers must be fully characterized by existential plurality, a deep commitment to all people and open to a style of a fruitful, harmonious, empathetic life and of intense proximity with each girl and boy and their environments.

The training of pre-school teachers will be expanded and will offer adequate ways to harmonize bio-narrative research with larger samples of opinion of teachers and students of this specialty, offering the most valuable data and sharing with the participants the challenge of providing in each course the most relevant elements that have contributed to the full professional development of teachers, the training of students, the consolidation of training institutions and the development of universities and centers for initial and continuing training of teachers of early childhood education.

Hadfield and Chapman (2016, p. 217), bring the added value of qualitative methodology to understand the values and cultures of educational institutions, especially these phenomena:

- "Historical/iterative, here, the focus is on the constructs that illustrate the role played by past experiences, pre-existing cultures, and norms in the natural of teaching and learning, and how they might be improved. These influences can range from individual habits and routines, to organizational histories of change and innovations, such as cultural reproduction and discursive manipulation".

And as second phenomenon:

- Current / contextualization, here the focus is on the immediate dynamics within classrooms and the future: "...the next phase in school improvement research is likely to be based on something of methodological volte-face, with academic researchers investigating a series of natural experiments conducted by communities" (Hadfield and Chapman, 2016, p. 29).

In this research, bio-narrations provide new data, information and expressions to improve the training of pre-school teachers. Such data and information summarize the most relevant professional visions and perceptions, emerging as an open line, and in appropriate contrast of teaching co-biographies to support all those involved in their own model of professional development and committed to the most valuable educational institutions in a continuous encounter and community framework.

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The Structure-formation Technique as a Tool for Exploring, Analyzing, and Promoting Students' Conceptions about Scientific Inquiry

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Abstract

Planning lessons for scientific inquiry is seen as a crucial expertise for student teachers in science subjects (Windschitl, 2004). A series of countries all over the world have therefore set up standards for scientific inquiry (e.g. NGSS, 2013; GFD, 2005). Therein, experimentation is given a particular importance as it completely reproduces the scientific research life cycle. In practice however the teaching of these standards proves a challenge in teacher education. Problems are caused by often still limited conceptual knowledge about scientific methods as well as limited laboratory skills of students of different teaching degree programmes. In the following article a structure-formation-technique (SFT) is presented, picking up the latest research findings in training of professional knowledge. The SFT allows firstly, to access students' Subjective Theories (ST) of content skills as well as of process skills and to make them available for the creation of learning environments. Secondly, the procedure can be used as an instrument to support learning that allows student teachers of science to reflect on their ST and their development in the course of their studies. Thus, the instrument is used as a survey and self-diagnostic tool. Results of the work with the SFT show that in the course of the lecture "Doing and reflecting experimentation" the content and process skills of science student teachers get more comprehensive, sophisticated and professional. In addition, via the SFT a change in the self-concept of students can be mapped.

1. Learning Process Oriented Teaching and Learning at Universities in Courses on Science Methods

Scientists, science teacher educators, and classroom teachers agree that students should hold knowledge about scientific inquiry, because scientific inquiry is seen as an indispensable component of scientific literacy (Abell, 2007). According to science education standards in numerous countries the term scientific inquiry is used at least in two respects (e.g. KMK 2004, NRC 2007, EDK 2011). On the one hand inquiry serves as a tool to teach science content. In this respect, scientific methods like examinations or experiments, other kinds of laboratory work, and models are used as teaching tools to illustrate science content with the aim of (a) enhancing student understanding about *facts* like plant nutrition or *concepts* like natural selection, (b) fostering interest in science and science learning, and (c) supporting students' teamwork abilities. On the other hand scientific inquiry is content in and of itself modeled after the inquiry process of scientists. It comprises reflective knowledge about scientific thinking, conceptual knowledge about scientific methods, techniques of laboratory work like planning and executing experiments, knowledge about the complexity of scientific investigations and their scope which is labeled as Nature of Science. The National Science Teachers Association (NSTA) (2002) highlights the relevance of inquiry experiences in schools by claiming "Inquiry-based laboratory investigations at every level should be at the core of the science program and should be woven into every lesson and concept strand." According to German education standards for Biology (KMK 2004) - among other objectives - students should be able to

- conduct scientific investigations using suitable qualitative or quantitative methods,
- plan and conduct simple experiments, gather and critically evaluate the data of prior testing,
- discuss consequences and limits of research design, research steps and results, and
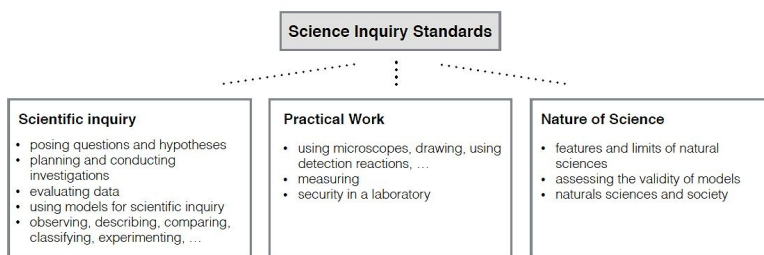- apply models to illustrate structure and function.

Figure 1: Excerpt of German education standards (KKS 2004)

As regards science teaching considering scientific inquiry as content of science lessons nevertheless seems to be unfamiliar in many schools in different countries, different subjects (biology, chemistry, physics) and over different academic years. Teachers commonly apply aspects of scientific inquiry for demonstrating and illustrating science facts and concepts (e.g. Tesch & Duit 2004, Asay & Orgil 2010, Schneider & Plasman 2011). With respect to experiments presented in schoolbooks they are primarily interested in fool-proof, real-life experiments that can be used for that purpose (Bölsterli et al. 2015). Science process skills like posing questions and hypotheses, controlling variables, conducting experiments, evaluating data with the objective of focusing on scientific inquiry as content of science lessons are rarely focused on (di Fuccia et al. 2012).

There seem to exist numerous reasons for that unsatisfactory situation. They are related to pedagogical knowledge (classroom organization, teachers' learning theories), pedagogical content knowledge (teachers' conceptions about good teaching practices in science), and content knowledge (conceptual knowledge about scientific inquiry, science process skills) as well as unfavourable beliefs (Davis et al. 2006, Schneider & Plasman 2011).

Appropriate conceptual knowledge and proficiency in process skills is seen as necessary prerequisite for the creation of science lessons focusing science process skills (Windschitl 2003). Concurrently with this hypothesis Melville et al. (2008) report data where pre-service teachers with limited inquiry experience show more difficulties planning inquiry oriented lessons than individuals with higher amounts of experience. A few studies are concerned with pre-service teachers' conceptual knowledge about scientific

methods and their ability to perform simple scientific investigations. Chabalengula et al. (2012), Mbewe et al. (2010) and Gyllenpalm & Wickman (2011a) show that pre-service teachers often encounter difficulties with defining and explaining central terms of scientific inquiry like observing, measuring, predicting, hypothesizing, and experimenting. A hypothesis for example is often defined as a "guess about an outcome" (Gyllenpalm & Wickman 2011b) without reference to theory or connection to other aspects of an experiment (e.g. question, data evaluation). Windschitl (2004) indicates that pre-service teachers hold a "tacit framework" of scientific methods that makes it difficult to plan inquiry oriented lessons. Kunz (2011) reports similar data for German in-service secondary science teachers where some of the test subjects rarely meet school science standards. Moreover primary pre-service and in-service teachers often show low levels of self-efficacy and self-confidence concerning scientific inquiry (Avery & Meyer, 2012; Forbes & Zint, 2010). One of the reasons may be seen in missing positive experiences within science in the past to value the opportunity to try things out for themselves and to explore scientific knowledge. Experience from science content courses and high content knowledge do not seem to affect pre-service teacher self-efficacy beliefs and knowledge about Nature of Science (Tosun 2000, Akerson et al. 2005). But inquiry-based science content courses can promote a positive change in attitudes if primary school pre-service teachers are actively involved in collaborative processes of learning and discovery (Riegle-Crumb et al. 2015). Capps & Crawford (2013) report for in-service teachers that reflection defined as "the ability to critically examine one's views and practice in light of new experiences and knowledge" combined with authentic investigations can serve as a tool supporting change in teachers' knowledge and beliefs about scientific inquiry.

In the light of promoting necessary content knowledge as a combination of conceptual content knowledge about scientific inquiry and science process skills as well as fostering self-efficacy and self-confidence within the group of pre-service primary science teachers several questions have to be clarified:

- What are first year primary science students' Subjective Theories about scientific methods (conceptual knowledge, process skills)?

- Does SFT prove as a suitable method to collect primary science students' Subjective Theories?
- Does SFT prove as a suitable method for students to reflect and develop their Subjective Theories about scientific methods?

2. Theoretical Background

2.1 Structure-formation Technique as a Dialogue-based Consensus Methodology

Structure-formation techniques (SFTs) are qualitative research methods that aim at disclosing the *Subjective Theories* of an individual. *Subjective Theories (ST)* are defined as complex collections of consciously or unconsciously held beliefs about learning and teaching. They are comparable to scientific theories in so far as they are characterized by a unique structure of argumentation, and as they serve as tools used to explain and forecast learning and teaching processes. Subjective Theories comprise an individual's experiences, attitudes, extracts of received theories, and other behavior controlling elements (Groeben 1988, 17).

The research process focused on the desire to interact as much as possible with the target group (*to give the target group the chance to reflect and comment*). The complex and creative process of re-experiencing actions is characterized by putting oneself in a situation or in the position of someone else. This involves the comprehending description of actions not from the perspective of an outside observer but from the point of view of the acting person itself. Specific and individual features of action are discussed in a dialogue and validated (Dann, 1992). SFTs are not standardized procedures, they need to be adapted to the given problem or to the object of research.

The Research Program Subjective Theories

The research program Subjective Theories was established by Groeben, Wahl, Schlee and Scheele (1988) and it is based on *Psychology of the Reflective Subject* (Groeben & Scheele, 1977). Its fundamental ideas are humanism, constructivism, theories of action and an epistemological conception of man.

The Assumption of the Conception of Man as a Reflective Subject

The *Psychology of the Reflective Subject* (Groeben & Scheele, 1977) criticizes the behavioral conception of man, i.e. the non-autonomous subject controlled by its environment, and picks up Kelly's concept (1955, 'man the scientist'), i.e. the approach to everyday tasks of man is qualitatively comparable to the approach to research tasks of scientists (*that man approaches its everyday tasks in a qualitatively comparable way to scientists approaching its research tasks*): Both have differentiated mental concept systems and base themselves through their actions on theses. For the scientist obvious features, according to his view of the world, are also conceded to the person being researched (object of study). These are the features of the linguistic and communication skills, the reflexivity, the (potential) rationality as well as the capacity for action (Groeben, Wahl, Schlee & Scheele, 1988). Thereby the everyday theories or Subjective Theories are taken scientifically serious, i.e. also the everyday thinking of the person being researched (object of study) has the function of explaining and predicting (prognosis) the events as well as of providing the delineation of actions (implementation of knowledge, technology), analogous to scientific (objective) theories (Groeben, 1988). Subjective Theories are complex cognition systems of the object of study in which its view of itself and the world are manifested and the ones show at least one implicit structure of arguments (Groeben, 1988).

2.2 Determination of Subjective Theories – a Two-step Process

Subjective Theories are collected in a two-step process. During the first step test subjects report about their thinking of the objects in question. The topics can be broad and general or very specific and directly initiating an action, they can refer to moral concepts, declarative or action knowledge. This first step is called ("Determination of the inside perspective"). Examples for two quite different themes are "How do you define moral courage?" (Kapp & Scheele, 1996) and "Thinking and action of teachers during their group lessons" (Barth, 2002).

During the second step results of the test subjects reports are confronted with subjects actions. The objective of this second step is to find commonalities and differences between self-report and subject actions.

Step 1: Determination of the inside perspective

To determine the inside perspective semi-structured interviews are conducted. Contents and relations are visualized within a structure. The dialogue between the scientist and the study object takes place within several appointments, whereas the reconstruction of ST further advances concluding with the dialogue-consensus the one represents the communicative validation. Meanwhile different structure-formation-techniques were developed (overview in Dann, 1992). The selected Structure-Formation Technique must be such that it is appropriate for the topic, the forms of knowledge and the study object (child or eloquent adult). This may mean that the set of rules of a well-known method needs to be adapted or simplified or even new rules developed.

Step 2: Comparing the internal with the external perspective

The external perspective comprises observations of test person´s actions. The data required derive from video recordings of the actions and can be enriched with products created during the actions like protocols, portfolios, learning diaries etc. A comparison between internal and external perspective takes place by relating both perspectives to each other and subsequently to the professionally desired actions and their justifications. Thus, this process makes it possible (1) to compare self- as well as external-perception and (2) to examine both perspectives for consistencies and divergences with the professional desired actions. The collected consistencies and divergences can be used for the development of individualized interventions.

3. Approach to Determine Subjective Theories on Scientific Inquiry

During the Summer Semester 2015 nine students participated in the scientific project "Support of experimental competence on individual level of first year primary school teacher students", where the students had to independently design and conduct an experiment at the beginning (t_1) and at the end (t_2) of the science methods course.
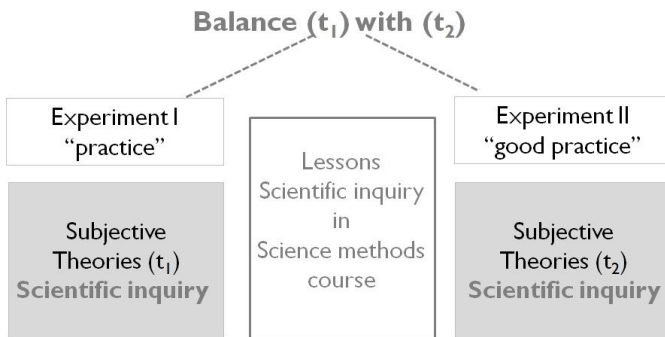
Figure 2: Balance of Subjective Theories on scientific inqury at the beginning and at the end of the science methods course

The STs about "scientific inquiry" are determined during both moments so being available two Subjective Theories of each person. For that the SFT was developed. Both Subjective Theories are analysed for similarities and differences. In our case SFT shall be further used as a tool for reflexion, either in the science method course or supporting the learning process.

3.1 The reconstruction of Subjective Theories

In order to come as close as possible to the cognitions which guide the actions the reconstruction takes place promptly in two steps.

Step 1: Reconstruction of Subjective Theories by the research person

Based on key questions the research person reconstructs his/her performed actions after being introduced to the basic rules. S/he creates a basic structure. The first reconstruction process shall stimulate the awareness about the actions during experimentation in order to be able to describe, explain and assess these. Content conceptions (Subjective Theories) are presented from the research person's point of view in form of "important statements" on small cards considering the basic rules.

Central questions: Planning of an experiment within the subarea problem collection.
Please remember in retrospect the situation where the task was handed out to you and you read it.
What did you think at that moment?

- Not what occurs to you later but only that what you thought when you read the task!
- Describe your subjective cognition (all your thoughts during planning, execution and evaluation of the experiment)

The following central questions should help you to think yourself back to the situation:
- Please describe how you preceded when solving the task.
- What did you from your point of view really do in detail?
- What did you want to achieve with it?
- From what did it depend that you just proceeded in this way and not in another one?

Figure 3: Excerpt of leading questions concerning the planning of the experiment
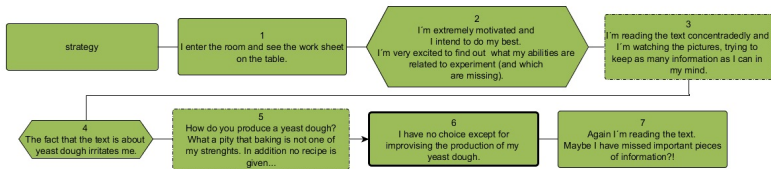
Figure 4: Excerpt of the basic structure of the first experiement in the sector problem determination

Step 2: Dialogic reconstruction between scientist and research person

Now a dialogue between the scientist and the research person takes place. The dialogue is characterized by the differentiated appraisal and reflection about the performed actions based on the basic structure. The latter is being discussed and can be further diversified during the interview (see Fig. 3). In dialogue form the approach, the conception, the insights but also illogical situations are being worked out. The interview can take place within several appointments if the basic structure is very comprehensive. The research person decides about the "meaningful interpretation" of her cognitions. The scientist assumes during the dialogic reconstruction phase the chairmanship.

He orientates himself towards the leading questions. During the dialogic phase the STs are being validated via communication. The reconstruction is concluded if the research person and the researcher agree with the described and discussed Subjective Theories (Barth 2002).
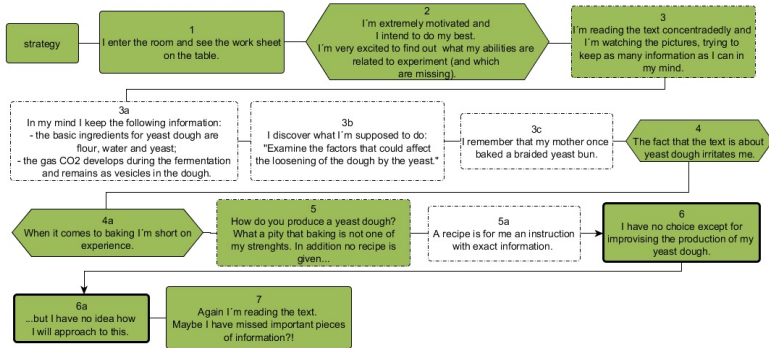
Figure 5: Validated structure via communication of the first experiment in sector problem determination

3.2 The set of rules

Subjective Theories comprise concepts and relations between the concepts. The concepts are being written on little cards visualizing actions as well as explanations, justifications and evaluations of actions. Actions are defined by action plans, process sequences and an ending.
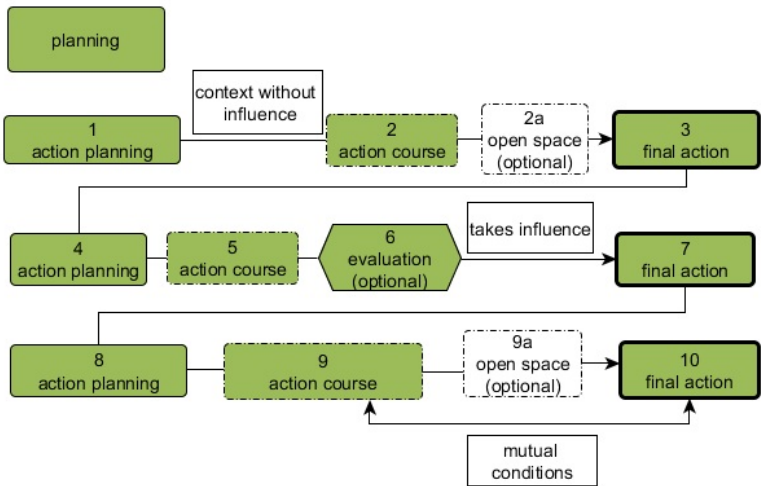
Figure 6: Excerpt of the set of rules concerning the step "planning of an experiment"

Figure 7: Colors of the cards define steps of the experimentation process

Figure 8: Different lines define relation between actions and concepts

Rectangular, thin border	Action plan
Rectangular, dash-dot border	Process sequences
Rectangular, thick border	Action ending
Rhombus	Evaluation
Rectangular, white with dot border	Additional charts

Figure 9: Different cards define the action process

4. Analysis of the Internal Perspective: The Experimentation within the Subarea of "Problem Determination"

The STs of a student named Anna concerning the sector "problem determination" are analyzed as examples and compared during two measurements before (t1) and after the course (t2). Subjective Theories of cognitive action and their assessment are realized and analyzed with regard to similarities and differences.

Anna starts with the planning of her experiment. At this stage she tries to determine the problem of the situation presented. Thereby the questioned phenomenon is identified so that a question can be developed during the next experimental step. To this end Anna needs to either reactivate her available knowledge about this phenomenon or a related phenomenon or work for missing knowledge with the help of provided material.

4.1 Development of the code system

The analysis of the internal perspective occurs through the development of a code system

a) deductively on the basis of professional perspectives about the experimental process and
b) inductively viewing the material of the internal perspective.

For the deductive code development available competence models about the process of experimenting from didactic research were reviewed (e.g. Hammann 2004; Mayer et al. 2008; Schreiber 2012; Wellnitz 2012).

During the inductive viewing the sector organization of the work process could be seen with competence assessment and emotional / motivational statements (following Bandura's self-efficacy concept 1997).

4.2 Case-analytical Description of the Subjective Theories

Accordingly, the analysis of the inside perspective during both measurements is described and compared case-by-case.

The following analysis refers to the first phase of the experimental process called "problem detection". The code system is subdivided in three independent sectors/codes.

> **Sector 1:** Scientific inquiry comprises knowledge about the scientific thinking process like content knowledge, scientific methods (knowledge about the process (e.g. sequence of the experiment) and practical work (e.g. knowledge about carrying out measurements).
> **Sector 2:** Organization of work processes comprises the description, evaluation / assessment of competencies (e.g. content knowledge, comparability of the solutes salt and sugar is being estimated as difficult), of mistakes (e.g. scientific methods, no questions and hypothesis within experiment 1), of learning strategies (e.g. excerpts of important information by marking and note-taking).
> **Sector 3:** Comprises emotional and motivational statements (e.g. experimentation is interesting, will be rewarded due to my efforts.

Table 1: *Code system with three independent sectors/codes*

Sector / Codes	Sub codes		
1. **Scientific inquiry**	Content knowledge	Scientific methods	Practical work
2. **Organization Working process**	Competences and estimations	Error analysis	Learning strategies
3. **Emotion & Motivation**			

Level of complexity of the statements:

For determining the quality of the expressed statements two levels of complexity are defined.

• Level of complexity C1: comprises description of actions

• Level of complexity C2: comprises additional explanations and/or justifications and evaluations of the described actions

Table 2: *Levels of complexity of students' statements*

Complexity level (C1)	Complexity level (C2)
Contains descriptions of action	Contains additional comments and/or explanations and evaluations of the described actions

4.3 Results of the Inside Perspective: Experimentation Within the Subarea of "Problem Determination"

The Subjective Theories are analyzed quantitatively by counting the relevant codes, taking into account the level of complexity of the statements.

Within one concept card, statements about several sectors (codes) can be made. Statements are transferred into a code system (see Table 1) and evaluated with the software MAXQDA (www.maxqda.de).

The following results become apparent by comparing t1 and t2: Due to the variety of "problem determination" no implementation can occur yet; therefore no codification *"practical work"*.

Activities "scientific inquiry" (t1)

As can be seen in figure 10 in the sector "scientific inquiry" a total of 7 statements are available. Two statements within the sub-code "content knowledge" are on the level of complexity C1 and five statements about "scientific methods" on the level of complexity C2.

Figure 11 shows that within sub code "content knowledge" there are three statements on complexity level C1 and 17 on complexity level C2. Within "scientific methods" two statements are on complexity level C1 and three on complexity level C2.
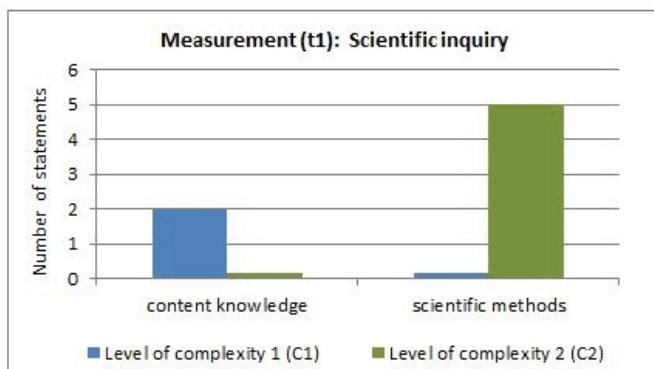
Fig.10: Numbers of statements about "content knowledge" and "scientific methods" (t1) with the levels of complexity
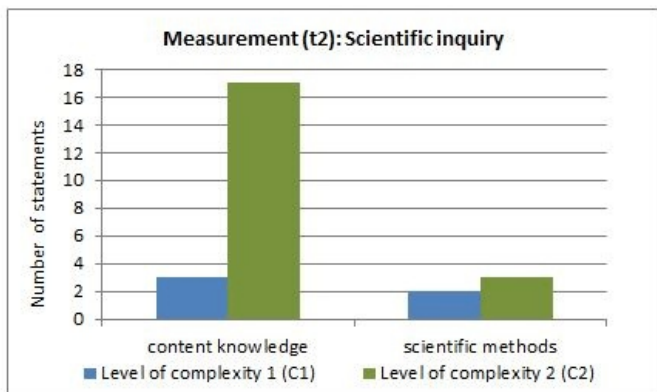
Fig. 11: Numbers of statements about "content knowledge" and "scientific methods" (t2) with the levels of complexity

Comparison of statements about "content knowledge"

Within the sector content knowledge differences between Subjective Theories at the beginning and after finishing the science method course can be identified:

1. The frequency of the statements has increased by 10 times within measurement t2 (two statements in t1, 20 in t2).

2. There are considerable changes in content and complexity of the students' statements. In t1 Anna expresses two statements of complexity on level C2, in contrast to 17 statements of complexity on level C2 in t2.

Table 3: *Statements of "content knowledge" and "scientific methods" (t1) on level of complexity and proof by charts of SFT*

Code	Sub code	Complexity level*		
		C1	C2	Proof (Charts SFT)
	Content knowledge			
	• Recording of factors of dough fermentation by yeast	2		3a,5
	Scientific methods			
	• Findings: open setting of a task causes drawing up an experiment completely		2	8,9
	• Developing of the research question by changing the setting of the task		3	10, 10a

Changes refer to a major problem Anna points out in t1 – her lack of content knowledge about the topic in question that made it difficult for her to cover the problem for her investigation. In t1 she didn't consider it purposeful to spend time on the object of investigation to conduct her investigation. The second structure shows that Anna intensively goes into knowledge about the object of research which was osmosis.

> Quotation: *"My enquiry material is lying in front of me on the table. I want to excerpt thoroughly important information. I mark interesting and important parts of the text or I briefly write notes on the margin."*

For Anna the outcomes of the enquiry process about the topic osmosis are the basis for the formulation of key questions and development of hypotheses. Although Anna has knowledge about osmosis she verifies her existing knowledge. Thereby she gets new information that osmosis is not influenced by the type of substance but by the level of concentration of the solutes.

She wants to investigate this circumstance. In absence of sufficient knowledge about the molecular composition of the solutes salt and sugar she rejects the research question:

> Quotation: *"Since I am not sure as to chemistry, it made me feel unsure that sugar is a disaccharin and salt is simply build in a different way. I can't compare both substances."*

Table 4: *Statements of "content knowledge" and "scientific methods" (t2) on level of complexity and proof by charts of SFT*

Code	Sub code	C1	C2	Proof (Charts SFT)
Scientific Inquiry	**Content knowledge**			
	• Deepening of the knowledge about Osmosis by research material		4	5,5a
	• Resolving of the concentration balance by diffusion	3		9,10
	• Resolving of the passive transport procedure with osmosis without energy effort		6	10, 11
	• Term explanation solute, • Resolving of the solutes salt and sugar of the same amount • Resolving the size of the salt and sugar molecules		6	15, 16a, 17
	• Because of the lack of sufficient chemical knowledge only the solute salt is examined		1	18a,19
	Scientific methods			
	• Asking the central question	1		16
	• Leaving the central question because of the lack of sufficient expert knowledge of the molecular structure of the solutes		3	16,16a
	• Asking new central question	1		23

Comparison of statements about "scientific methods"

There are five statements at the beginning and at the end of the scientific methods course, respectively. In contrast, the level of complexity has changed after the course. There are three statements within the complexity level K2. Only in t2 Anna is able to provide detailed information about the way she developed the research question on basis of her inquiries. As expected the phase of problem determination within the sector scientific method seems to play a secondary role.

Relating to the sector of problem determination the scientific method course was profitable for Anna. After the course Anna was better able to assess the meaning of a thorough content analysis before the formulation of research questions. For Anna the sector scientific method plays a secondary role at this stage. The level of complexity of the statements has

increased. After the course Anna provides explicative information about the research question´s development. She deduces her final research question from the time-consuming inquiry about the process of the osmosis.

> Quotation: *"What influence has the additional administration of water to a salad dressing on the intensity of the osmosis process?"*

4.4 Organization of the working process

Figures 12 and 13 comprise evidence about the organization of work processes. Altogether there are four statements depicted in table 3 and 24 statements in table 4. Figure 12 shows the sub-code competencies. There are four statements on the complexity level C1:
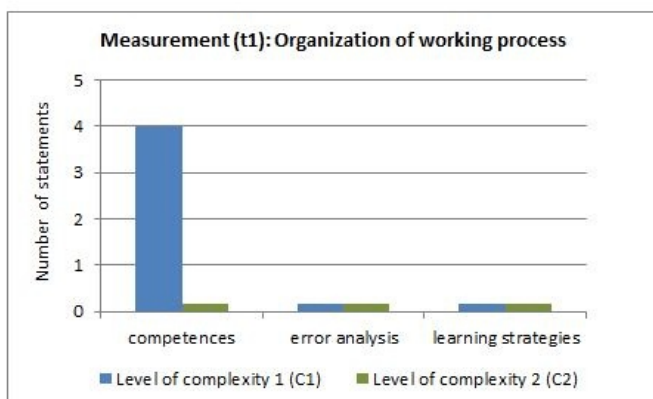
Fig. 12: Numbers of statements about the organization of working processes (t1) on two levels of complexity

In figure 13 we see that within the subarea competence there are altogether 18 statements on complexity level C2 and one statement of complexity level C1. Additionally there are within the subarea "analysis of error" two statements on complexity level C1 and within the subarea "learning strategies" six statements, three of them on complexity level C2.
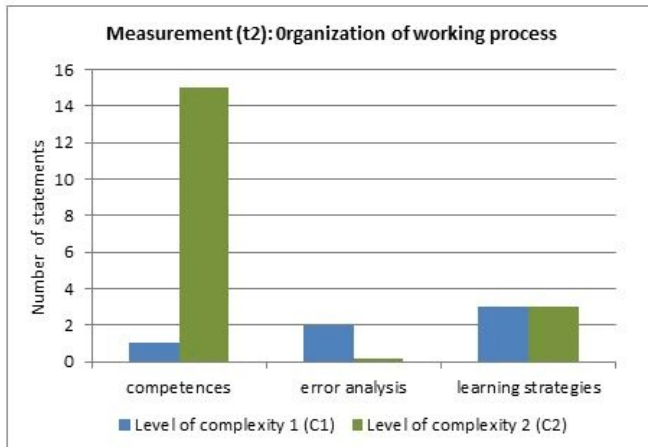
Fig. 13: Numbers of statements of the organization of working process (t2) with the levels of complexity

In turn, a difference in the sector organization of the work process is clearly recognizable. The frequency has increased by three times and barely three times on complexity level C2 of the statements compared to the measuring at the beginning of the course. Furthermore, the subarea "analysis of error" has two statements on complexity level C1 and the subarea "learning strategies" has three statements on complexity level C1 and three statements on complexity level C2.

Table 5: *Statements about the organization of working processes (t1), sub-code "competence" with levels of complexity and proof by charts of SFT*

Code Organization Working process	Sub code	C1	C2	Proof (Charts SFT)
	Competences			
	• Knowledge of experimenting – which does exist - which doesn't	1		2
	• Uncertainty because of the lack of experience in baking	1		4
	• No imagination of the realization of producing a dough	2		6,6a

Table 6: *Statements of the organization of working processes (t2), with the sub-codes "competence", "error analysis" and "learning strategies", with levels of complexity and proof by charts of SFT*

Code Organization Working process	Sub code	C1	C2	Proof (Charts)
	Competences			
•	New mistakes will certainly happen	1		4
•	Comparison of the solutes salt and sugar causes difficulties		2	19,
•	no sufficient knowledge about the structure of the molecules of salt and sugar		4	19a
•	Searching for the central question consumes time		4	21
•	Planning comparison of experiment 1 and 2		5	21a
	Error analysis			
•	Avoiding mistakes, like no setting up a construction of a hypothesis, no control of material	2		1, 4
	Learning strategies			
•	Fixing important passages by excerpting	3		7, 8
•	Clearing of the fact selective-permeable membrane by a sketch		3	12,12a, 13

In t1 changes within describing, assessing and evaluating of performed actions are found; Anna now appraises her competencies more realistically and draws conclusions for her further scientific inquiry procedure. She evaluates her knowledge in chemistry as insufficient and her endeavor too exigent.

> Quotation: *"My chemical knowledge is not profound enough and imy endeavor is too exigent for the short time."*

Therefore she rejects her original research question. Within the available time (90 min) she cannot solve the problem of the molecular structure of the solutes salt and sugar. Searching for a new key question takes her a lot of time.

> Quotation: *"The better the basic knowledge the bigger the chance of success during experimentation."*

Anna evaluates her knowledge of planning during experiment 1 as "unmethodical". From her point of view she now (t2) works in a structured manner as a result of the interventions during the course.

During the second reconstruction process, besides the description and evaluation of competencies, information about the analysis of error and the handling of difficult situations (learning strategies) is added. Anna wants to absolutely avoid her errors during experiment 1. She did not build hypotheses and inspect the material.

Quotation: *"I am curious about the second real experiment. Will I repeat the errors of the yeast dough experiment (e.g. no hypothesis, no inspection of materials)? Which new errors (which will happen for sure) will I make?"*

Anna takes her time in order to detect difficult situations. She repeatedly goes through the assignment, reviews the notes, and marks again important passages in order to find new indications for new research questions based on repeated inquiries.

4.5 Emotion/Motivation

In Figure 14 and 15 statements about emotional (a total of 3 statements, complexity level C1) and motivational procedures (8 statements, 7 on C2, 1 on C1) are represented. Here too, the statements increase quantitatively.
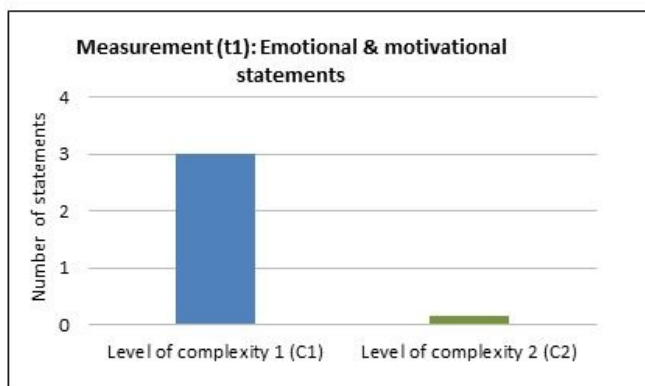
Fig. 14: Numbers of emotional and motivational statements (t1) with the levels of complexity
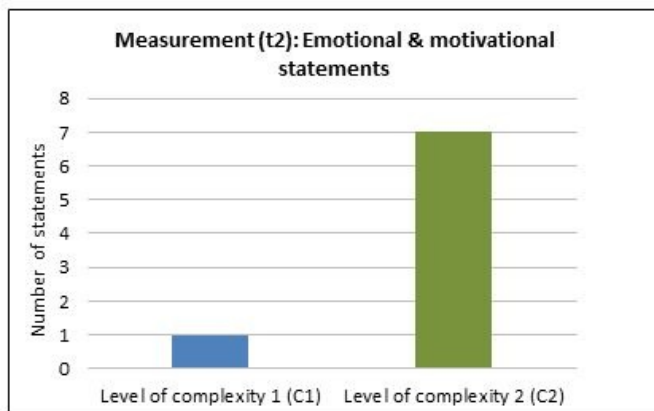
Fig 15: Numbers of emotional and motivational statements (t2) with the levels of complexity

Compared to the beginning of the course there is nearly a 3-fold increase. The complexity of the statements also rises. At the beginning there were no complex statements, after completion of the course seven from

eight were accredited to C2. The least statements appear in the sector emotional/motivational processes.

Table 5: *Statements of emotional and motivational processes (t1) with levels of complexity and proof by charts of SFT*

Code Organization Working process	Sub code	C1	C2	Proof (Charts SFT)
	Competences			
	• Knowledge of experimenting – which does exist - which doesn't	1		2
	• Uncertainty because of the lack of experience in baking	1		4
	• No imagination of the realization of producing a dough	2		6,6a

Emotional / motivational processes

After the course before starting her investigation Anna is relaxed and confident that she will be able to successfully plan and execute the experiment. Experimentation is interesting for her. She is motivated to prepare the experimental design. Errors of experiment 1 shall not occur again. This would be a defeat for her.

The acquired experimentation structure during the science method course (experimentation cycle) is a support and orientation for Anna and the basis for the development of hypotheses and the planning of the experiment. Anna feels rewarded for her undertaken efforts, she does not feel stressed and wants to begin with the building of hypotheses. The optimism does not seem to be broken after the "unmethodical first experiment". She is now curious about the second experiment.

Anna's results in the sector emotions and motivation show that the SFT also offers an opportunity to manifest the emotional and motivational processes.

Table 6: *Statements of emotional and motivational processes (t2) with levels of complexity and proof by charts of SFT*

Code Organization Working process	Sub code	C1	C2	Proof (Charts)
	Competences			
	• New mistakes will certainly happen	1		4
	• Comparison of the solutes salt and sugar causes difficulties		2	19,
	• no sufficient knowledge about the structure of the molecules of salt and sugar		4	19a
	• Searching for the central question consumes time		4	21
	• Planning comparison of experiment 1 and 2		5	21a
	Error analysis			
	• Avoiding mistakes, like no setting up a construction of a hypothesis, no control of material	2		1, 4
	Learning strategies			
	• Fixing important passages by excerpting	3		7, 8
	• Clearing of the fact selective-permeable membrane by a sketch		3	12,12a, 13

5. Discussion

The aim of this structure formation technique is to survey and analyze Subjective Theories before and after a course on scientific methods for science teacher students on the primary level. Therefore it was obvious that when selecting an appropriate instrument, the researched person "must get a chance to speak".

The *psychology of the reflexive subject* (Groeben & Scheele, 1977) assumes that people approach their daily duties qualitatively in the same way as scientists approach their research duties. Cognitions about performed actions are described, discussed and communicatively validated from the perspective of the research person.

After finishing the course on science methods significant differences in all sectors can be seen. Anna reconstructs her learning processes on a cognitive level (scientific inquiry and organization of work process) and

gives information about emotional / motivational processes during experimentation. Anna uses the tool as support for reflection.

Altogether, the course on scientific methods seems to be profitable for Anna. The total number of statements within t1 in the subarea "problem determination" is 14. At point t2 there are 53 statements. This is a tremendous, almost fourfold increase as compared to the measurement 1.

The complexity of the statements also has increased. At the beginning of the course five statements were on complexity level C2. In contrast, after finishing the course 44 statements are on complexity level C2. The increase is almost eightfold.

Anna's Subjective Theories in the subarea "problem determination" support the findings of other investigations (e.g. Chabalengula, 2012, Gyllenpalm, 2011). Comparing the findings before and after the course on science methods there is a clear difference in the sector "content knowledge". The results show that the developed SFT enable the investigation and analysis of Subjective Theories about scientific inquiry. With the SFT it is possible to analyze and differentiate cognitive concepts from emotional and motivational processes.

At the end of the course Anna is able to describe, evaluate and assess self-critically her working process. Reflexivity of the learning process proves to be particularly significant within the teacher education programs when transferring once learned topics to new situations (Capps & Crawford, 2013; Baumert & Kunter, 2006). It can be assumed that the tool offers Anna stimulations for reflecting and evaluating her working process (e.g. due to the development of a basic structure, the dialogic discourse between researcher and the research person and due to the set of rules).

Negative as well as positive emotional/motivational processes seemed to be important for Anna during the experimentation process. The results in the field assessment of competencies, emotions/motivations indicate that the self-efficacy concept (Bandura, 1997) can be used to analyze these statements. The concept of self-efficacy describes the conscious believe of a person in its abilities/competences to plan and carry out its own actions in such a way that (future) situations can be managed. Fuchs (2005) claims

that coping with "adequate obstacles" makes self-confident (still to be verified in this study). Long-term believes in one's self-efficacy results in success that arises after coping with difficulties and after persistent focused work.

6. Conclusions

The case of Anna shows that SFT allows an assessment of Subjective Theories for experimentation in a differentiated way. The development of a basic structure and the dialogic reconstruction of Subjective Theories between student and teacher are very time consuming (approx. eight hours and three hours, respectively). However, the time involved for learning the technique is only around 45 minutes, since the set of rules was kept as easy as possible. The method is worthwhile as a structuring and also reflecting tool used within seminars as a learning support. The rules of the method showed to be feasible and applicable. The results of the student Anna show that the tool is suitable for the assessment and analysis of Subjective Theories on experimentation. The results also suggest that the tool can offer a way to reconstruct / reflect learning processes in a course on science methods.

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Qualitative Assessment of Interpersonal Competencies in Higher Education: A Case Study on Criterion-based Evaluation

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Abstract

Higher education has seen important changes to the structure and organization of it teaching in recent years, favouring an approach based on the development of student competencies. As such, interpersonal competencies are associated with developing students' critical and self-critical abilities, teamwork, interpersonal relationship skills, interdisciplinary communication, appreciation of diversity and multiculturalism, the ability to work in an international context and ethical commitment. Therefore, this study sought to describe a criterion-based instrument, also called a "rubric" by some authors, for assessing collaborative work, understood as a tool used to evaluate higher education students' skills and the development of their interpersonal competencies. Criteria linked to individual work were taken into account, including individual contribution to group work, a team-oriented mindset, collaboration, attention to work, advance preparation, handing work in on time, and type and quality of said work. Meanwhile, items including participation, roles and responsibility were highlighted under group work assessment. Moreover, this criterion-based assessment specified the different achievement levels attained by the students for each criterion, these being insufficient, sufficient, good and excellent, as well as the maximum score given. In short, this involved performing an objective assessment of students' competence development associated with interpersonal skills based on specific criteria and indicators.

1. Relevance of the Article for Quality Research in Social Sciences

Higher education has been approached from a new educational, social, cultural and technological context in recent years (Gutiérrez-Herrera et al., 2012), having undergone significant transformations in terms of its

organizational structure as an outcome of the European convergence process. At a methodological level, a change in how the teaching-learning process is conceived has been proposed, focusing on the development of a series of student competencies as well as on the acquisition and building of knowledge (Martínez, 2015). This novel approach seeks to boost learning, holding students responsible for their own learning (Harris, 2008).

Within the framework of the European Higher Education Area, the "Tuning Educational Structures in Europe Project" (2009) makes a distinction between the following types of generic and transferable skills that students should acquire upon completion of their chosen university degree course:

- Instrumental competencies: cognitive, methodological, technological and linguistic abilities that facilitate students' academic development in a higher education setting.
- Interpersonal competencies: relating to communication and critical thinking skills that promote positive interaction with other students. These may be individually oriented (capacity to express one's own feelings, critical and self-critical abilities) or social in nature (teamwork, social or ethical commitment).
- Systemic competencies: these enable students to become more familiar with the reality of their complex relationships. Implied here is a combination of understanding, sensibility and knowledge that allows one to see how parts of a whole relate and come together. This set of competencies requires, as a basis, the prior acquisition of instrumental and interpersonal competences.

In addition, the assessment system proposed in the tertiary classroom should evolve in line with this new way of understanding and developing university teaching (Hamodi, López-Pastor & López-Pastor, 2015); teachers should hand over more control to their students, encouraging greater autonomy and independence in learning (Jenaro, Flores, Poy, González-Gil & Martín, 2013). Thus, when it comes to setting out the competences that students should acquire, we must consider not only how to teach them, but also how to assess them (García, 2014). According to Medina, Domínguez and Sánchez (2013), competence-based assessment means gauging the students' command of the most relevant knowledge areas, its application for solving problems within the profession, and monitoring advances in the

values and attitudes most consistent with the deontological rules required for performing this assessment.

As such, student-oriented assessment calls for an ongoing process which includes teacher-student feedback to ultimately improve the teaching-learning process (Offerdahl & Tomanek, 2011; Sancho & Escudero, 2012); this makes it an essential tool for conducting follow-ups and keeping tabs on progress, guiding and reinforcing the learning process and quality in higher education (Castillo, Hernández, Munevar & Postilla, 2014).

Furthermore, and as pointed out by Mateo and Vlachopoulos (2013), every evaluation process requires competencies for assessment to be identified and the context in which they are applied to be determined, characterizing and implementing them based on the associated learning outcomes and establishing the achievement levels. Additionally, and according to Rodríguez, Ibarra and Gómez (2011), three requirements should be accounted for when developing learning-oriented assessment practices:

- The evaluation tasks should also be learning tasks.
- The students must be actively involved in the assessment.
- Feedback should be made available.

Research carried out by Martínez (2015) highlights how students welcome this shift in learning assessment via the use of different instruments. These are defined by Rodríguez and Ibarra (2011) as real and tangible tools used by the assessor to systematize their opinions of different aspects. Meanwhile, Tejada (2011) sets out a classification of assessment tools, including the criterion-based approach as a resource related to the students' "showing how" as opposed to measures that reflect "knowing" and "how…?" (such as speaking tests, practice exercises, concept maps) and tools corresponding to the act of "doing" (for example, observation). Furthermore, Panadero and Jonsson (2013) refer to the use of criterion-based evaluation for formative assessment purposes as one of the most effective methodologies for facilitating student self-assessment, characterized by:

- Presenting a series of criteria for assessing the proposed tasks.
- Using a rating scale featuring different task performance levels at a quantitative and qualitative level.
- Allowing students to compare and rate their work over the course of their learning.

García (2014) even highlights how the criterion-based approach clarifies teachers' expectations, creating clearly high quality demands for task performance, help with self-assessment and mutual evaluation. However, studies like those developed by Reddy and Andrade (2010) report on how the usefulness, reliability and validity of criterion-based assessments have yet to be precisely defined, meaning that further research linked to this field of study across a range of educational contexts is needed in order to prove their effectiveness.

This teaching resource allows to plan for goal achievement in learning (Panadero & Jonsson, 2013), while facilitiating self-regulation in the process (Nicol & McFarlane, 2006). Thus, criterion-based feedback improves students' self-reflection and control regarding their own learning process, which needs to be mantained throughout the learning experience (Sáiz & Bol, 2014). Moreover, it enables one to assess the students' learning difficulties by setting out progression criteria (Iglesias et al., 2010).

Rodríguez (2014) explains how criterion-based approaches provide students with explicit instructions guided by the assessment criteria, highlighting the to-be-assessed aspects and the weight for the overall task rating. Furthermore, the use of criterion-based assessment enables students to actively partipicate in coming up with desirable features for the end product as well as intervene in the rating procedure for assessing their work. Thus, the use of these resources may prove to be a good educational decision when faced with the need to improve the evaluation of supervised projects (Cabero & Rodríguez, 2013).

Even more, different studies including those developed by Rodríguez and Gil (2011) and Torres and Reyes (2011) have yielded positive results relating to competence-based achievement when using the a criterion-based assessment tool. Furthermore, Villalustre and Moral (2010) report how students responded favourably towards knowing what the deadlines were

for carrying out the activities as well as the assessment criteria presented in these tools.

2. Purpose and Research Question

Taking into account the previously reviewed studies and research, this study sought to describe a criterion-based approach to assessing colla-borative work, understood as a tool used to evaluate higher education students' skills and the development of their interpersonal competences.

To achieve this, criteria associated with students' individual work were considered. These included individual contribution to group work, colla-boration, attention to work, advance preparation, handing work in on time and type and quality of said work. Meanwhile, items including participation, roles and responsibility were highlighted under group work assessment. Moreover, this assessment tool specified the different achievement levels attained by the students for each criterion, these being insufficient, sufficient, good and excellent, as well as the maximum score given to the student.

3. Description of the Study

The criterion-based assessment presented in this study was applied to the Primary Education degree program taught at the University of Jaén (Spain), specifically for the first-year compulsory subject "Educational Processes and Contexts in Primary Education". When developing the practical work assignments for this subject, the students were offered the opportunity to draft up a welcome plan which would include the following sections:

- Theoretical and normative rationale
- Contextualization
- Timing
- Scenarios in which this takes place
- Dynamics selection: presentation, knowledge and appreciation.

This practical work was carried out in working groups following a collaborative learning approach. These groups were made up of no more than five people, ensuring heterogeneity among members in terms of gender, personal and academic abilities, and interests in studying. Thus, we sought to use a methodology based on collaborative learning as a learning strategy to develop students' interpersonal competencies.

Once the assessment tool had been created by the teacher, it was shown to the students during one of the first class sessions; each one of the assessment criteria were deciphered, as well as the associated performance levels. The students were unaware of how this instrument was used to assess academic assignments. The tool was also made available to the students from the start of the term on, together with a work schedule that detailed the objectives, sections to cover, timing and assessment criteria.

Once the students had completed and presented their assignments, they proceeded to evaluate them. Peer evaluation took place by randomly handing out the projects among the various groups. Each project was assessed in accordance with the criteria set out in the assessment tool; a final grade for the work was given and a report drawn up justifying the assessment based on the assigned criteria. Peer evaluation would account for 50% of the final grade, with the other 50% decided by the teacher, who also based their assessment on this instrument.

4. Results and Discussion

In this context, and when creating the criterion-based assessment tool, a series of consecutive stages were taken into account, as shown in Table 1:

Table 1. *Stages for creating the assessment tool.* Source: Compiled by author.

Creating the Criterion-based Assessment Tool
Analysis of the syllabus devised for this subject (objectives, tasks, competencies and learning outcomes.
Description of assessment criteria envisaged for the project.
Formulation of the different achievement levels and rating for each criterion.
Presentation of the rubric to students. Changes and ideas for improvement.

The first step involved analyzing the objectives, tasks, competences and learning outcomes outlined in the subject syllabus. Of interest here was to identify the areas for development among students so that, in line with the proposed objectives, students could opt for certain assessment criteria over others. Thus, table 2 describes the learning outcomes to be acquired by students for this subject:

Table 2. *Learning outcomes.* Source: University of Jaén.

Learning Outcomes
Know educational institutions, their organisation and functioning. Understand the different types and forms of management at schools.
Analyze in detail the structure of the education system.
Understand how participatory bodies work in the control and management of schools; show the ability to analyze problems and suggest possible solutions.
Know and understand the opportunities and problem areas relating to students in the school setting. Become familiarized with aspects concerning admission, groupings and promotion/school year.
Gain enhanced understanding of the role of teachers and teaching coordination bodies at schools.
Know the opportunities for parent involvement in the school setting, associations, schools for parents.
Understand the opportunities school offers as a learning environment and the need for timing/scheduling work at school.
Know and handle the school management tools and the corresponding planning documents.
Understand the opportunities that the mass media affords and its educational opportunities.
Handle virtual teaching/learning environments.
Create and handle educational support teaching programs.
Carry out lesson plans adapted to specific needs
Know the basic classroom-based interaction and communication processes that promote a healthy learning environment.
Implement and interpret sociometric assessment techniques.

| Know what classroom control techniques work better with which groups of students; draw up case-specific resolutions. |
| Design activities aimed at preventing behavior problems in students. |

More specifically, these practical work assignments aim to develop competencies that promote students' collaborative and individual production, as well as analyze and understand the educational processes at play during the Primary Education stage. This includes developing activities that encourage classroom-based interaction and communication, peaceful conflict resolution, and preparing students to become active and democratic citizens (Table 3).

Table 3. *Learning competencies.* Source: University of Jaén

Competencies
Identity and plan solutions to educational situations that affect students with different capabilities and different learning paces
Analyze and understand the educational processes at play inside and outside the classroom covering the 6-12 period
Know the principles of primary education
Know the classroom-based interaction and communication processes
Address and solve discipline problems
Promote cooperative and individual work and efforts
Promote activities for teaching values aimed at preparing students to become active and democratic citizens

Based on the analysis of the competences and learning outcomes published in the subject syllabus, the criteria for assessment corresponding to the proposed practical assignments were drawn up; these would determine the quality of the students' work. The Tuning Project (2009) specifies how the interpersonal competences to be developed in higher education students address their critical and self-critical abilities, teamwork, interpersonal skills, the ability to work in an interdisciplinary team, the ability of communicate with experts from other fields, appreciation of diversity and multiculturalism, the ability to work in an international context and ethical commitment. Thus, when it comes to designing the assessment

tool, aspects linked to students' individual production as well as their contributions to the group should be taken into consideration, as shown in Table 4.

Table 4. *Criteria associated with group work.* Source: Compiled by author

Criteria associated with	individual work
Individual contribution to group work	Provide useful ideas Play one's part in the group
Team-oriented mindset	Effort Positive attitude towards the work A critical eye over other people's work A constructive opinion about the work
Teamwork	Active listening Share and support the effort made by others Seek collaborative work; everyone coming together
Attention to teamwork	Focus your attention on the work Support your classmates
Preparation prior to teamwork	Contribute necessary material Availability for the work
Handing work in on time and type of work	Handing in as per deadline Personal accountability
Quality of work	Final check of work
Criteria associated with	group work
Participation	Showing enthusiasm Knowing how to listen Knowing how to voice an opinion Contributing to solving problems raised in an activity
Roles	Definition of roles within the group Effective work performance
Responsibility	Shared responsibility in the group task

Detailed below are the different achievement levels to be attained by the students for each coursework-based assessment criterion, as well as the maximum score given to each one. On this basis, it is deemed interesting to perform an objective assessment that would enable us to determine the students' score depending on the achievement level, as outlined in Table 5.

Table 5. *Achievement level and score associated with the assessment tool.* Source: Compiled by author

Achievement level /score	Insufficient (0.25 points)	Sufficient (0.5 points)	Good (0.75 points)	Excellent (1 point)
Description	The work fails to meet the assessment criteria. The student does not take into account all required aspects during coursework development.	The student only sometimes takes into account the proposed assessment criteria. They only address some of the items required for the activity.	The student generally meets the proposed citeria for producing this work. The assignment adheres to a high percentage of criteria.	The student always meets the proposed assessment criteria for producing this work. This includes all items required for the activity.

Lastly, the assessment tool was presented to the students to learn what they think about this specific evaluation tool and any approriate changes were carried out. Ultimately, the exercise involved adapting this resource to the needs and requirements of tertiary students in the university context. In this case, and reflecting on the teaching experience previously described, the students responded favorably to the instrument; they made no changes for its implementation.

5. Methodological Consequences for Qualitative Psychology

The use of a criterion-based tool or a rubric for assessing interpersonal competencies through collaborative learning-based assignments allows us to conduct a more objective assessment, given that it describes the criteria for consideration at the design stage as well as the specific indicators. Furthermore, and as explained by Villalustre and Moral (2010), criterion-based assessment let students know what the deadlines are for each activity as well as the established assessment criteria. Similarly, this tool highlights the to-be-assessed aspects and the weight for the overall task rating (Rodríguez, 2014).

This is undoubtedly of enormous interest to qualitative research in the field of Social Sciences, notably because the criterion-based assessment makes it easier to plan students' learning objectives (Panadero & Jonsson, 2013), self-regulation in the teaching-learning process (Nicol & McFarlane, 2006), students' self-reflection and control (Sáiz & Bol, 2014), and learning difficulties assessment (Iglesias et al. 2010).

However, this study does present a number of limitations, one being its restriction to a teaching experience developed within the context of a compulsory subject taught as part of the degree in Primary Education at the University of Jaén (Spain). Therefore, the outcomes and assessments for highlighting in this exercise may limit the generalization of data and results for other populations.

Thus, future research would do well to increase the study sample, performing a mixed model analysis that combines quantitative and qualitative research on university students' perceptions regarding the use of this type of instrument to assess the learning process in a higher education setting. In short, this involves implementing teaching activities and experiences that foster competence development in students, whereby they take responsibility for their own learning, as established in the new European project for Higher Education (Harris, 2008).

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Part II: Answers to Actual Questions in Education

The Sound Sources from Musical Education Textbooks as Multicultural Reinforcers

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1. Introduction

Textbooks are still relevant resources in everyday life of students and schools (Pingel, 2010; Hummel, 1998). Usually textbooks are printed and used to promote teaching, functioning as assistants and promoters of learning (Prendes & Solano, 2009). However, in the information society the textbook is "something more" than just a teaching resource (Martinez Bonafé, 2006, p. 2). Printed textbooks in their communicative and didactic functions specifically in the field of motivation, information, active explanation and complementarity fall short of the audiovisual media that allow the combination of sound and pictures, which is clearly an advantage. Jurado and Amaya (2008) underline the importance of hearing as a category of resources that should be employed in teaching and learning, integrating spoken words and actual sounds in these processes.

Music as part of this category and first order educational tool is not necessarily academic, but represents spirit and life. However, in schools, music is perverted for evaluation purposes, for assessment, for something completely different. Reducing music from a personal signature to just another content of curriculum is a big misunderstanding in teaching systems (Rinaño & Maravillas Díaz, 2010).

In the field of teaching and learning ICT can be used sensitively for instance to record audio tracks of the true musical compositions and to

manipulate them or to create sound files for later use in educational activities. "Like any traditional musical instrument, every piece of music technology will have its own strengths and weaknesses." (Ashworth, 2012, p. 75).

In addition, music can be played on computers. The development of music software has improved over time. Nowadays, graphical interfaces allow to integrate sound as a tool available for students, letting them not only experience sound and other elements of the musical language, but encouraging the development of new, richer, varied, and highly motivating teaching and learning contexts (Tejada Giménez, 2001).

In the age of digital advances, with the development of more and more technological tools, the inclusion of ICT in a learning context of musical education appeals to many "technophiles", who advocate the use of classroom ICT, but is rejected by "technophobes". (Giráldez, 2007, p. 8). The integration of new information and communication technologies in musical activities changed dramatically the way of making music, to be a musician, composer and also a teacher. It is fascinating to see to which degree the current textbooks use already technology, particularly as regards the type of sound recording presented, considering that this allows students to experience the sound and combine the elements of the musical language in a vivid and motivating way.

We must take into account the tensions teacher experience (Atherton, 2013; Darby, 2008; Imants & Van Veen, 2009) and why they reject innovation. Therefore pre-service and in-service teacher training should incorporate three key antidotes to overcome resistance to change: "... it is designing itineraries training to promote the transition of teachers to higher levels of professional autonomy, situational and emotional protection setting" (Monereo, 2010, p. 584).

It is required to establish relations between different multimedia artistic productions, proposing pedagogical practices related to the multimodal model, using sound and music in line with visual and kinesthetic stimuli. Multimodal projects in the field of arts education will allow an approach to the world through multimedia artistic expression (García, 2012).

The textbook has been an essential element in the history of education, and is considered a keeper and promoter of culture, a "score" of know-how very simple and easy to use. Here we refer to the metaphor presented by Gimeno-Sacristán (2009, p. 26); he compared the textbook to a score of knowledge, thus placing the students in a learning context where the textbook is the only reference text just as the conductor has the score as the only reference during rehearsals and concerts. In this sense the dominant practices of teachers are to use the textbook as a guide to curriculum development, providing a schedule of contents. With this in mind, all teachers of music education (current and future) should seize the new educational opportunities related to the sound (without forgetting the image and text) in their classrooms, which are offered by ICT.

Music diffuses through the media and is subject to mediation by them (Sánchez Martín, 2010). Connecting education with the student's life, trying to get to it by means of sound, image, media, online and offline interaction is a key strategy. Therefore the interest is justified to develop an analysis of the content of textbooks for music education, concentrating on the question: What is presented to students regard to the sound?

To answer this question, a general objective was drafted to analyze the sound recordings contained in textbooks for music education. Thus we wanted to find out what kind of sound material is offered to students and whether these materials meet the transmission and driver function of multiculturalism. It is intended to identify whether the sound of textbooks is supported by new technologies; whether the average of the sound materials in textbooks is compatible with the reproduction of complete musical themes; who are the composers and performers identified in the sound materials; whether these materials are mostly original versions; which is the dominant musical style in these materials; and whether the sound parts included in music education textbooks are taken equally from the five continents. In order to answer these questions they were formulated as specific objectives:

- Identify the type of resources that carries the sound;
- Discover the duration of the sound parts included in textbooks;
- Identify composers and selected / referenced interpreters;
- Analyze the predominant musical style;

- Identify the representative world region.

It is important to remember that, according to Choppin (2007) each subject analyzes the textbooks of their area and – in the case of this study – explains the content analysis with didactic interest. It is essential to consider that school textbooks should allow
- to display problem situations confronting students with complex situations that are contextualized or similar to real life situations;
- to explore several sources;
- to activate students as much as possible;
- to organize situations of interaction between students by inducing social cognitive conflicts;
- to stimulate learners' reflection as regards their activity;
- to encourage student-centered evaluation;
- to allow students to structure their new acquisitions;
- to help students to integrate their personal resources;
- to "investigate the meaning of each learning" (Gérard, 2011, p. 38).

2. Research Methodology

Data collection used for this research was the documentary analysis of textbooks. We opted for the content analysis of the information. This content analysis technique requires the categorization of data that can be included in several types of communications, documents, audio, audiovisual, multimedia, etc. The content analysis can perceive the frequency occurrence of certain categories following a methodical way in information processing (Flick, 2014). After a survey with the publishers of the textbooks that are in printing, the sample number was defined in the study to recompile the information and process it through qualitative analysis tools (software *NVivo Qualitative Data Analysis* - version 10).   The document analysis used the four textbooks of music education for the 3rd cycle of basic education available in Portuguese language.

Table 1: Sample of analyzed textbooks

Title of textbook	Abbreviation
Fábrica dos Sons 8/9	M1
Menu Musical (nova edição)	M2
MP3 7/8 (nova edição)	M3
MusicBox	M4

The content analysis is based on information whether particular characteristics are present or absent. However, this again is based on interpretation, thus preferring the fertile subjectivity of interpretative endeavors over the detached frequency information oe mere word counts. The main advantage is to allow an easy comparison of several cases analyzed b standardized categories. In the particular case of this work, it is a structural study of the contents of a type of mass communication – textbooks – particularly for music education. The main objective is the analysis of the occurrences to meet objectives related to the semiotic code (music/sound). Without any kind of relationship with independent variables it is intended to demonstrate the regularity of certain events and their characteristics through a taxonomic analysis that allows certain comparisons.

We chose to use the software NVivo 10.0 because of its potential. This software stores, organizes, manages and reconfigures efficiently the codes. However, this code is not produced by the software, but it is the responsibility of the investigator. The codification process is realized by organizing data grouped into content cores that share similar characteristics (Saldaña, 2013).

In this study the thematic element of the sound was to characterize the textbooks of music education in relation to sound content identified and included in them. In this sense, the sound parts were considered available for use in the classroom by teachers and students and even at home. The sound itself was not analyzed only audibly but also in writing and based on the script of sound parts and other complementary resources to textbooks for music education.

3. Results

Regarding the sound present in textbooks for music education, this was the subject of study based on the analysis of the

- type of support features of the sound track and its duration.
- composer and performer.
- musical style and representative world region.

Content analysis detaches six categories (2nd level): resources; duration; composer; interpreter; music style; and world region (Figure 1).
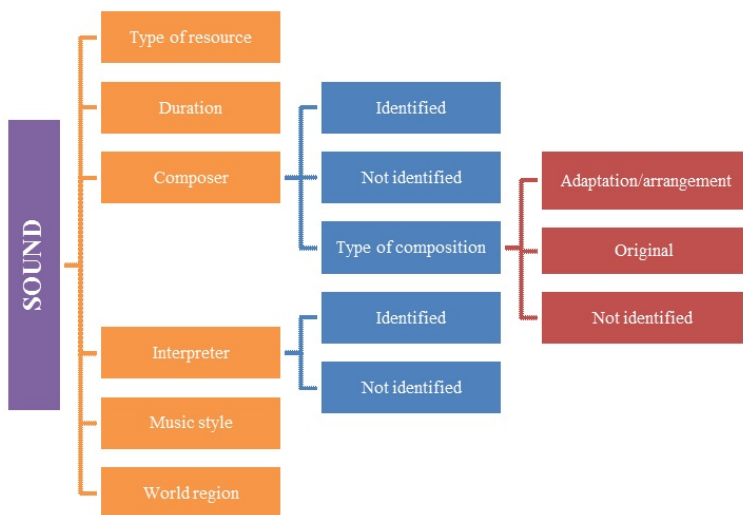
Figure 1: Subcategories of the thematic unity sound

3.1 Resources and duration of the sound tracks

In the category analysis (sound) were treated all the sound examples accompanying textual and visual content of the textbooks in study. The sound resources relate to all supplementary materials of textbooks of music education that are available to students/teachers use and better enjoyment.

Here was required to identify whether the textbooks in question have complementary sound material, as is the case of sound tracks in digital format, CD or DVD media with songs from the scores, access to music audible bases online, music listening software, site indication for listening, among others.

For example, the identified additional resources of M2 are just a CD with a total of 52 sound tracks. This is the only resource that exists in addition to the printed textbook, without the distinction of being used by teacher or student. In turn, in the M4 were identified again teacher CDs, a total of five. Students have their tracks to listen in addition to the information included in the textbook by downloading through the website of the publisher.

In the four textbooks analyzed the sound is predominantly provided by an audio CD. The CDs feature between 66 tracks (M1) and 198 (M3). The textbook with less sound tracks is M2 (n=52) and M4 (n=50). The average number of tracks in these textbook is 91.5 in a total of 366. Either the M1 or the M4, the only sound resources that exist are to be used by the teacher. The tracks used by the students in M4 are achieved by download from the website of the publisher. In M2 and M3 there is also a CD for students.

The duration in hours, minutes and seconds relates to the average time of each track identified in textbooks of music education. The duration in seconds of the identified compositions in M2 varies between the minimum value of 47 seconds and the maximum of 7 minutes. The global value of 52 sound tracks corresponds to 84 minutes and 2 seconds, and the average of each composition is about a minute and a half. Regarding the M3 teacher CD, the total of the sound tracks is 4 hours 53 minutes and 7 seconds, and the length is between the minimum value of 4 seconds and a maximum of 5 minutes and 33 seconds. The average value of each sound track on the teacher CD is 1 minute and 38 seconds. Regarding the student CD, the duration in seconds of M3 sound tracks varies between a minimum of 25 seconds and a maximum of 5 minutes and 7 seconds. The average value of each sound track is 2 minutes and 1 second.

Globally, the duration in seconds for textbooks has taken into account the average duration of each identified sound track. The manual with the

longer sound parts is the M4 (1 minute and 8 seconds), followed by the M2 (1 minute 6 seconds) and the M3 (1 minute 3 seconds). The textbook with shorter sound tracks is the M1 (57 seconds). On average, the sound tracks of the textbooks last 1 minute and 4 seconds.

3.2 Composer and interpreter

With regard to the composer of the sound tracks it was considered to create three subcategories to understand if the composer is identified or not and which is the type of composition. Composers were identified using graphics, texts and listening. Composers should be recognized by a direct expression of his/her name in the composition, otherwise we concluded that there is no identification associated with the composition. The analysis of the sound tracks to gather information on the intention to work aurally the intercultural and multicultural dimension, essential in attention to diversity, both in terms of representative musical genres, both in terms of periods of music history and most referenced composers. The type of composition was divided up into three categories: adaptations/arrangements of the textbook authors; original from the textbook authors; and unidentified. The purpose of the creation of this element of analysis is related to the need to verify that the presented and used compositions in textbooks of music education are adaptations or originals from the textbook authors. We also created the topic "unidentified", in which case it is not possible to frame the composition in terms of authorship.

In the case of textbooks for music education considered appropriate also to study the occurrence of varied music performers. This category was separated in two parts: the first for the framing of the performer as an individual artist or music group; and a second that involves the identification (artist or band) or the non-identification of the interpreter associated with the sound track.

In the analyzed textbooks were recognized authors and composers, but more frequently we found unidentified composers (n=304/538) compared to the identified (n=234/538). In M1, the most frequently identified composers embrace Bach, Rimsky-Korsakov, Tchaikovsky, Chopin, Mozart, Dvorak, Mussorgsky and Scott Joplin, for example, which has a representation of n=2/538. In the M2 are newer composers and a smaller

amount of classic musical style, such as: João Gil; Bem King, Jerry Leiber e Mike Stoller; Carlos Paião; Dina; John Laudermilk; José Cid and Paulo Gonzo. M3 provides more classical composers such as Mozart, Bach, Beethoven (n=8) and Tchaikovsky, also identified in M1. It is also possible to identify composers from other styles, such as: Scott Joplin; Delibes; Haydn; Carulli; Adolph Adam; Afonso X o Sábio; Andrew Lloyd Webber; Assis Valente; Briccialdi; Monteverdi; Duke Ellington; Chopin; Schubert; Fernando Pessoa and Mário Pacheco; Haendel; Puccini; Rossini; Verdi; Hoffmeister; Brahms; among others. Some of these are common to M1, such as Scott Joplin.

Already composers identified in M4 are common to M1, as is the case of Mozart. They are still Wagner, Andrew Lloyd Webber, similar in M3. From the sound tracks, it was also possible to collect information whether they are adaptations or arrangements of the textbook authors, original textbook authors, or whether the authors are not identified.

Of the overall of 315 sound tracks existing in the four textbooks the authors of the arrangements (n=247/315) are mostly unidentified. Those in which it was possible to identify the authors, the results show that they are arrangements or adaptations of the textbook authors (n=68/315), not being identified any original hearing of the textbook authors.

Regarding the interpreters, the attention was focused on whether these are or are not identified in the study textbooks. The data collected show that the interpreters are mostly not identified (n=334/538) compared to those who are named (n=204/538). Those that are identified, split the analysis in group or individual, predominantly of the group (n=117/204) comparable to the individual (n=87/204).

Between the individual performers identified in the sound recordings of the M1 the most prevalent are: Elvis Presley, Jerry Lee Lewis, Madonna, Manu Chao and Michael Jackson. Less frequent are sound tracks of Amália Rodrigues, Bessie Smith, Bob Dylan, Bob Marley, Jimi Hendrix, Louis Armstrong, Mário Laginha and Miles Davis. In the M2, the sound parts of Paulo Gonzo are the most frequent. In M3 are identified as the most frequent the interpreters Yaya Diallo, Louis Armstrong, Bessie Smith, Bill Haley, Cindy Lauper and less representative Elvis Presley, Vitorino, Mariza

and Rui Veloso. It is emphasized here that Elvis Presley, Bessie Smith and Louis Armstrong are more common in M1. The M4 has in common with the M1 performers like Elvis Presley (the most common), Madonna and Manu Chao.

Already in the group of the interpreters in the M1 stand out Super Tramp with a dual presence, followed by names such as Art Tatum, Delfins, Stéphane Grapelli and Django Reinhart, The Police, Rolling Stones, Toon Tunes and Xutos and Pontapés. The M2 is the only textbook in which the group of performers exclusively represents folkloric ensembles, such as Maio Moço, Tons do Povo, Brigada Vítor Jara and Terra a Terra. The M3 has in common with the M1 the Xutos e Pontapés and the Rolling Stones, identifying names as Clã, Beatles, UHF, Queen, GNR, Fugees, Vozes da Rádio and the folkloric group from Santa Marta de Portuzelo and the Red Hot Chili Pepper.

In M4 are identified sets of interpreters as the Muse, Swingle Singers, Queen, The Who, The Beach Boys, The Beatles, Iron Maiden, Spice Girls, ABBA and the Rolling Stones. The Beatles are common to M3, while Rolling Stones also are identified in M1 and M3. One can realize that the interpreters of the most relevant groups for textbooks are: Beatles, Rolling Stones and Xutos e Pontapés, which are represented in three textbooks (M1, M3, and M4). Again, the most representative individual interpreters are Elvis Presley, Madonna and Manu Chao in three of the four textbooks (M1, M3, and M4).

3.3 Musical style and region of the world

The identification of the musical style of sound tracks led to its division into traditional/folk and classical style. The sound concern of traditional/folk style refers to the music that is part of folk tradition of a particular geographic area or context. In this style are encoded tracks representing the rock, pop, hip-hop, jazz, blues, gospel, black spiritual, cha-cha-cha, samba, kizomba, reggae, ragtime, country, disco and many others. The classical style is the musical diversity that covers all the songs and compositions of a certain historical period, in this case divided into: medieval, renaissance, baroque, classical, romantic, twentieth century and contemporary.

Required is also to frame the sound tracks in different regions of the world, here coded as Europe, America, Asia, Africa and Oceania. The goal is to find whether compositions of a particular region of the world are predominant over others and whether typical sound tracks from Portugal (original country of textbooks in the study) are represented more frequently than those from other European countries.

In the overall analysis of the textbooks we identified thirty-two musical styles exemplified in the sound tracks (n=543 total sound tracks of the four textbooks). The most representative musical styles are the classical (n=147/543) and the traditional ethnic (n=112/543) (Table 2). It was also possible to identify rock (n=77/543), soundtracks (n=65/543), pop (n=36/543) and jazz (n=23/543). The remaining styles identified occur between one and seven times in the textbooks.

Table 2: *Distribution of musical styles*

Soundtrack	65
Bebop	1
Blues	7
Classical	147
Jazz	4
Opera	23
Pop	6
Ragtime	36
Reggae	5
Rock	77
Swing	1
Tradicional ethnic	112
Disco	1
Tcha-cha-cha	4
Christmas song	6
Hip-hop	4
Quickstep	1
Rap	1
Tango	5
Samba	6
Valsa	1
Gospel	3
Country	4

Lundum	1
Modinha	1
Chorinho	1
Kuduro	1
Funaná	1
Black spirituals	7
Kizomba	1
Others	4
Total	543

The erudite style is dominated by romanticism (n=56/147), classic (n=30/147), baroque (n=29/147) and the twentieth century sound tracks (n=20/147). The less representative tracks are of the medieval times (n=7/147) and renaissance (n=5/147) (Table 3).

Table 3: *Distribution of style periods*

Medieval	7
Renaissance	5
Baroque	23
Classic	30
Romanticism	56
20th century	20
Contemporary	0
Total	147

As regards the tracks of the ethnic traditional style, it was possible to identify that there are many of Europe (n=54/112) and mostly representative of Portugal. Distribution of tracks by continents of the world in M1 notes a predominance of sounds of Europe (n=41/66) and America (n=25/66) as compared to the other identified regions (Figure 2).

Regarding Europe the sounds of other European countries are dominating (n=28/41) in comparison to the sounds of Portugal (n=13/41). Globally, the distribution of sound tracks from the regions of the world is mostly European (n=318/564), highlighting the sound tracks from Portuguese regions (n=176/318) related to those of other unidentified European countries (n=142/318). It was possible to recognize America's sound tracks (n=185/564). Less frequent are sound tracks representative of Africa (n=26/564), Asia (n=16/564), and Oceania (n=4/564) (Figure 3).
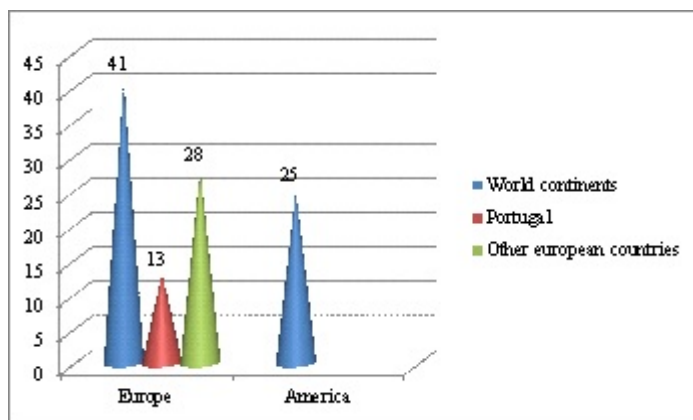
Figure 2: Distribution of the M1 sounds by continents
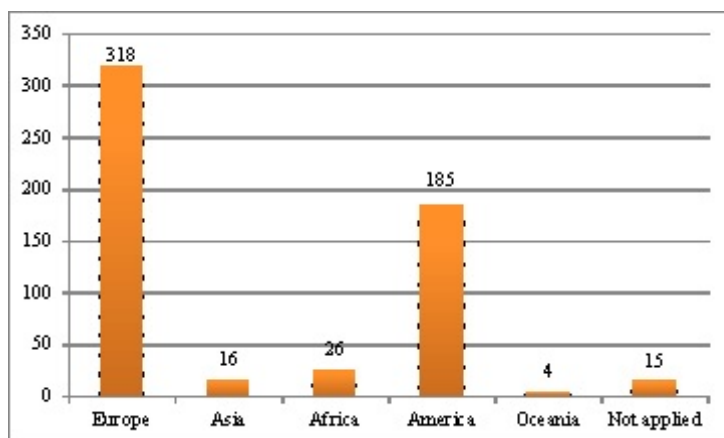
Figure 3: Sound tracks from different continents

4. Conclusions

It is a fact that the resources in which the sound is presented are predominantly CDs. It is surprising that there were not virtual platforms, pen with mp3 files, or use of any new technology instead of maintaining almost

a technology that already has thirty-three years of existence. On average these CDs have 91.5 tracks. In some textbooks there is no CD for the students, but the indication of the Web page to download the music track. It is emphasized that it is not always indicated whether the CD is available in the textbook for the student or the teacher.

The time in seconds for the textbooks took into account the average of each of the identified sound track. Thus, the average length of each of the tracks is 57.3 seconds, performing approximately one minute. In turn, the total length of the sound tracks on the CD is 1 hour and 3 minutes, ranging from the minimum value of 7 seconds to the maximum of 2 minutes and 41 seconds. The average of each track is shorter than expected. This is understandable because the class time is not sufficient to allow to listen to very long extracts, but ends up becoming a failure to monitoring the global performance, from start to the end, as if they were a real pop-rock group.

For the music tracks, as happens in the scores, we tried to identify the indication of the composer and author. It was hoped that these indicate the composer, but the data show that most of the hearings composers are not identified. When they are identified, taking into account that it is a textbook for the 3rd cycle, it would be expected that they were of a more recent period (XXI century) and current in terms of contemporaneity. This was not found, for most authors belong to the twentieth century or earlier, in which the most important are the classical music tracks. It was supposed that there was a higher amount of Portuguese composers, referring to names as for example Carlos Paião, José Cid and Paulo Gonzo who are little known in the student's musical repertoire. Also composers of various styles were identified, for example Delibes, Haydn, Carulli, Adolph Adam, Afonso X, o Sábio, Andrew Lloyd Webber, among others.

As happened with the composers, most of the performers were not identified in the sound tracks. It is unclear why publishers do not to submit this important information. Perhaps they want to avoid to include too much text in an activity section that is supposed to be more practical. In case they are identified, then they are mostly grouped. Again, as we are dealing with Portuguese textbooks, it was expected a predominance of individual performers and Portuguese groups, but this could not be confirmed. Individual performers are mostly from other countries. Also in the

interpreter groups foreign members are prevailing, and once again names that are not outstanding in the students' musical culture in the age range studied (12 to 15 years).

It turns out that composers and interpreters are rarely presented in textbooks. It would be desirable that the music tracks in the textbooks were predominantly original, however the data shows that it is rarely mentioned whether the sound tracks are original versions or arrangements, as the authors of the arrangements are mostly unidentified. In those cases in which it was possible to identify authors, the results show that they are arrangements or adaptations of the textbook authors, not identifying any original sound track from the textbook authors.

The most representative musical style among the music tracks is the traditional ethnic. Nevertheless, we also found soundtracks, pop, rock and jazz, but significantly less representative. It should be noted that in the classical style dominated the sounds of romanticism, classical, baroque and twentieth century period. This classical music style does not match the preferred taste of students. Regarding the sound tracks of the ethnic traditional style it was possible to identify that these are predominantly from Europe, mostly representing Portugal. It can be stated that the issue of multiculturalism and interculturalism is not clearly evident in many of the music tracks in the analyzed textbooks, summing up to the mere inclusion of world music when the chapter with that name is treated, reducing sound tracks of the European continent and the national representativeness. The sound tracks that are included in the textbooks of music education are not equally taken from the five continents of the world, because they are predominantly from Europe, and other regions are significantly less valued. The few presented sound examples also are not embedded in their historical and social context except some examples of the M4, the only textbook that presents interculturalism and multiculturalism more explicitly, although the number of sound tracks is small that are relevant for this particular interest.

It is paradoxical that the intercultural dimension and training for global operations on the one hand dominate the pedagogical discourse and curricula, but on the other hand they are not integrated into materials in a subject area that would be well suited for multicultural education. The textbooks still give a partial and tendentious representation of the students'

environment and does not take advantage of the potentiality that music has to bring cultures together. A sad example is the exclusion of music tracks from students' everday life and the minimum of non-Western music tracks in the analyzed textbooks. In fact, the potential contributions of music as a cultural expression to intercultural education and the development of cultural identities is neglected.

As regards the number of music tracks included, it is not proportional to the duration of the tracks presented, since the textbook which provides more tracks (M3) is not the one with the greatest lenght of music examples (M4). M2 is the textbook with the longest duration of each of its sound tracks.

The CD remains the main medium of sound support to work with and by the students. The fact that some scores are not assisted by exemplifying sound or audio support for monitoring is an indictor that the evaluation of instrumental practice as an educational goal is sometimes low..

We found that there is an awareness of World Music/Ethnic sounds. The frequency corresponds tendentially to the traditional Portuguese sound tracks. Therefore, we conclude that the analyzed textbooks neither meet the requirements of current cultural diversity present in schools and society, nor the esteem expressed and values represented in curriculum guidelines. In addition to the quantitative reinforcement of world music tracks, it is interesting to invest perhaps in a qualitative improvement with special attention to an unbiased selection of sound examples included in textbooks. Above all it should be paid attention to the aspects that the sound tracks

- are motivating and stimulating for the student,
- refer to their musical lifestyle as much as possible,
- inform of the composers' and performers' names,
- differentiate whetherthey are original works or arrangements, and
- are representative of the five corners of the world.

Note

The content of this work is taken from V. Ferreira's doctoral thesis (presented in 2016) with the title "Analysis of textbooks for Music

Education of 3rd cycle of the Portuguese basic education and pedagogical practices that derive from its use."

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US Foreign Language Assistants in Bilingual Schools in Spain: Performance and Preparedness Estimation by Local Teachers

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Abstract

A plan to bolster multilingualism was approved in Spain in March of 2005 in order to be in compliance with the European Union educational policies about language education. Two important measures were adopted. Firstly, the creation of schools with bilingual curriculum and secondly, the inclusion of native speakers of the foreign language of the school to help running the classes in the target language. The present investigation takes a closer look at the opinion of the local teachers on the assistants that perform the above-mentioned tasks. A total of 206 participants completed a questionnaire that gathered information regarding the assistants' pedagogical knowledge, implication, knowledge of the curriculum and personal traits for education. The relevance of these aspects will be analyzed using the Jonckheere trend test and the average participation time as the dependent variable. Outcomes reveal that the active participation of the assistants positively and significantly relates to the teacher characteristics expressed: pedagogical formation ($p < 0.05$), implication ($p < 0.02$), knowledge of the curriculum ($p < 0.002$), personal trait ($p < 0.005$). Associations of the findings for the improvement of the program along with suggestions and future lines of research are included.

1. Introduction

Teacher personality is becoming the focus of many investigations nowadays (Rushton et al., 2007; Pishghadam & Sahebjam, 2012). Some traits like experience, motivation or knowledge are clearly a factor that affects the outcomes of the students. That outcome is measurable these days thanks

to standardized tests scores. Different educational systems select their candidates in different ways. For example, in the United States, public schools select their candidates just as a private company would do by means of online applications. Then different persons responsible for the school interview the candidates, that is the administration team, a group of teachers and sometimes parents of students. In this case, we can assume they are looking for several if not many traits that make those candidates the perfect fit for their school environment. Other countries like Spain use a very different system, candidates are tested to measure their knowledge in the specialty for which they are applying for a position within the teaching domain, that is classroom teacher, music teacher, language teacher or etc. In this last case, the selection committee has neither understanding nor knowledge of traits other than their subject expertise itself.

Teacher characteristics are the object of many studies that try to correlate several cognitive or non-cognitive factors with students' results (Rockoff et als. 2004; Hanushek & Rivkin, 2005: Kane et al., 2008).

Correspondingly, Spanish bilingual schools employ foreign language assistants without previous control of important factors as mentioned above. This investigation tries to measure to some extent the performance of these assistants based on some of those traits that we consider to play a relevant role in education. The measure chosen is the average time per class these assistants participate in an active role, for instance, correcting grammar, correcting pronunciation, helping students one-to-one, explaining contents, etc.

Teaching is different for beginners, because they have the same or even more responsibilities than their experienced counterparts. This may not be the case for language assistants as they share the class with a regular teacher, but nonetheless, the feeling of responsibility for the group of students can be similarly overwhelming.

2. Review of the Literature

2.1 Pedagogical knowledge

In order to be eligible to participate in this program, the candidate must be an undergraduate or graduate in any field of higher education. Thus, students of many disciplines will be collaborating with lead teachers. Knowledge and preparation of a particular subject provide the prerequisites to perform on a higher level than a person without such resources, or at the very least, they are better prepared to perform well from the first day on or need less initiation time. A student of education sciences covers a wide range of subjects and knows about emotions, motivation, development and physiological issues in education.

The education department considers that one of the sources of richness of this program is the diversity of traits and skills the young assistants bring to the classrooms. Furthermore, it is also claimed that they are not meant to teach, but to support teaching and therefore they are not required to have great pedagogical acumen. However, there are those who defend the arrangement of mandatory workshops to instruct the assistants in the best pedagogical techniques.

Having a look at the recent history of the combination of lead teacher and language assistant, the research shows that one of the reason causing conflicts and dysfunctions was the lack of confidence in the assistants' abilities to fulfil their classroom duties (NALA, 1993). Martin and Mitchel (1993) prepared a video that shows the correct use of this duo along with several strategies to foster team work. This summary also includes the opinions of participants as regards the participation of the assistants in the daily work. A complain against this study comes from Cebreros (2003), who criticizes the one-sided way of data gathering, or in other words, only teachers were asked and not assistants. The present study considers also the opinions of the assistants.

The education department of Ireland supervised a study in 1991 with crucial and surprising results: the pedagogical knowledge of the assistants impacted the connection and interaction with the students, but this relation

was not significant. In many cases assistants without pedagogical knowledge connected perfectly with students.

2.2 In-class participation of foreign language assistants

One of the motivations of this study was to investigate the roles of assistants during the lessons in bilingual schools. Cebreros (2003) regrets the scarce use of the assistants to lead dialogs in the second language. The assistant may bring the real language closer to the students and teachers and therefore this possible advantage should be explored in depth. Byrnes (1996) concludes in his study that the assistant should lead the class in three major task areas. These are talking in the second language with the teacher, using the vocabulary of the unit, and correcting pronunciation errors.

NALA (1993) recommends the participation of the assistant in small group activities with students of the class. Not only this facilitates the control of the assistants but the students also feel less anxiety to participate in something potentially difficult in front of a large number of their peers. Such task is more often seen in interventionists and has been seen in schools from a long time now.

In a study conducted by two schools that used this system, Carless and Walker (2006) considered cooperative teaching as beneficial enough to keep this idea alive.

Byram (1992) admits that the role of the assistant helps teachers as well as students, but in different aspects. For this author the teacher must make sure that the students reach the objectives of the curriculum, whereas the assistant has to make sure that the students get exposed in a natural way to the target language, connected with the nature of the unit and subject.

2.3 The importance of the motivation to participate in exchange programs abroad

Motivation is considered a common denominator for success in every ambit in life.

Living abroad as compared with just visiting a foreign country as a tourist has many benefits for a person. The reasons for a person to live or work abroad can be very different in nature.

Improving the skills in Spanish is of course one of the main reasons why these young assistants come and work in Spain for a year or two. Allen (2010) considers this experience as an ideal means of developing foreign language proficiency. The same author makes an interesting remark regarding the duration of the experience. For this author, any experience under eight weeks is not enough time to develop substantial skills in the language to be acquired.

Professional growth and cultural learning are other reasons to motivate individuals to gain working experiences abroad. The personal and professional transformation that occurs through interaction with people from other counties can be really beneficial and such learning can help instantly or later after return to the home country at the regular workplace.

2.4. Personality of the teacher

Andrews and Barnes (1990) use the term "teaching personality" to the traits that are observable and constant in teachers and have an impact on students' performance.

In order to be eligible to become part of bilingual schools in Andalucía these young assistants are not required to have any teaching background or credential. They just need to be graduates or undergraduates with English as the mother tongue or be fluent in it. With that premise, we will find in the classrooms future engineers, doctors, artists, etc. Are they prepared to be successful educators? That is the questions that arises and initiated this study. Every year the program "Foreign Language Assistants in Bilingual Schools" is getting bigger and also more voices claim for the creation of more workshops that deliver instruction for the assistants to help more effectively in the classroom. Clearly, something is not working as it should. In turn, the board of the program defends that the variety in the knowledge of the assistants will enrich the experience of the kids in bilingual schools.

The National Association of Language Advisers (1993) documented the problems between teachers and assistants in a program that could be compared to the one of this study. Problems arose when classroom teachers did not trust the capacities of the assistants and more concretely their content knowledge.

Experience in any aspect of life shapes our behavior as friends, members of families and as teachers. This factor is an important indicator of personal and professional growth. Learning based on experiences can accumulate since the very early stages of teaching to the most advanced individual in this field.

Tait (2008) affirms that novice teachers often struggle in their first year. This author focused on the personal traits that new teachers used to overcome the adversities found in the first year of teaching. Two categories were found to have the biggest impact: personal efficacy and emotional intelligence. According to McIntyre (2003, p. 2) "new teachers at risk of leaving the profession express strong dissatisfaction with their teaching assignments, and frustrations with the politics of their profession, the lack of adequate resources, and inadequate mentoring support".

Roede (1989) indicates that there is a widely known distinction between motivated behavior and motivational factors. Motivational processes are derived from one's personal goals, believes and self-perception. Teacher commitment is often also seen as an intelligent internalization of the goal of society, which in most of the cases are the goal of schools. The affection teachers develop by performing school duties is another factor that influences motivation (Thoonen et al., 2011). It is important to remember that the motivation to participate in the program is not what we are measuring here, but the motivation to perform complying to the performance demands of the program. Culver et al. (1990) showed that motivation of the teacher relates to overall satisfaction with the job. Motivation has been widely used as a variable in educational research, it is correlated with teaching experience (Reyes, 1989), nominal factors as genre (Coladarci, 1992) or as in the present study, some embodiment of per-formance. Motivation or commitment are variables rather hard to isolate, it is hard to find studies that are relatively comparable, since factors such as nationality, age or social background have remarkably high impact. Motivation must not be seen as a priori factor, an invariable precondition

educators show. Motivation can be induced by organizational variables such as school climate (Culver et al., 1990).

Despite teachers' preparedness has not been a trigger for discrepancy among Spanish educational policy makers, this is certainly true in other countries like, for example, the US, the country were the most assistants are used in bilingual programs. Being a certified teacher was not a requirement of the program our study is dealing with. It is important to bear in mind the studies that have compared results of certified teachers versus those with some sort of alternative certification. Deck (2004) compared the program "Teach for America" (a highly selective program across the United States) with non-traditionally certified teachers. Results showed a significantly higher efficacy in math instruction for the first group and no differences in reading instruction.

Teachers content knowledge has repercussions on the active engagement of the students in class. A knowledgeable teacher, Anders (1995) claims, is able to systematically link teaching examples with part of the curriculum students already mastered. Cai (2005) explains how a teacher with a rich background of subject knowledge can pose questions, resort to alternative explanations and propose additional inquiry. Furthermore, this study posits advantages of knowing the content for the evaluation of teaching materials and/or classroom activities. A knowledgeable teacher is one who can differentiate between effective and less effective materials for his or her students as compared to one who just applies what he or she has been given, but may not bring the desired results.

3. Purpose of the Study

This study is an attempt to synthesize the opinions of regular teachers in regard to several aspects or traits of the assistants they share their classrooms with. The mains goals of this study are:

1 – To look for significant differences regarding the impact of the pedagogical knowledge on the active participation in teaching.
2 – To look for significant differences regarding the impact of the motivation of the assistants in their average participation in lessons.

3 – To look for significant differences regarding the impact of the content knowledge of the assistants in their average participation in lessons.

4 – To look for significant differences regarding the impact of the assistants' personal disposition to teaching.

4. Methods

Only schools from the geographical area of Jaén have been considered as participants of this study. This selection responds to the necessities of the research team as within the area surrounding the university it is easier to arrange face-to-face contacts. Once schools were chosen, the participation was optional, but recommended by the administrators of the schools. Each assistant in bilingual schools in Andalusia and each regular teacher that shared the classroom with an assistant were eligible to participate in the study by answering the online questionnaire designed according to their role.

By default, the administration or governing board of this program distributes the number of assistants brought to bilingual schools, but the schools themselves decide on how many teachers receive help from one assistant. In other words, the number varies a lot and therefore, it is certainly impossible to track the number of potential participants for the group of teachers.

Two online questionnaires were created and shared with the administration of the program, who in turn accepted the study and allowed the research team to contact bilingual schools and their administration. Each of these two questionnaires contained both questions for selecting pre-constructed answers and for open answering, that is, they collected both quantitative and qualitative data. In order to collect the impression of the local teachers regarding the knowledge of the assistant, open questions were created. To collect exact data on the amount of time of participation per class a numerical answer (in minutes) was required. An external researcher from a different university was contacted and paid to help in categorizing open responses into a Likert type scale we could operate with, when necessary. The open questions were not originally designed to convert them

into numerical data, but for the purpose of this smaller study the conversion is quite appropriate.

Schools were contacted on a total of three occasions. I was announced that the study was sponsored by the administration of the program. It was also mentioned that no identification data was asked and data per school would remain anonymous in order to avoid discrepancies and avoid animosities derived from the opinion of one group over the other within the confines of the same educational center.

5. Results

The relationships between dependent and independent variables of the hypotheses were investigated by means of the Jonkheere Tresptra test. This test, also know as the trend test, differs from ANOVA and Kruskall Wallis, which consider the ordering of independent samples within the same population. Having several ordinal variables makes the use of the trend test possible. Finally, it is important to mention that this test is non-parametric and, hence, it uses the median as its central value.

With respect to the effect of teachers' pedagogical knowledge on active participation, table 1 shows that those with the biggest knowledge contribute significantly more to the classroom activities (J-H Statistic = 10,400.5, $p<0.05$).

Table 1: *How long did the language assistant usually participate actively during a lesson?*

Do you think that your language assistant has knowledge of pedagogy and subject matter at his/her disposal?	Mean	n	Std. Dev.	Median
1 = not at all	258	26	144	20
2 = some	313	31	126	35
3 = sufficient	321	64	126	30
4 = considerable	358	65	124	35
5 = very much	348	30	141	30
Total	326	216	132	30

The second hypothesis is centered on the impact of the assistants' involvement and how this affects their active participation in their classes (see table 2).

Table 2: *How long did the language assistant usually participate actively during a lesson?*

To what degree is your language assistant involved in the program and in teaching?	n	Std. Dev.	Median
1 = not at all	6	118	225
2 = some	19	155	30
3 = sufficient	30	136	30
4 = considerable	74	115	30
5 = very much	30	136	30
Total	216	132	30

How long did the assistant participate actively during a lesson?

To what degree is your language assistant involved in the program and in teaching?

Total N	216
Test Statistic	9,363.500
Standard Error	496.455
Standardized Test Statistic	2.588
Asymptotic Sig. (2-sided test)	.010
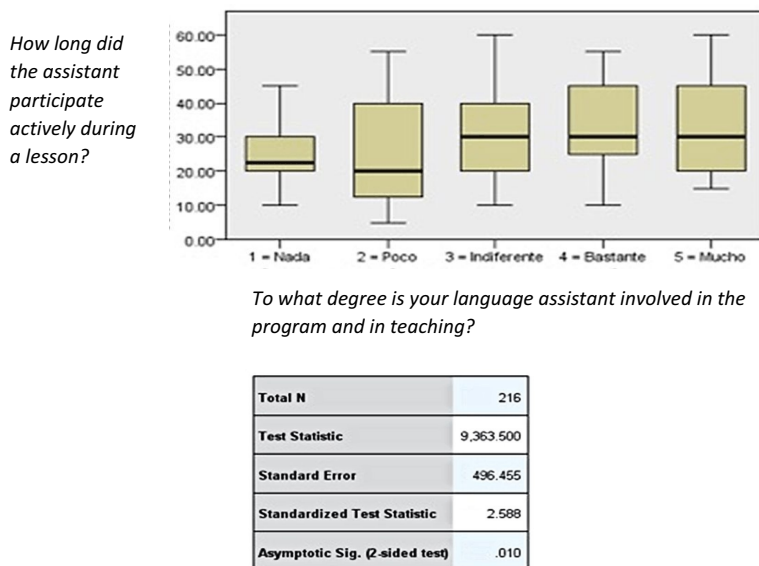
Figure 1: Independent samples Jonckheere-Terpstra test for ordered alternatives

Similarly (see table 3), significant differences were found among the independent groups of the variable that gathers the opinion of the regular teacher as regards for the involvement of the assistants (J-H Statistic = 9,363.5, P > 0.05).

Table 3: *How long did the language assistant usually participate actively during a lesson?*

How much do you trust in the assistant's ability to teach the contents of the curriculum?	Mean	n	Std. Dev.	Median
1 = not at all	272	9	173	20
2 = some	269	26	1108	30
3 = sufficient	296	49	136	30
4 = considerable	347	73	122	30
5 = very much	358	59	141	40
Total	326	216	132	30

How long did the assistant participate actively during a lesson?
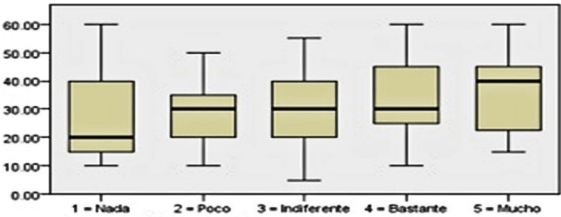
How much do you trust in the assistant's ability to teach the contents of the curriculum?

Total N	216
Test Statistic	10,430.500
Standard Error	506.540
Standardized Test Statistic	3.472
Asymptotic Sig. (2-sided test)	.001

Figure 2:   Independent samples Jonckheere-Terpstra test for ordered alternatives

For the third hypotheses (see table 4 and figure 3), a significant ascending trend is once again found when observing the average participation of the assistants as related to the teachers' level of confidence in their assistant's teaching capabilities. (J-H Statistic = 10,430,5, P > 0.005).

Table 4: *How long did the language assistant usually participate actively during a lesson?*

Do you think that your language assistant has all the personal capacities necessary for teaching?	Mean	n	Std. Dev.	Median
1 = not at all	275	10	150	20
2 = some	274	25	138	30
3 = sufficient	320	39	128	30
4 = considerable	316	74	122	30
5 = very much	366	68	132	40
Total	326	216	132	30

How long did the assistant participate actively during a lesson?

Do you think that your language assistant has all the personal capacities necessary for teaching?

Total N	216
Test Statistic	10,077.500
Standard Error	504.765
Standardized Test Statistic	2.972
Asymptotic Sig. (2-sided test)	.003
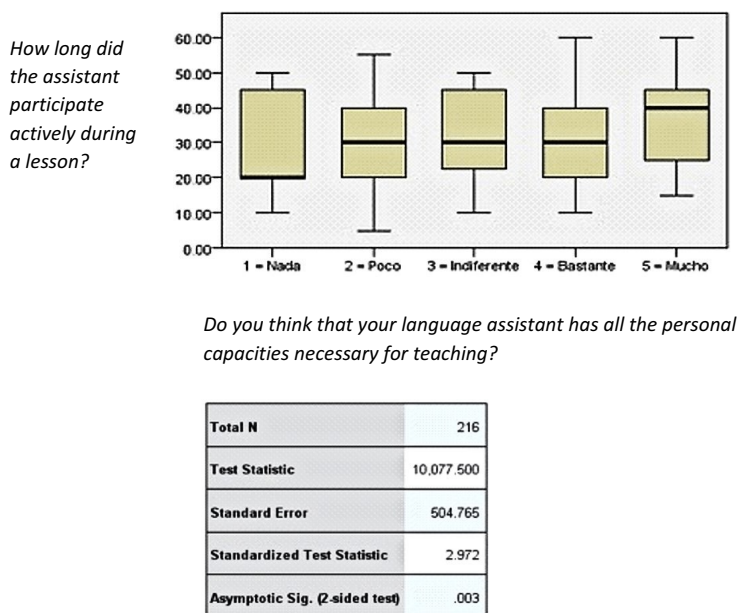
Figure 3:   Independent samples Jonckheere-Terpstra test for ordered alternatives

Finally and in a similar way, the more traits the regular teacher observes in the assistants the more they use this resources in class. (J-H Statistic = 10,077.5, P > 0.005).

6. Discussion

As for the first hypotheses, we found significant and ascending results, which proves that specific knowledge through higher education instruction helps the assistants be more valued among regular teachers and hence, more helpful in bilingual schools. We cannot claim that university instruction is the only source of knowledge in this regard as there are special cases, i.e., assistants instructed by older siblings or as children of teachers.

Intrinsic and extrinsic motivation play a mayor role in every duty that we perform on a regular basis. Unfortunately we could not include data on this aspect in this paper. These data, however, are available in a larger study of which this paper is just a part. The results show a growing use of those assistants whose observed motivation is higher.

Bilingual schools as described in the sections above deliver all contents through the target language and therefore, subjects like math, science or physical education will use English or French as the vehicle of instruction. Assistants are used more significantly in terms of time when the perception is that they have solid background knowledge in these content areas.

Finally and with similar trend, personal traits such like patience, caring, open minded or balanced help are of advantage in any educational setting. In this case, these traits enabled the assistant to participate more in the lessons, to interact better with the students and to gain the confidence of the regular teachers.

7. Conclusion

A good educator cannot be presumed one-dimensional or qualified only in one single aspect. Being a good teacher encompasses a variety of traits, some of them impossible to teach in university classes, as for instance patience or caring.

All of them have been proven in this study to correlate positively with the amount of time assistants participate actively in lessons. Time of participation is an indicator of trust and trust, in turn, is an indicator of preparedness. "Ready to use" tools are important for any work and so they are for schools and teaching. Regarding the fact that an assistant can remain maximally two years in the program, a school does not fare well if it has to spend a large amount of time and efforts to shape an assistant to become a useful co-teacher.

Different schools with unique working environments or alternative teaching methods can benefit from other aspects or traits not considered by the hypotheses of this study and therefore future lines of research can

include or consider such qualities. The study has limits as regards not having the research team observe a great number of classrooms but instead giving the participants the responsibility to self-report their time of active participation and thus delegating the collection of data.

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Mini-video Teaching Mathematics in Economics: A New Stimulus for Students and Teachers

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Abstract

In this paper, we present a teaching innovation experience that the authors are conducting, which can be seen in the website www.mini-videos.es, where we collect the mini-videos we are performing for the subject of Mathematics in grades of Economics. These mini-videos develop theory, practices and exercises done "by hand" using a document camera.

The mini-videos are characterized by their short duration (5-10 minutes) and all of them follow the same structure, in order to give them consistency and ease of use; they are sorted into short and specific sections, so that they can be consulted independently and directly, without having to see all the content of a lesson.

Our goal is to highlight how this experience benefits the student when preparing a course and the new challenge for the teachers involved in the use of new technologies.

1. Introduction

In this paper we describe the process that we have followed for the construction of a web page mini-videos. The authors are teachers in mathematics degrees in Economics.

We emphasize this fact because mathematics is not a goal for our students, but they need it as a tool in other disciplines. Therefore, we are looking for a quick and effective resolution of the situations our students will face as future economists.

Additionally, our students enter our classrooms with poor and very heterogeneous levels knowledge in mathematics. This fact impedes the normal progress of the class.

In our times it is obvious that students prefer to seek information on the Internet over opening a book. Any unfamiliar concept, they quickly seek on Wikipedia, etc. But these searches, though many are very good, can make the students lose a lot of time and are not personalized to their agenda, many findings are not in their language, i.e. the students may become lost in the network and receive really little information.

Therefore, to accustom students to mini-videos, where they know exactly what to look for and which also explains in the same way as a gives classes, is of great interest and is what motivated us to get to work on them. Why we call them mini-videos? We must not forget that the students watch the video and their attention span is declining rapidly. This cannot be compared to reading a book or notes, since watching a video of mathematical content for the same time is much more tiring.

In our experience, it is much more helpful to divide the video into several parts, always following two objectives:

• Videos must be well structures: It should be easy to find something specific with a detailed index.
• Videos must be independent: it should not be necessary to see all previous videos to understand what we are consulting with few exceptions where you have to reference other.

With these initial reflections we mean that the idea of mini-video recording comes with the intention of helping our students on two levels:

• In pre-subject concepts that students are supposed to dominate. However, in reality most students have not mastered these topics and

we do not have time enough to explain them again in the classroom. So this knowledge is "taken for granted" often erroneously.

• In the daily development of our agenda, where there are many students who fall behind, they do not take good notes, they do not grasp the main ideas, etc.

We note that in the previous concepts entered secondary issues where, indeed, there is plenty of information for them, both written and in videos. For this part we have chosen only what we need and just what we will use in our subject, so that we do not lose "reviewing" concepts that will be useful to us later.

2. Description of the experience

Subsequently we discuss the content of our website (see fig.1):

Fig. 1: Website "mini-videos" ([www.mini-videos.es;](www.mini-videos.es) mini-videos@mini-videos.es)

Our goal on this page is that students find in an orderly and rapid way the main concepts that they will need in the different subjects of mathematics in grades in which we teach. Above all, we emphasize that we have tried to make the mini-videos independent, i.e., not necessary to visualize an entire section to make a specific inquiry of one of them.

We have divided the agenda into eight large blocks, where we cover the content of three subjects.

The first is basic in nature and is taught in the first semester of the first course. It consists in most grades of two blocks, Theory of functions and Matrix Algebra. In these two sections, we started a little before our own agenda, with concepts of review, such as functions of a variable or elementary operations in Algebra Matrix (operations with matrices, solving systems of equations, etc.).

The second subject we cover is Mathematical Programming, structured into four blocks: Introduction to Mathematical Programming, Nonlinear Programming, Linear Programming and Multi Criteria Analysis, where we see different types of optimization problems and problem solving techniques.

The last subject we address in mini-videos is Financial Mathematics, to which we dedicate one block.

Finally, we have a separate block dedicated to the program we use to solve using the computer program Mathematica, where we use the general ideas of the program, since we continuously refer to it in other blocks.

In general, in each block we have separate sections in the most concrete way possible, where the student finds several uploaded to You Tube file, worked in power point and a document camera, where we explain the theory succinctly, emphasizing in practical exercises, done by hand or with the help of Mathematica program when the characteristics of the problem require it. The content of the eight blocks, broadly speaking, is as follows:

THEORY OF FUNCTIONS
- Some basics of interest.
- Theory of differentiable functions:
    - Functions of a variable.
    - Functions of several variables.
    - Homogeneous Functions.
    - Implicit functions.
- Integral calculus.

MATRIX ALGEBRA
- Matrices, linear systems and applications.
- Diagonalization.
- Quadratic forms.

INTRODUCTION TO PROGRAMMING MATHEMATICS
- Convexity.
- Graphic resolution.

NONLINEAR PROGRAMMING
- Problem without restrictions.
- Problem with equality constraints.
- Problem with inequality constraints.
- Numerical methods.

LINEAR PROGRAMMING
- Simplex Method.
- Duality.
- Sensitivity.
- Integer Programming. Grafos.

ANALYSIS MULTICRITERIA
- Programming goals.

FINANCIAL MATHEMATICS
- Fundamentals of financial valuation
- Valuation of financial income

• Financial operations

MATHEMATICA PROGRAM
    • Start the program.
    • Using the library mateco.m

3. Results and Discussion

Which advantages has a mini-video for students? When a team of teachers embarks on a task of this size, the motivation must be very clear, and this promotes, of course, our target, that is, our students.

Therefore, we reflect on the advantages of mini-videos for the student. It is the first question that arises when we started recording videos: What is our goal? Do we really help the student?

Our students belong to the generation of "digital natives". Anything that has to do with computers, Internet, etc., it will attract attention, so it is a tool that we can not ignore it would be to live in the past.

Primarily, mini-videos are the surface of teaching, that is, the everyday work of teachers in the classroom is unquestionable. Therefore, we have not tried to record videos of entire classes so that students "choose" whether to attend the class or watch the video. For the student it must be clear that class attendance is fundamental.

It is obvious that the video approach serves as virtual subject. We have experience in other subjects, virtual character, where the philosophy is very different. In these we have used other tools, (webinar, where we use interactive chats, virtual tutorials, etc.) but they are not the objective of this work, where we focus on classroom subjects.

Once the students know the subject, they can go to the mini-video looking for:

• Previous concepts that they should know, but do not dominate.

• Any idea of the agenda, which has not been clear to them in class.
• More exercises carefully explained by a teacher, to which they may listen as often as they like.

Therefore, it could be understood as another resource that is available to students to complete their information on a topic. If students still have doubts after seeing the mini-videos, they should go to a personal tutoring with the teacher. This is another advantage that is noteworthy of our mini-videos. If a student sees any video on YouTube and does not understand something, s/he has no chance to ask. In our videos, students have their teacher whenever they need her/him for tutorials.

Finally, we must be very careful not to be tempted, by the teacher, to force students to study through the mini-videos. These must not become an overload of information or agenda for the student, but can be used in a timely manner for complementary activities, such as the student prepares some assignment that s/he presents in class and collaborative work, etc.

Which advantages has a mini-video for professors? The construction of a battery of mini-videos in advance that cover several subjects is an overwhelming task for teachers.

To record videos requires a technical team in the background (image management, sound, light, etc.), if you want to achieve quality videos. Having a good team is not always easy, given that we are few teachers who use them and now our university is not provided with many media in this regard.

First of all, the usefulness of the video depends, of course, on the producing teacher's communication skills. Teachers "are supposed" to have their experience in classroom teaching, but to get in front of a camera changes things radically. A video is of little use, if it is recorded with high quality of image and sound, but low quality of communication. Therefore, we face a completely new topic, which we have to approach calmly and well supported.

We emphasize that the first thing is to have a group of teachers convinced of the usefulness of mini-videos; a job like this is almost

impossible for one person. A well-knit working equipment to different areas and a good distribution of tasks is essential to reach fruition.

On the other hand, we have to give up the concept of perfection. It is impossible to record a mini-video that fully satisfies us, there is always a phrase we think can be improved, some mathematical operation that we would like to raise another way. We are not actors or do not pretend to be, we have to do it the natural way and as good as possible, but not repeat recording a mini-video twenty times before giving "approval". Of course, improvement comes with experience.

And most importantly, once you have recorded a lesson, how do we use it? How do we control whether it is useful for students? Is it complete enough? Or too specific?

As we noted in the previous section, our goal is to provide students a comfortable place to answer their questions once they know the subject. Obviously we cannot force students to use the videos, but in our experience, the students just demand videos once they start to work with them, since videos are very useful when students are studying and get stuck in some operation or concept. Now they have the opportunity to listen to their teacher again.

To the question whether they are complete enough or too specific, we remember that in Mathematics there are a number of theorems and theoretical results on which we rely for solving exercises. In this sense, our approach has been primarily practical, i.e., we determine the fields necessary to perform exercises without showing the results. The teacher can cause the feeling that students have not developed the subject in depth, but we insist that our goal is not to "burn whole classes", but that students have a reference to turn to for specific questions about the concepts that have been explained in class.

4. Conclusions

In this paper we have shown the work we are doing in the field of construction of mini-videos. In our classrooms, we use them as

complementary tools. It is not our goal that students can master a subject by just viewing videos, but by using them additionally to their class notes of explanations of the teacher, etc.. Mini-videos are a tool that can support students by a number of advantages that other media will not provide.

Obviously we cannot say that this work is completed, in fact, it is a work in constant review. Also teachers will change over time due to their students' demands. The videos will be modified and changing according to the suggestions of students and teachers. Moreover, being a fairly new subject, it will be with time and experience in use that we see how it really affects our teaching and where we will find us in the future. Our students obviously are those who will guide us in this process, since they are the recipients of our work.

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A MOOC Experience in Financial Education

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Abstract

The authors of this paper have participated in the development of a Massive Online Open Course (MOOC) on Financial Education. This course is designed for people with an average training and aims to increase their capacity and personal autonomy to face financial problems. It affects the financial decision-making in the family budget, in the supply of instruments for saving and investment, and the use of credit. This type of courses offers flexible opportunities of participation as regards time and place. Most important, it allows interaction among participants to share knowledge and concerns during the teaching-learning process. In this course teachers try with multiple media to find the most appropriate way to their students' educational resources.

1. Introduction

The MOOCs (Massive Online Open Course) are training courses conducted in virtual environments with a methodology based on access to knowledge massively, open, free, online, collaboratively, trying to reach the largest number possible of users. One of the great advantages of these courses is that they are participatory, virtual communities, where students share their knowledge and experience, creating networks of collaboration and dialogue; thus, the course is enriched by the contributions of its participants.

There are different types of MOOC: (1) Informative courses on topics of general interest. (2) Complementary courses offering additional training to the curriculum of undergraduate and graduate teaching, in order to improve the preparation of students and provide extracurricular and

additional training. (3) Introductory courses offering an introduction to the subjects taught on any level of university teaching either with the aim of serving as a base course for the relevant areas or as a mechanism to motivate and encourage students to study it. In our case we will carry out an informative MOOC in the Miriada X platform, called "Keys of financial education for citizenship".

2. Description of the Experience

The University of Malaga (UMA), through the International Center for Postgraduate and Doctoral School and the Vice President for Academic Organization, has developed a series of actions to promote the creation and development of MOOCs. It supports the development and implementation of a number of new MOOCs in each academic year and therefore publishes a call for suggestions from teachers of UMA. The selected courses will receive support and assistance for development and implementation from the Virtual Service of Education and Technology Laboratories at the University of Malaga.

Important is on the one hand that this initiative is stimulating the development of a new teaching model as a component of higher education, and on the other hand it offers a quality training and promises to improve the skills of teachers and technicians. It will also serve to increase the international visibility and scope of the University of Malaga and attract new students.

The authors of this paper participated together with other academics and financial professional teachers in this competition suggesting the MOOC "Keys of Financial Education for Citizenship" – which was selected. All team members share extensive experience in participation in financial education programs and are part of the team of the Edufinet project, which since 2007 has produced a wide range of online and face-to-face activities in the field of Financial education for the general public and for particular groups (children and youth, businessmen and entrepreneurs, employees, etc.).

The purpose of the course is to enable the acquisition of a set of skills that allow citizens an autonomous development in the field of personal finance. Through active participation of students it aims to provide the fundamental basis for citizens without specialized training to identify, to contextualize and to evaluate situations related to their personal finances and to make responsible financial decisions, assessing the assumed risks and associated compensations.

It is, in short, an informative course on Financial Education that focuses on exposing the fundamental contents with a view to the acquisition of a set of basic tools to cope with some autonomy in the financial field competitions. It affects the overall framework of financial decision-making, in family budgeting, in the supply of instruments for saving and investment, and the use of credits.

Given its informative nature, the course is designed for a typical citizen with an intermediate general education. Looking ahead to the course can have a transnational reach in terms of participants, it emphasizes the crucial elements necessary for teaching objectives without being anchored in any particular country or territory. The course can also be useful for college students outside the field of finance, who want to have some knowledge that will allow them to face financial decisions It will assist even students, who have to study these degrees.

It is considered a good advice that students, who want to participate in this course, come with prior knowledge on a level equivalent to Higher Secondary Education. However, this recommendation is not meant as an insurmountable requirement since, through a gradual approach students could be accommodated without that strict educational background.

The course includes, among other content, managing the family budget, the basics for financial decision-making: financial instruments, charac-teristics, basic variables, legal framework and taxation, also the interpretation of financial information, financial calculation basics, the role and functions of the financial system, the use of means of payment, deposits, fixed and variable income, the institutions of collective investment, forecast products and, finally, the loans.

Evaluations will be based on a battery of multi-choice test questions with four answers as options among which only one is valid in each case. To pass the assessment it will be required to obtain at least 50% of the maximum score attainable.

For the recording of the contents, we used the Advanced Classroom Teaching in the lecture hall López Peñalver on the campus of Teatinos.

The course is structured in 6 modules:
- Module 1: The family budget and interpretation of economic information
- Module 2: The financial decision-making
- Module 3: money, means of payment and deposits
- Module 4: Fixed income and equities
- Module 5: Investment funds and pension products
- Module 6: Loans

Besides these, there is a module of introductory character, in which students are welcomed and presented to the faculty and the objectives. They receive explanations for competencies they are expected to acquire, for the contents of the course, for which audience the course is intended and which prior knowledge is recommended. Course duration and workload per week, recommended readings, sources of direct consultation and support elements are also indicated. There are also descriptions of the different forms of participation and interaction, teaching methodology, qualifications offered, and the evaluation system. Finally, a test of prior knowledge is performed.

3. Results and Discussion

Generally, the members of our society a lack an understanding of financial concepts. This is an area of knowledge of great relevance today, as evidenced by the large number of initiatives of international organizations to promote Financial Education or the recent inclusion of this field in the PISA tests.

Therefore we took the initiative to develop a MOOC "Keys of Financial Education for Citizenship" with the goal to reach as many people as possible.

Some key ideas for a properly working MOOC are:

- Think about what appeals to a large audience. We must consider the MOOC recipients, not just ourselves. The course must be "massive", i.e., appeal to the largest possible number of people. The "potential" audience and its interests have to be analyzed carefully.
- The course must be flexible and open, but not unexpected, must first manage very thoroughly and accurately all the details and structure contents. An indispensable prerequisite is to develop a clear and detailed description of the programming, evaluation and course content as well as to develop a systematic module structure and activities (mandatory and voluntary).
- It is important not start with the modules on a Monday, because this implies that the previous module ends on a Sunday and if problems arise there is no easy way to solve them.
- Keep in mind that it is not advisable to use tools that have not been applied before, because with so many students any difficulty may cause complications and further problems.
- Regarding the duration of the videos it is advisable that they do not last longer than five minutes.
- The additional resources must be carefully selected, not offering a lot, but quality material.

We expect that this course will be useful to any citizen who wants to access financial services, obtain financing or payment operations, cover certain risks or simply interpret financial information.

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An Approach to Teacher Collaboration in Higher Education through an Analysis of Current Research

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1. Teacher training for university teaching

It is general knowledge that university teachers contribute to the advance of science –research– and transmit science –teaching–. Although, in the last years, responsibilities of administration, management and service to the university community have been demanded of university teachers (Marsh & Hattie, 2002, 603). In spite of these tasks, which may be temporary and complementary and do not even involve all the teachers, there is some consensus that teaching and research are the main functions of university teachers.

Thus, if the university has to develop investigation programs to obtain advancements of knowledge, the university teachers have to be agents of these programs. In addition to another of their key tasks, i.e. teaching, they have to take on the complementary job of researchers. Consequently, the various training initiatives have to prepare teachers both for the tasks of teaching and investigation (López Gómez, 2015).

The preparation for investigation, from the point of view of initial training, is realized during the phase of doctoral studies. As regards teaching there are only few initiatives focused on offering in a systematic way an educational training for future university teachers – unlike the situation of teacher training for other levels of the educational system.

In the last years there is a general tendency in many countries to prepare university teachers for teaching (Postareff, Lindblom-Ylänne & Nevgi, 2007; Simon & Pleschova, 2013).

López Gómez (2016) has underlined four key elements for the development of a training of university teachers for teaching:

•   Take as starting point the needs of the university teachers and consider the demands of the institution or of the framework of the university. It is important to align the future teachers' educational needs with the institutional priorities so that the initiatives of training have better results. In the words of De Ketele (2003, p. 166): "The training is barren when the institutional logics of the centre and the personal logic of its actors are opposed or when they are mutually ignored". In this way, it will be possible to avoid that the teachers feel that there is a mismatch between their own and their institutions' priorities. They will be motivated more highly to develop as a professor (Macfarlane, 2011; Zabalza, Cid & Trillo, 2014).

•   According to Zabalza (2012) the educational training acquires its meaning within a particular context, when models are developed that are oriented towards the practice and allow to connect the theoretical references with the evidence of institutional or international best practices.

•   The organisation of the training has to consider diverse formats and flexible strategies to facilitate participation, depending on whether the training is offered in periods of lower educational load, of no lecturing tasks or of maximal need. The training activities are structured in a systematically scheduled program with the aim to offer pedagogical knowledge for high quality and effective the teaching.

•   The training will be more effective, if it is developed as an integrated project that facilitates and encourages each professor to transfer the knowledge and skills acquired in the training to his/her own teaching (Feixas et al., 2013).

What emerges in this context is a training approach focused on teacher collaboration as an essential element for continuous training and professional development. As a proposal for teacher training, it was shown in the international literature that mutual support of teachers promises numerous benefits (Evans, Homer & Rayner, 2013; Hay et al*.,* 2013;

Orlander et al.*,* 2000; Sánchez & Mayor, 2006; Van Waes et al., 2015). These studies demonstrate that teacher collaboration leads to progress in the pedagogical competence of university teachers. Indeed, collaboration between professors has showed its potence to develop the educational competency within the university, especially in the training of the novice teachers. The training content has been focused, essentially, on the following topics:

- planning of teaching (preparation of programs, examinations, practical activities),

- methodology (methods and didactic strategies, resources and means, group dynamics),

- communication and didactic interaction (movement in the class-room, gesticulation, tone of voice, expressiveness, etc.),

- professor-student relationships (motivation, awakening the interest of students, tutoring, etc.),

- evaluation (of numerous groups, assessment of students' global attitude, formative evaluation, etc.)

- institutional context (how to move in the university organizational chart, etc.).

As Kezar (2014) remarks, the training of teachers in teams and educational networks generates a culture of learning in collaboration, characterized by an exchange of ideas and a process of offering and accepting valuable feedback about the educational task.

In this context, this contribution aims at exploring current research focused on partnership and peer collaboration among university teachers (teacher collaboration). Our research wants to find out the actual knowledge about peer collaboration between university teachers as a way to improve teacher training at universities in a framework of faculty development. The purpose was to analyze current research, in particular the developments of investigation on this topic.

2. Method

To attain the aim of this study we tried as a first step to review systematically the available literature. However, the heterogeneity of keywords in this field of research impeded to obtain relevant/sisgnificant results. This heterogeneity is the result of a conceptual confusion concerning teacher collaboration. According to Vangrieken et al. (2015, p. 18), "a considerable amount of different terms is used to describe this phenomenon: teacher teams, teacher collaboration, professional (learning) communities, (teacher) learning communities, (teacher) learning teams, etc. These terms were often used interchangeably and different researchers tended to allot different interpretations to the same term".

Therefore, we conducted a non-systematic review of the literature in order to indentify, select and summarize high quality research related to teacher collaboration (Torgenson, 2003).

Information search was carried out in the database Web of Science (WOS). WOS is recognized for its standards of quality, dissemination and international relevance. The descriptors have been *teacher collaboration* and *higher education* or *university,* in *Education & Educational Research*. The inclusion criteria for the studies were: (a) time period - the years 2013-2015 (both included), (b) scientific journal articles, (c) written in English, (d) full text available.

After different exploratory searches and also after removing duplicate articles, we obtained a total of 26 publications. We excluded six of them because they were not available in full text - eithers because some journals are not subscribed by our universities or these texts were published very recently. Finally, a total of 20 articles were included for our review.

According to previous studies (Camilli, Lopez & Barceló, 2012; Camilli & López, 2015), the categories established before starting the study are:

- • *Contextual*: this category includes information related to the publication of studies such as the years, authors, areas of knowledge, place of origin of universities and scientific journals.

- *Methodological* category (methodological approaches conducted in articles reviewed).

- *Substantive* category: related to the content in order to summarize the specific results of the research, in this case focused on teacher collaboration. The substantive category has been studied in various central parts of the documents such as the discussion, conclusions, limitations and prospects.

The categorization process followed three levels of analysis: (1) Open coding, characterized by a first approach to the formation of the first meaning categories; (2) Axial coding, where meanings are grouped into major categories and, finally, (3) Central category, which was elaborated without seeking greater depth at this level, because we run an exploratory study.

Data analysis has been guided by a descriptive perspective (*Contextual* and *Methodological* categories) of the articles reviewed and, on the other hand, a deeper analysis of the category that refers to the *Content* of the research.

3. Results

3.1 Contextual and methodological results

Table 1 summarizes the contextual characteristics of the sample such as the years of publication, number of authors, and the journals included in this review.

Table 1: *Contextual characteristics of the study sample (n=20)*

Contextual characteristics		
Publication years	N	%
2013	3	15
2014	6	30
2015	11	55
Authors	N	%
One	2	10
Collaborative research	18	90
two authors	8	40
three authors	4	20
four authors	2	10
five authors	4	20
Journals included	N	%
Studies in Educational Evaluation	4	20
Teaching and Teacher Education	3	15
Higher Education	2	10
Asia Pacific Education Review, College Teaching, Educational Research Review, Frontline Learning Research, Gender and Education, Higher Education Research & Development, Innovations in Education and Teaching International, Innovative Higher Education, Instructional Science, Journal of Workplace Learning, Palgrave Communications	11	55

Source: own creation

Table 1 shows a heterogeneous distribution of publications by years, highlighting a greater number of articles published in 2015. The majority of articles have been carried out in collaboration, two authors is the most representative number of co-authors. The journals included are diverse, although we can highlight the articles published in Studies in Educational Evaluation (4), Teaching and Teacher Education (3) and Higher Education (2).

Another analysis of interest refers to the keywords of the article. This review highlights heterogeneity and plurality of different keywords. In the 20 articles reviewed 63 different descriptors were used. As shown in figure 1, an analysis of these descriptors provides an interesting overview in co-

herence with the main purposes of this research. Also the dispersion can be seen, demonstrating that this is a field of knowledge with different approaches, which make the development of a systematic review rather complicated.
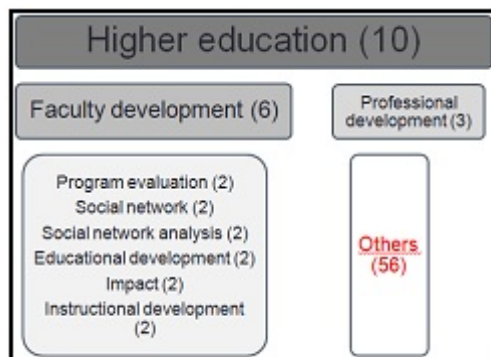
Figure 1: Keywords included in the reviewed articles (Source: own creation)

An analysis of the methodological approximations of the articles included in this review show some interesting results. In the first place, the presence of longitudinal studies stands out. This does apply to the work of Bickerstaff and Cormier (2015), using qualitative methods and taking three years. The study of Nevgi and Löfström (2015) also is a longitudinal investigation of six years length with a narrative approach. Finally, the investigations of Rienties and Kinchin (2014) and of Van Waes et al. (2015b), too, were longitudinal studies. Similarly, the study of Devlin-Scherer and Sardone (2013) presents an experience caled "*multiyear collaboration*" between two professors, analyzing the collaboration in an experience of co-teaching.

Other studies can be grouped around the qualitative perspective. This is the case of the study by Drew and Klopper (2014), who present an example of action research, or the study of Stewart (2014) that tackles an approach from educational narratives with the aim of exploring the long-term effects of a teaching programme for university teachers. The study of Van Waes et al. (2015a) also is carried out from a qualitative point of view, specifically by an egocentric approach to social network analysis.

Other studies are focused on literature reviews. The study of Kezar (2014) stands out; this author develops a review of research focused on social networks in Higher Education. Another example is the investigation of Phuong, Duong and McLean (2015) that offers a review of literature focused on faculty development in Southeast Asian higher education. Saroyan and Trigwell (2015), too, propose a documentary investigation that tackles the professional learning from the processes and outcomes. Finally, very notable is the systematic review conducted by Vangrieken et al. (2015) on teacher collaboration.

Another group of publications is grouped around the methodological perspective of a mixed method approach. O'Meara & Stromquist (2015) develop a qualitative mixed-methods design with concurrent strands (2011-2014) based on pre/pos-test and qualitative techniques (triangulation). Pataraia et al. (2014) applied the analytical method of Social Network Analysis (SNA) combining quantitative and qualitative approaches. Romeu, Guitert and Sangrà (2015), too, adopted qualitative and interpretative research methods with the objective of obtaining a more global knowledge of reality. They also used a mixed method approach. Finally, Stes, Coertjens and Van Petegem (2013) realized a quasi-experimental study applying mixed methods with the aim to investigate how students perceived the impact of an intervention on teachers' teaching behaviour.

Other publications report a qualitative case study (Kahn et al., 2013), a comparison of case studies of professional development programmes at eight world class universities (Jacob, Xiong & Ye, 2015) or, finally, a quantitative study with questionnaires (Niehaus & O'Meara, 2015), descriptive findings and the results of statistic analysis (one way anova and regression models).

3.2 Thematic content emerging from the review

To present the thematic content that these investigations present we elaborated a map of subjects that are tackled in the investigations in a transversal way.

3.2.1 Research background

The background of research on teacher training was focused on the skills and knowledge for teaching from an individual approach. Over the last decade, the consideration of collaborative networks is an emerging issue.

This review has shown that there are only few studies of training experiences which refer to professional learning needs. There is a predominant approach to training that starts from institutional logics, standard training, which does not take as a reference the needs of each teacher or micro-groups.

In addition, research shows that there are various training initiatives, but there is insufficient research on the effectiveness of these activities, and particularly, there is little evidence of the effects of training on everyday teaching in terms of a transfer of training to the teaching practice. In this regard, the identity of university teachers develops through interaction between teaching practice and profounding pedagogical constructs.

3.2.2 The role of collaboration and social networking for professional development

The processes of collaboration between teachers implies going beyond personal beliefs and expectations. Thus, the training programs that are developed from approaches like peer review / co-teaching enriche the reflection on experience through contributions shared and discussed in collaboration. University teachers help each other to improve their practice in the innovative research process (they co-evaluate, record classes, take field notes, share schedules, best practices, etc.). The lasting change (sustainable innovation of teaching) is related to the interaction with the community rather than individual intentions, plans or projects.

In short, the review carried out has highlighted the important role of social networks (teacher interactions, communities of practice) to consolidate teacher training and professional development, especially by modulation of beliefs, self-analysis of teaching practices, and pedagogical competence.

3.2.3 Professional development programs

There is a transversal theme related to professional development programs that include training initiatives focused on teacher education from collaboration. Thematic analysis of the reviewed studies allows us to establish a double analysis.

General framework of professional development programs

- It should be highlighted that professional development programs should consider the nature of learning, how to carry out the implementation of the courses (design), educational practice (application) and how the student learns.

- In addition, few teachers voluntarily enroll in the programs, most are compulsorily involved. In this regard, can it be considered that compulsory training of university teachers is effective? From our point of view, it is necessary to want voluntarily to learn.

- - In the same way, research seeks to find out the reasons that there are teachers who benefit greatly from professional development programs while other teachers benefit little. This is an aspect that needs to be further investigated.

- Finally, it is noted that professional development programs should address: (1) the identity of teachers as reflective university teachers, innovators and researchera, (2) the identity of teachers as an expert in their subject, and (3) the identity of teachers, who know how to improve university teaching.

Evaluation of professional development programs

- Our study highlights the need for more research on the evaluation of training programs. It is necessary to conceive the evaluation as a holistic process, therefore the evaluation of training programs hase to include several actors (teachers, students, department heads, etc.).

- In the evaluation of professional development programs there are several levels of depth: (1) agreement with the training contents, (2) application of knowledge, (3) transfer of learning to the professional field, and (4) changes in the organization. Least efficient of the four levels of depth in the evaluation of professional development programs are "transfer of learning" and "organizational change". In other words, there is a consensus about the importance of what is learned and its potential, but not so much transfer to the teaching practice - and still more complex - achievements in organizational changes. This is certainly the real and main challenge.

3.2.4 Strengths and benefits of teacher collaboration

This research has presented in various ways the benefits, strengths and potential of collaboration between teachers. Some important ideas are:

- Collaboration in teaching relationships is based on trust and mutual interest, role exchange, and responsibilities. New ideas are obtained, feedback, and information exchange and professional capital is building.

- The benefits are not visible immediately, but emerge after more or less distance in time from training - particularly, if organiza-tional / institutional / collective changes are intended. Many studies seek to evaluate the effectiveness of professional develop-ment programs. Studies have to take several years (longitudinal studies), since professional development "*cannot be*" expected immediately.

- Collaboration is relevant to move forward in professional development. It is considered a key step for professional development.

- In addition to collaboration within the institution, research has highlighted the importance of expanding the professional network off-campus.

Summarizing, the benefits of the training developed on the basis of this

community approach are diverse. In addition to the institutional climate and the professional culture that is generated in these exchanges, it promotes well-being and motivation for professional activity, more effective teaching performance, more positive attitudes and optimization of resources in a more efficient way, that is: a better quality university model.

4. Conclusion and future research

This study addresses a classic and at the same time actual theme, since it tries to emphasize the role of collaboration in the training of university teachers. It is an underdeveloped approach, according to Vangrieken et al. (2015, p. 37), who point out that "literature appeared to be limited to collaboration in primary and secondary education, rarely incorporating the context of higher education". Therefore, it is a relevant and timely issue in the current context of higher education and, consequently, in the university context.

From the methodological point of view, reviewing the existing literature is always an interesting approach. However, limitations of this study can be seen in its exploratory nature and the methodological difficulties impeding a systematic review.

Many of the innovations promising improved outcomes for under-prepared university students require teachers able to change their teaching practice. That is true especially in a context, where in the view of Macfarlane (2011, 2012), academic freedom and the "must be" of the university are threatened by high-level teachers who are giving up traditional roles of academic leadership for a management style, more concerned with quantifiable data than the advance and creation of original thinking. It is necessary to overcome the current excess of administrative tasks that the most relevant academics are taking on, causing that academic life is hollowed out and academic practice is disaggregated in separate areas (research, teaching and services) that have materialized, especially management and bureaucracy (Macfarlane, 2010).

Perhaps, today more than ever, university demands a professional responsibility in research and teaching, strengthening the connection

between both (López Gómez, 2015). From the point of view of research activity, research is organized in groups, but there is no tradition of teaching groups. Therefore, to strengthen the culture of collaboration in teaching is a necessity and a challenge.

Collaboration is a continuum that goes beyond individual aggregates and is powered by strong team collaboration. In this way, team effectiveness has much to do with the shared vision and perspective of beliefs, roles, and membership in a collaborative network (Vangrieken, Dochy & Raes, 2016).

The benefits of teacher collaboration focus on the teacher, but go beyond: students and the institution. In this regard, teacher collaboration in professional development is necessary including neighbouring disciplines (*beyond departments*) and also reveals the need to promote connectivity within and outside the institutions (*on campus* and *off campus*).

Professional development programs grounded in mutual support and collaboration among teachers have to be realized to further develop and improve university teaching. In this way, the design of professional development programs is focused on collaborative rather than individual designs. It is understood that from collaboration may arise projects, investiations and that they can improve educational practice in a broad sense. This study supports the idea that educational research also has to provide support for an appropriate evaluation of training programs in order to estimate its relevance, impact, benefits, limitations, etc.

Some of the proposals derived from this study are focused on involving teachers in collaborative action research to improve teaching practice by establishing and consolidating social networks to promote professional development in a learning community (López & Tinoca, 2016).

Teachers improve their teaching if they receive support to reflect in collaboration on their practice and to conduct student centered teaching (López Gómez, 2016). If universities consider teaching and learning important, they should provide policies that encourage support for reflective and collaborative practice in teaching (Kennelly & McCormack, 2015). In our view, it is a necessity that has already become a major challenge.

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An Approach to Content and Language Integrated Learning (CLIL)

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Abstract

This article wants to introduce the reader and above all the teaching staff to the method of "Content and Language Integrated Learning" (CLIL), which is quite common in bilingual education. Taking into account that this method is quite practical, two practical sessions have been included in full detail in this article so as to show the reader the step-by-step process of a given lesson. This lesson is based on the teaching of Sciences. To be more precise, it is focused on the Earth and the Moon.

Introduction

CLIL is an acronym, and as such it tends to attract people's attention. It means Content and Language Integrated Learning, which basically consists of learning a subject through the medium of a foreign language with a double aim, the learning of contents as well as the learning of a foreign language. According to Ball (1-2, 2010)[1], it was implemented by ancient Roman upper-middle classes, who preferred to have their children educated in Greek. Thus the foreign language becomes an essential subject where learners learn in order to do something else. "CLIL refers to situations where subjects, or parts of subjects, are taught through a foreign language with dual-focused aims, namely the learning of content, and the simultaneous learning of a foreign language" (Marsh, 2002).

This paper offers a lesson proposal based on Content and Language Integrated Learning methodology (henceforth, CLIL) whose objective is to

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[1] For further detail visit
http://www.onestopenglish.com/clil/methodology/articles/article-what-is-clil/500453.article

combine the teaching of a foreign language with the presentation of non-linguistic contents. This plan consists of two one-hour session designed for the second year of Compulsory Secondary Education based on a non-linguistic subject, which in this case is Science.

This teaching practice is very significant, as it provides new and positive ideas and try to influence the way students think about subjects. These tend to think subjects are bored; however, our goal, as teachers, is to change that way of thinking by making the acquisition of the L2 as meaningful as possible. And thanks to CLIL methodology and our imagination, which is crucial, we expect to get it by means of these two one-hour session plan. As Tejada Molina et al. (2005, p. 200) claim, students do not focus anymore on language learning, this time the target language is used as the vehicle through which contents are learnt.

As far as this lesson plan is concerned, it is oriented to bilingual education by means of two models. On the one hand, it is based on the ELT planning model proposed by K. Barnhouse (1991). On the other hand, it is also based on the so-called Sheltered Instruction Observation Protocol model (henceforth, SIOP), devised for bilingual education contexts by Echevarría, Vogt and Short (2007), whose aspects are essentially the same as those of CLIL methodology.

According to the SIOP model, students acquire the target language by means of its interactive use at the time of studying the content in the language in question (Echevarría et al. 2007, p.16). Besides Echevarría et al. (2007, p. 17) claim that students interact in the foreign language by means of the use of realia.

Benefits

Before moving on to the lesson planning section, let us see some of the benefits[2] of CLIL methodology.

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[2] http://ieselpalobilingual.wikispaces.com/CLIL-Methodology

- It develops intercultural communication skills
- It improves language competence and oral communication skills.
- It develops multilingual interests and attitudes.
- It provides opportunities to study content through different perspectives.
- It allows learners more contact with the target language.
- It does not require extra teaching hours.
- It complements other subjects rather than competes with them.
- It diversifies methods and forms of classroom practice.
- It increases learners' motivation and confidence in both the language and the subject being taught.
- It builds intercultural knowledge and understanding.

Apart from the above benefits, CLIL also causes changes[3]. Some of them are as follows:

- Teachers are expected to adjust their teaching techniques so that learners understand the contents.
- Contents will be learnt by means of interaction, group work, as well as tasks (that is cooperative learning).
- It is crucial that materials are adapted; and teachers are in charge of doing so.
- Besides the vocabulary is more appropriate for the subject they have to learn.
- CLIL is an approach to all types of students, as stated above, it is carried out through cooperative learning.

Lesson planning

Once the main theoretical aspects constituting this two-session plan have already been presented, the structure following our plan will be showed. As stated above, it is based upon Barnhouse's (1991) ELT planning model and the SIOP Lesson Plan Templates (Echevarría et al., 2007): first, the teaching

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[3] CLIL causes change.
http://www.onestopenglish.com/methodology/methodology/teaching-approaches/what-is-clil/156604.article (last access 24 July).

context accounts for the reality of our teaching-learning situation, that is to say, group features, the institution, the classroom, among others; second, recent work, where a brief mention is made about the contents that students have already seen in the previous session; third, standards, which are the most general objectives included in the curriculum of the subject set out by the Spanish educational system; forth, objectives, which is a section that presents both content and language objectives (both of them may be found in the sessions below); fifth, procedures, which coincide with lesson sequencing, as this section contains the activities I have proposed for these two sessions, as well as the main SIOP features that this lesson includes. As regard to activities, it is worth noting that they have been described by basing us on the Katherine Barnhouse's (1991) model; and sixth, reflections, where the one in charge of the teaching-learning process writes down their findings.

The planning of this two one-hour session is largely based on the SIOP model of bilingual education (Echevarría et al., 2007). It highlights the aspects below. Regarding content and language objectives, these are going to be presented in a very easy language at the very beginning of the session so that students can be aware of what they are supposed to have learnt by the end of this two one-hour session. Besides, students' previous knowledge is linked to the contents of the lesson. In addition, the use of supplementary materials, facilitates the contextualization of learning, for instance, our lesson plan consists of two sessions where supplementary materials, such as realia, images, readings, and among others. Nonetheless, we have to bear in mind that our students' learning needs and styles are different, which is why curricular materials are adapted in accordance with the SIOP model. Instances of this are jigsaw readings, outlines, and charts, among others. As a matter of fact, the SIOP model combines the learning of non-linguistic concepts as well as the practice by means of activities.

My two-hour session includes the following characteristics of the SIOP model.

Characteristics of the SIOP model found in my sessions.	
Preparation	Content adaptation, and incorporated strategies.
Scaffolding	Modelling, guided practice, independent practice, and comprehensive input.
Groupings	Whole class, Small groups, Partners, and Individually.
Integration of skills (4 + 1)	Reading, Writing, Speaking, Listening and interaction.
Application	Hands-on, meaningful, linked to objectives, promotes engagement.
Assessment	Individual, Group, Written, and oral.

Contextualization

Having introduced the two models on which our lesson plan is based, we shall now move on to the context of the teaching process.

These two lessons are going to be taught at an Andalusian secondary school and are addressed to fourteen-year-old pupils belonging to the second course of the first cycle of Compulsory Secondary Education (henceforth, C.S.E.), where there are twenty students, eight boys and twelve girls whose class is large, with space for group work, dramatization, etc. These ones are features appropiate for the execution of Content and Language Integrated Learning methodology (henceforth, CLIL).

The school is placed in a town where the families living there have an average socioeconomic and cultural level. Pupils live close to this school and need no medium of transport to arrive at school. There are twenty groups of students belonging to two different educational stages, both Compulsory and Upper Secondary Education, which make a total population of approximately sixty hundred and fifty pupils. Most of them are Spanish; nevertheless, our institution has recently received a substantial number of immigrant students, as families from South America and Eastern Europe have moved to the neighbourhood.

The relationship between the community and the school is positive. Parents frequently collaborate with teachers in the teaching-learning process

and in the activities developed at the school. A Parents' Association (PA) displaying high parental involvement and a great degree of cooperation with the different organs at the school was founded years ago.

Its Board of Directors is responsible for the organization and control of the school, and is constituted by a Head teacher, a Vice-Head, a Director of Studies and her Deputy, and a Secretary. Three people in charge of administrative tasks and other services make up the so-called Ancillary staff. As far as the English Department is concerned, it comprises six teachers, four having obtained a definite post at the school and the two left being supply teachers. There are fifty teachers of whom thirty are women and the rest men.

The school building has three different floors and every classroom has its library, some referential material and central heating. Apart from a reasonable number of ordinary classrooms (ten of them equipped with one computer per every two pupils), the school offers some specific ones: a Computer Room proper, a Music Classroom, a Technology Room, an Arts Room, and three different laboratories, one for foreign languages, another one for Physics and Chemistry and a third one for Natural Sciences. It also has a large library for students to gain access to any kind of information (via internet, encyclopedias, dictionaries, magazines or any other means), a gymnasium, a teachers' room, a multipurpose room, two different play-grounds, a coffee bar and some offices. The Centre is today part of the Andalusian net of schools which are making use of the Information and Communication Technologies (ICT) for the teaching practice. The atmo-sphere at the school is characterized by fellowship, respect, cooperation and tolerance.

It is of paramount importance to mention the fact that three years ago this school joined the regional government's initiative to foster the development of the students' communicative competence in at least one foreign language, that is to say, the Plurilingualism Promotion Plan to be precise. The goal is to make the learning of foreign languages a meaningful process whereby the foreign language is no longer an end in itself, but a means to an end, which is the learning of the non-linguistic curriculum through the foreign language(s).

As previously said, our goal is not to teach a foreign language, but a non-linguistic subject (i.e. Science). It is worth remembering that the foreign language is not the goal, but the vehicle. The contents to be covered in the two sessions have to do with the Earth and the Moon, particularly with the different phases of the moon and both solar and lunar eclipses.

Although these students have been exposed to a CLIL methodology for three years so far, their competence in the foreign language is not good enough yet to follow a lesson completely taught in English. Accordingly, it is highly advisable not to focus these lessons on speech but accompany them by plenty of different resources and materials which we should take advantage of such as multimedia (to make lessons as visually attractive as possible), realia, pictures, we mean things that can be tangible (as contents are sometimes acquired in a better way when pupils can touch and see them) apart from adapting any written text to the students' level of proficiency, use cognates (so that they can understand the contents in an easier way) and the students' mother toungue as a last resort, when necessary.

As regard to the times where the teaching lessons take place along the week, this particular group of students have four Science lessons a week divided into the following way along the week:

Science lessons	
Monday: 08:30 -09:30	Tuesday: 09:30 – 10:30
Thursday: 11:00-12:00	Friday: 12:00 -13:00

Although there is a period of time of one day when students have not got any Science lesson, it is not considered as a handicap, as the contents of the previous session are always reviewed at the beginning of every single session during the warm up part of the teaching.

Regarding students' recent work, students have already dealt with the contents about the Earth and the Sun in previous lessons.

Objectives

According to the Spanish Decree 148/2002, some of the general objectives of C.S.E, those of the target language as well as those of the subject itself are as follows:

General objectives of C.S.E.	
	At the end of the lesson, students will be able to:
Spanish Decree 148/2002	Follow as well as produce oral and written messages in the target language.
	Understand that both the sun and the moon produce some phenomena, which take place in our daily life.

General objectives of the target language	
	By the end of the lesson students will be able to: Listen to the target language so as to acquire certain structures.
Spanish Decree 148/2002	Communicate properly by making use of basic linguistic structures.
	Transmit concepts, ideas, feelings, emotions or needs.
	Use the language in question to express ideas, feelings, needs and realities.
	Make use of the target language as a vehicle to learn other subjects.
	Improve their communicative competence.

General objectives of the subject itself (Science: 1st cycle in C.S.E.)	
Spanish Decree 148/2002	By the end of the lesson students will be able to: Reflect upon science phenomena.
	Make use of a step-by-step process at the time of carrying out the activities. Get the general ideas of simple messages.
	Extrapolate what they have learnt in the classroom to their daily lives. Learn how to interact and cooperate with their mates at the time of doing the activities proposed.
	Be aware of some phenomena that are perfectly observable in every day such as the phases of the moon, solar and lunar eclipses, among others. Learn both solar and lunar eclipses before moving on to the rest of the heavenly bodies of our solar system.

To be more precise, the objectives of this two-session lesson are classified into content objectives and language objectives. As for the former, students will be able to (henceforth, SWBAT):

- Talk about the Moon.
- Know the phases of the moon.
- Recognize a lunar eclipse.
- Identify a solar eclipse.

With regard to the latter, SWBAT:

- Make use of the present simple tense to describe daily processes and phenomena.
- Learn the vocabulary related to the Earth and the Moon.
- Follow brief explanations in the language in question being complemented with realia as well as visual materials.
- Get the general idea of a short text dealing with the Moon.
- Work with your classmates to fulfil a task about the phases of the moon.
- Express ideas and opinions related to the topic.

- Identify every single one of the phases of the Moon.
- Cooperate with your partners and respect other students' points of view.

Vocabulary + materials and resources

During the lessons, the teacher is going to make use of the semantic field of the Moon, eclipses and phases of the Moon, where students are going to get used to listening to the next substantives and verbs, which will be crucial in this two-session plan. Instances of the former are crust, mantle, outer and inner core, eclipse, orbit, shadow, Earth, phase, Sun, planets, craters, surface, satellite and sunlight, crescent, half, gibbous, full, and new Moon. Instances of the latter are: shine, move, see, observe, eclipse, orbit, fall, crash, block, travel, hide and obscure.

We cannot forget about the use of materials and resources for our lesson to be a success. To cite but a few, some of them may be hands-on activities, realia (such as a home-made solar system, some marbles and a container with some sand, among others), multimedia (a powerpoint presentation), visuals, adapted texts, pictures, images, a lunar calendar, black/whiteboard, sheets of activities, students' notebooks, etc.

Step-by-step process

We shall now move on to the step-by-step process in which every activity will be described in full detail thanks to the use of the charts below:

Session 1: activity 1			
Description	Warm up: the contents of the previous session are reviewed before introducing the new ones of this session which are interrelated.		
Grouping	T ↔ Ss[4]	**Language skills**	Speaking, listening and reading.
Objective	To review the contents of the previous session and present or introduce the new ones of this session, which both are interrelated.		
Materials	Visuals, powerpoint, pictures and images.	**Timing**	5'
Anticipating difficulties	- Students may present difficulties to speak in English due to the fact that they do not find the equivalent words from Spanish to English.		
	- They may not remember the contents of the previous session; therefore, they may feel lost.		

Session 1: activity 2			
Description	Previous knowledge: having showed a picture of the Moon and basing us on the brainstorming technique, students will tell what they know about the Moon. It is important that they make guesses.		
Grouping	Firstly, T ↔ Ss. Secondly, S	**Language skills**	Speaking, listening, writing, vocabulary.
Objective	To get to know the students' knowledge about the Moon. The fact that they write down the information has the aim to contrast what they knew at the very beginning of the lesson with what they will know at the very end of it. In this way students will be aware of their progress and evolution in the learning of the subject.		
Materials	Blackboard, visuals, powerpoint, linked to previous background.	**Timing**	5'
Anticipating difficulties	It is possible that students have not got the specific vocabulary or that they feel ashamed of speaking in the target language.		

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[4] Each abbreviation corresponds to a specific grouping pattern:

Ss↔Ss or GW: Group-work (students work in groups).

S↔S: Pair-work (students work in twos).

T↔Ss: Active communication between teacher and students. The teacher elicits the students' participation, and the students participate.

T→Ss: Whole-class teaching (the teacher explains something to students and students simply listen to the teacher).

S: Individual work (students work on their own).

Session 1: activity 3			
Description	Text about the Moon: having read a text about the Moon, students will briefly tell what they have learnt. After that, they will answer a questionnaire about the text.		
Grouping	Firstly, S (as they are going to read the text while two or three volunteers read it aloud at different moments. Secondly, T↔Ss (feedback). In the third place, S↔S (questionnaire).	**Language skills**	Reading, listening (as two or three students are going to read the text aload while the rest of the class follow and listen to their partners' reading), speaking, writing, grammar, and interaction.
Objective	To learn more things about the Moon as well as to improve pronunciation.		
Materials	Hands-on materials, adapted texts. Printed hand-out (see activity 1.3, page 16).	**Timing**	10'
Anticipating difficulties	- Students do not understand the text, although it has already been adapted. - Students do not follow their partners' reading.		

Session 1: activity 4			
Description	Phases of the Moon: the teacher will show a diagram of the different positions of the Moon in its orbit around the Earth in the space which will be compared to different pictures of the Moon seen from the Earth, so that students can identify them better.		
Grouping	T ↔ Ss	**Language skills**	Speaking, listening, vocabulary.
Objective	To identify each and every one of the phases of the Moon.		
Materials	Multimedia (powerpoint).	**Timing**	5'
Anticipating difficulties	Students may not know the terminology.		

Session 1: activity 5			
Description	Match the pictures with the vocabulary: students will label the pictures of the different positions of the Moon with the correct names of each phase.		
Grouping	S↔S	**Language skills**	Writing, reading, speaking, listening and interaction.
Objective	To be able to identify every single one of the phases of the Moon.		
Materials	Hands-on materials, worksheets (see activity 1.5, page 16).	**Timing**	5'
Anticipating difficulties	Students do not make use of the language in question when they work in pairs.		

Session 1: activity 6			
Description	Observing the Moon: the teacher will give students a worksheet including a lunar calendar with the aim that they record their observations of the Moon during the next month.		
Grouping	S (as it is homework).	**Language skills**	Writing.
Objective	To record the students' observations of the Moon for the next month, as practice is crucial in the assimilation of the vocabulay and contents.		
Materials	Lunar calendar (see activity 1.6, page 17).	**Timing**	5'
Anticipating difficulties	Taking into account that it is a one-month activity, students may forget to look at the Moon every single night. That is why the teacher will remember them in each and every lesson that they have to carry out the activity.		

Session 1: activity 7			
Description	Task: *'Lost on the Moon'[5]*: Students are supposed to be astronauts that are lost on the Moon. Nonetheless, they cannot escape from the Moon on their spaceship due to a technical problem. That is why they have to arrive at the lunar station on foot to call for help. They can make use of different objects or tools found on the spaceship to survive during their trip to the station. Students will order the instruments from the most important to the less important one.		
	A ranking for each group will be established on the blackboard by the teacher.		
Grouping	First of all, GW (three or four students). Secondly, T↔S.	**Language skills**	Speaking, listening, reading, writing and interaction.
Objective	- To cooperate with the rest of the members of the group (respecting other students' opinion) with the aim to survive on the Moon by applying the theory; that is to say, the information they already have about the Moon. - To give arguments and explain why they chose these objects and not others in this order.		
Materials	Visuals, powerpoint (to show them the objects or instruments [see activity 1.7, page 17]).	**Timing**	15'
Anticipating difficulties	It is possible that students do not speak in English when they work in groups, which is why the teacher will monitorize the activity.		

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[5] ['Lost on the Moon'. Taken and slightly modified from a NASA activity http://www.kathimitchell.com/lost.htm (4 July, 2014)].

Session 1: activity 8			
Description	Recapitulation: - At first, the teacher will ask students for feedback so that students repeat and summarize the contents they have learnt in this session. - Then, s/he will repeat the objectives of this session. - Moreover, students will be told about bringing some marbles and a container containing some sand to the classroom, as an experiment will be done in the next session. - Finally, the teacher will give an advance of what students will learn in the next session; that is to say, students will learn what an eclipse is.		
Grouping	T↔Ss	**Language skills**	Speaking, listening and interaction.
Objective	To summarize the contents of this session, so that students bear in mind the most important aspects of this one.		
Materials	If necessary, the teacher may show again a slideshot including the phases of the Moon (see activity 1.8, page 17).	**Timing**	10'
Anticipating difficulties	Those students who did not attend the lesson may feel lost.		

Session 2: activity 1			
Description	Warm up: Students will tell what they learnt in the previous session about the Moon with the teacher's help when necessary. Then, the teacher will introduce the objectives of this second session, which are interrelated.		
Grouping	T↔Ss	**Language skills**	Speaking, listening and reading.
Objective	To review the contents of the previous session and amplify them with the ones of this second session.		
Materials	Multimedia (powerpoint to help them to remember [see activity 2.1, page 21]).	**Timing**	5'
Anticipating difficulties	- Students may not remember the contents. - They may feel ashamed of using English to express themselves. - Those students who did not pay enough attention in the previous session may feel lost.		

Session 2: activity 2			
Description	What is an eclipse? Making use of the brainstorming technique, students will make guesses about what an eclipse is, which will be written on the blackboard by the teacher.		
Grouping	T↔Ss	Language skills	Speaking, listening, and reading (their guesses written on the blackboard).
Objective	To have a general idea about the students' knowledge, so that we, as teachers, know where we have to begin from.		
Materials	Blackboard. Linked to previous knowledge, (see activity 2.2).	Timing	5'
Anticipating difficulties	It is probable that students have no idea about the topic.		

Session 2: activity 3			
Description	Text about eclipses: having read a text about eclipses, which has been read aloud by two or three students at different moments, the teacher will explain the procedure by means of which an eclipse takes place with the help of a home-made solar system, so that they can visually get a general idea. Then, students will answer the questions about the text.		
Grouping	Firstly, S. Secondly, S↔S.	Language skills	Reading, writing, listening, speaking.
Objective	- To learn what an eclipse is, how it is produced, and how many types of eclipses there are. - To improve pronunciation, as they have to read aloud.		
Materials	Hands-on materials, worksheets (see activity 2.3, page 21).	Timing	15'
Anticipating difficulties	- Students do not understand the text, although it has already been adapted. - Students do not follow their partners' reading. - Nevertheless, it is hoped that these problems are solved by means of the dramatization of the facts by using a home-made solar system; that is to say, realia.		

Session 2: activity 4	
Description	Second part of the task: *'Lost on the Moon:'* Students will tell and explain us which three items were the most important ones in order to remember what we did in this exercise in the previous session. Which ones would be useless in the Moon? Once this is finished, students will calculte their marks in the exercise. Later, it is our aim to get some

	conclusions.		
Grouping	Firstly, S↔S. Then, T↔S.	**Language Skills**	Speaking, listening, reading, writing, vocabulary, grammar (as they have to express themselves) and interaction.
Objective	- To give arguments and explain why they chose these objects and not others in this order. - To notice whether the contents have been acquired or not		
Materials	Visuals, powerpoint (so as to show them the objects or instruments), worksheets (see activity 2.4, page 23).	**Timing**	10'
Anticipating difficulties	Students may find difficulties at the moment of expressing their ideas in the foreign language such as not to have the vocabulary, to feel ashamed of speaking in the target language, to want to say the same things as they say in Spanish and not to be capable of finding an equivalent expression.		

Session 2: activity 5			
Description	Why has the Moon got craters on its surface? The brainstorming technique was thought to be appropriate for this task. Students will make guesses about what are the reasons why the Moon has craters on its surface, by making use of this technique. At that point, students' reasons will be written on the blackboard by the teacher.		
Grouping	In the first place, T↔Ss. Secondly, S or S↔S	**Language Skills**	Speaking, listening, reading (their guesses on the blackboard) and interaction.
Objective	To get to know the reasons why students think the Moon has got craters on its surface by encouraging them to make guesses, even though the real reasons will be given in the end by means of experimentation with real objects.		
Materials	Blackboard, realia (some marbles and a container with some sand). Linked to previous knowledge (see activity 2.5, page 24).	**Timing**	10'
Anticipating difficulties	There is a possibility that some students forget to bring the materials to the classroom. In that case, they will work in pairs.		

Session 2: activity 6			
Description	On the one hand, students are going to write everything they have learnt about the Moon. On the other hand, this information is going to be compared to the one they wrote at the very beginning of the lesson, so that students are aware of their progress and notice that there has been an evolution in their learning. We may say that it is like a self-check.		
Grouping	S	**Language Skills**	Writing.
Objective	To be aware of one's learning.		
Materials	Students' notebooks.	**Timing**	5'
Anticipating difficulties	- Students may have some problems related to grammar. - They might present some difficulties to express their ideas at the moment of writing.		

Session 2: activity 7		
Description	Recapitulation. - The teacher will help students to summarize the contents of this session. - In the end, the teacher will give an advance of what is going to be taught in the next session, for instance the heavenly bodies that constitute our solar system, in other words, the Earth in relation to the rest of the planets such as Saturn, Mars, Venus, among others.	
Grouping	T↔Ss	**Language Skills** Speaking, listening.
Objective	To recapitulate the contents of this session so that students bear in mind the most important aspects.	
Materials	Realia, multimedia (powerpoint).	**Timing** 10'
Anticipating difficulties	Those students who did not pay enough attention during the session may feel lost.	

Session 1

1.1 Warm up.

Having seen the parts of the Earth in the previous session, this vocabulary will be reviewed by the students with the teacher's help, before seeing the Earth in relation to the Moon. That is the purpose of this session.
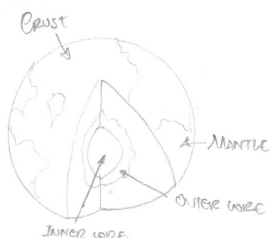
Figure 1: Parts of the Earth.

1.2 Previous knowledge.

Having shown two pictures (one of the Moon and another one of an astronaut) and basing us on the brainstorming technique, students will make

guesses and tell what they know about the Moon. Then, this information will be written on their notebooks.

> Would you like to live on the Moon?

> The Moon shines at night. Where do you think the light comes from?

> What do you know about the Moon?

> Write down five things you know about the Moon
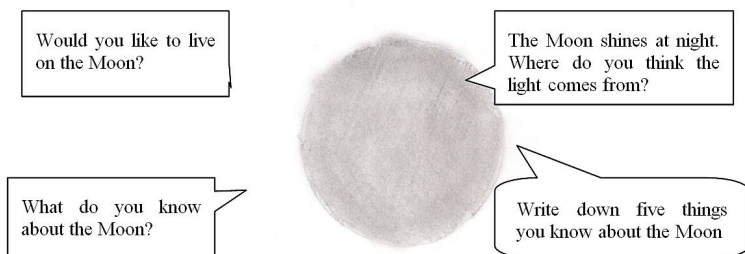
Figure 2: The Moon.

1.3 Reading: the Earth & the Moon[6].

The moon is a satellite. We always see it in the sky at night. It seems to be quite close, but the moon is approximately 384.000 kilometres from Earth. The moon orbits Earth in 29 days. We call this period a lunar month. There are 13 lunar months in a year.

The moon appears to have different shapes during the lunar month. These are called the phases of the moon. We do not see the moon at the beginning of a lunar month – we call this the new moon. We can see half of the moon seven days later. We see a full moon in the middle of the month and we see a half moon again during the last days of the lunar month.

1.4 Complete the sentences according to the text:

1. The moon is .... away from Earth.
2. The moon takes .... to travel around Earth.
3. There are thirteen .... in a year.
4. We see a .... in the middle of the lunar month.

1.5 Sort the phases of the Moon out.

Full, gibbous, half, new, crescent, gibbous, half, crescent.

Figure 3: Phases of the Moon.

⁶ [Text about the Moon that has been taken and slightly modified from http://www.space.com/18145-how-far-is-the-moon.html (4 July, 2014) so that it could be adapted to students].

1.6 Observing the Moon.

Having given students a worksheet including a lunar calendar for the month of March, it is expected that they record their observations of the Moon during the next month.

MARCH LUNAR CALENDAR						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
◯	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	☽	◯	☾

1.7 Task: *'Lost on the Moon.'*

Imagine you all are astronauts that are lost on the Moon. Nonetheless, you cannot escape from the Moon on your spaceship due to a technical problem. That is why you have to arrive at the lunar station on foot to call for help. You can make use of different objects or tools found on the spaceship to survive during your trip to the station. The instruments will be ordered from the most important to the least important one.
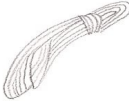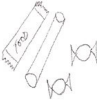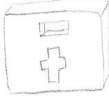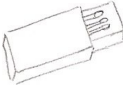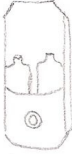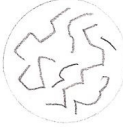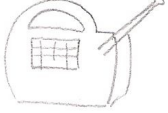
Figure 4: Water.	Figure 5: Flashlight.	Figure 6: Mobile phone.	Figure 7: Parachute.
Figure 8: Sunglasses.	Figure 9: Rope.	Figure 10: Compass.	Figure 11: Sweets.
Figure 12: A Multifunction penknife.	Figure 13: Holy Bible.	Figure 14: First-Aid kit.	Figure 15: Three signal flares.
Figure 16: A Matchbox	Figure 17: Two 45-caliber pistols.		Figure 18: Tanks of oxygen.

Figure 19: Star Chart.	Figure 20: Portable heating unit.	Figure 21: Solar-powered radio.

1.8 Recapitulation.

Once the session is about to come to an end, it is time for us to recapitulate. What do you know about the Moon? It is a satellite that orbits around Earth. We see it in the sky at night. It is approximately 384.000 kilometres from Earth. What is a lunar month? The moon orbits Earth in 29 days. We call this period a lunar month. How many lunar months are there? There are 13 lunar months in a year.
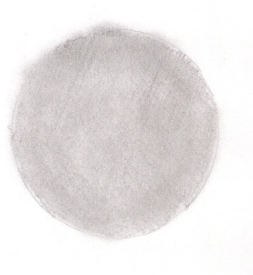
Figure 22: The Moon.

The Moon has different shapes during the lunar month. These are called the phases of the moon. What are their names? These are crescent, half, gibbous, full, gibbous, half, crescent and new.

Figure 23: The Phases of the Moon.

Next day we are going to see what eclipses are.
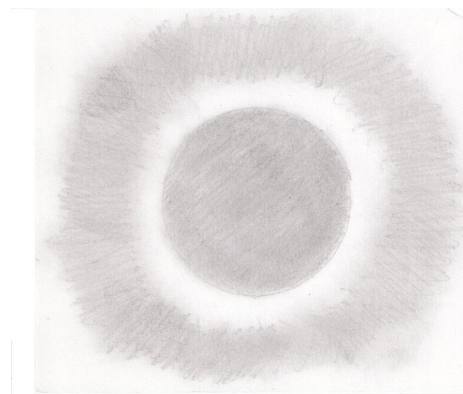
Figure 24: Lunar Eclipse.

Appendix 2 (session 2)

2.1 Warm up.

The teacher will start the session by asking: What do you remember about the previous session? And students, with the help of the teacher if necessary, will answer that we learnt about the Moon, which is a satellite that orbits around Earth. We see it in the sky at night. It is approximately 384.000 kilometres from Earth. The moon orbits Earth in 29 days. We call this period a lunar month. There are 13 lunar months in a year. The Moon has different shapes during the lunar month. These are called the phases of the moon. What are their names? These are crescent, half, gibbous, full, gibbous, half, crescent and new.
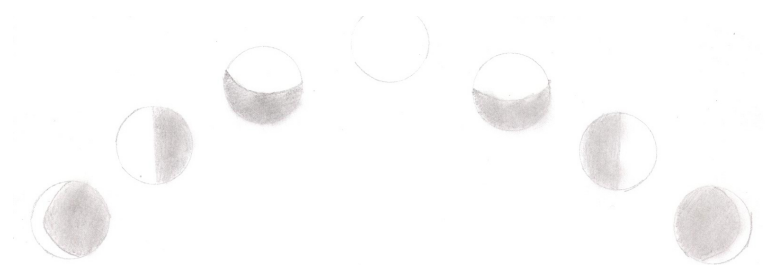
Figure 25: The Phases of the Moon.

2.2 Previous knowledge.

Basing us on the brainstorming technique, students will make guesses and tell what they know about eclipses.
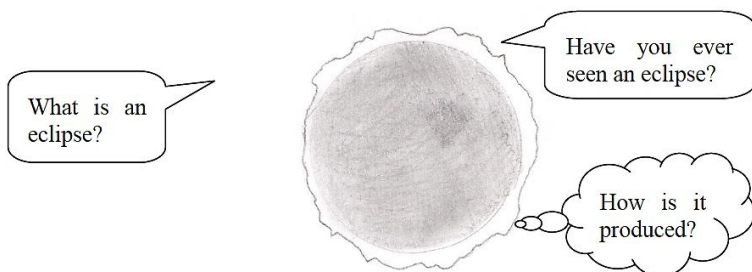
Figure 26: Solar Eclipse

2.3 Reading: A solar eclipse[7].

Have you ever seen an eclipse of the sun? It is called a solar eclipse. Solar means sun. A solar eclipse happens when the sun's light is blocked from Earth. Do you know why this happens?

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[7] [A solar eclipse.
<http://service.columbia.k12.mo.us/shepard3/files/2011/08/November-2-8.pdf> (4 July 2014)]. Both text and reading comprehension questions were taken from the aforesaid link.

The moon travels around Earth. Earth and the moon both travel around the sun. Sometimes, the moon passes exactly between the sun and Earth. The sun's light is blocked by the moon. Earth becomes dark. This darkness can last from two to seven minutes. Then, as the moon moves, the sunlight appears again. A solar eclipse is an amazing event.

Comprehension questions:

1 - Kwanda is writing a report on solar eclipses. Which sentence would best help her summarize what a solar eclipse is?
a) Have you ever seen an eclipse of the sun?
b) A solar eclipse happens when the sun's light blocked from earth.
c) The moon travels around Earth.
d) Then, as the moon moves, the sunlight appears again.

2 – The word 'solar' means:
a) Moon
b) Blocked
c) Eclipse
d) Sun

3 – Which of the following statements about a solar eclipse is not true?
a) The darkness of an eclipse lasts a day.
b) The sunlight appears again when the moon moves.
c) Sometimes the moon passes exactly between the sun and the Earth.
d) Earth and the moon both travel around the sun.

A lunar eclipse[8]

I like astronomy and all that, but some things used to confuse me. For example, I had never been able to get clear on eclipses. I read about them and still I was not straight about the differences between a solar eclipse and a lunar eclipse.

A visit by a friend of my father's changed all that. Dr. Fielding is a college professor who went to school with my dad way back in the early 70's. He came over for dinner one evening, and we got to talking about my

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[8] [A lunar eclipse.
http://www.lcps.org/cms/lib4/VA01000195/Centricity/Domain/12368/mainideadetail summarizingstudyuide.pdf (4 July 2014)].

interest in astronomy, and specifically, my confusion about eclipses. That's when Dr. Fielding cleared it all up for me.

The word eclipse means that something is being hidden in the shadow of something else. A specific eclipse is named for the thing that is being hidden, or obscure. So, on a sunny day, if I stand in front of my dog, Rusty, so that I am between him and the light and my shadow falls on him, it is a 'Rusty eclipse.' (OK, I made that up, but it helps me understand better.) The word 'sol' means sun, and in a solar eclipse, the view of sun is being obscured by the moon. 'Luna' means moon, and of course, in a lunar eclipse, it is the moon that is obscured, this time by the shadow of the Earth.

Hey, if you were confused about eclipses, too, but now you get it, I'll thank Dr. Fielding for you.

Comprehension questions:

1 - Summarize in your own words the main idea of the story.
2 – In a total solar eclipse, what object can you not see?
3 – In s lunar eclipse, what is causing the shadow?
4 – The author chose a personal and informal tone. Do you think this was an effective way to present scientific information? Why or why not?
5 – Cite two examples of informal, casual language used in the story.

2.4 Task: *'Lost on the Moon'* second part.

- A printed worksheet is going to be given to the students so that they answer to the following questions:

1. Which ítems were the most important? Why?
2. Which items would be useless? Explain your answer.

- Compare your list with the one supplied by your teacher. Astronauts would list the items in this order:

1. Two 50-kg tanks of oxygen (for breathing).
2. Water bottle (replenish body loss).
3. Star Chart (principal means of finding direction).
4. Some energetic bars (daily food requirements).
5. Solar-powered radio (signalling and receiving).
6. 20-meter-nylon rope (climbing, securing packs, etc.).
7. First-aid kit (injury or sickness).
8. Three signal flares (location marker when in sight of base ship).
9. Two 45-caliber pistols (useful as propulsion devices).
10. Portable heating unit (useful only on dark side of the moon).
11. Mobile phone (to call the station).
12. Flashlight (useful only on the dark side of the Moon).
13. Multifunction penknife.
14. Holy Bible (as there is no gravity on the Moon, your feet will be more in contact with the ground, as it is a heavy book).
15. Three pairs of sunglasses (useful to do signs).
16. Parachute (to travel faster with the help of solar winds).
17. Magnetic compass (useless since the Moon has no magnetic poles).
18. Matchbox (little or no use on the Moon).

- To score your list against the astronauts' list, do the following[9]:

1. Beside each item on your list place the number that represents the difference between your ranking and the astronauts' ranking. For example, if you listed oxygen first, you would write 0 in front of oxygen on your list. If you had listed it third, you would write 2, and so on and so forth.

2. After placing a score beside each item on your list, add up the individual scores to get a total. Compare your score with those of other students.

3. What is your total score?

4. The lower your total score, the closer you came to surviving the return trip to the base ship. How did your chance of surviving compare to other students' chances?

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[9] [The answers. <http://www.kathimitchell.com/moonans.htm> (4 July 2014)].

- Conclusions:

1. What does the moon lack that humans need for survival?
2. What materials would you need to survive on the moon?

2.5 Previous knowledge.

The brainstorming technique was thought to be appropriate for this task. Students will make guesses about what are the reasons why the Moon has craters on its surface by making use of this technique.
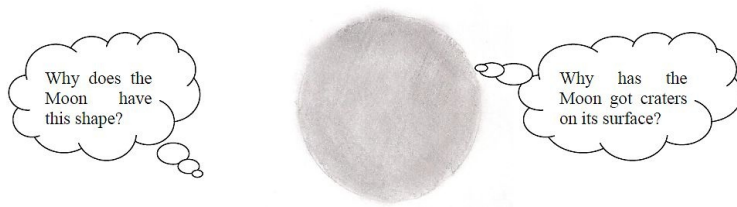
Figure 27: The Moon.

Then, they will understand why the Moon has got that aspect by means of the dramatization of the facts by using realia (some marbles and a container with some sand).

2.7 Recapitulation.

Let us recapitulate. What is an eclipse? It is produced when an object does not receive the sunlight. How many types of eclipses do you know? There are two types: a lunar eclipse, which takes place when the Earth is located between the Sun and the Moon, and solar eclipse, which is produced when the Moon is located between the Sun and the Earth.
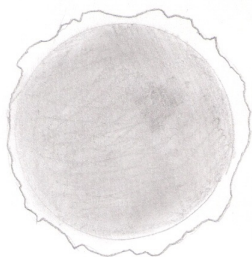
Table 28: Solar Eclipse   *Table 29:* Lunar Eclipse
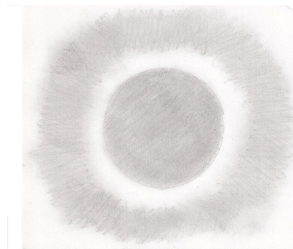
Why has the Moon got craters on its surface?
Why does the Moon have this shape?
Why does the Moon have craters on its surface? Because of rocks from the space or meteorites that crashed into it.
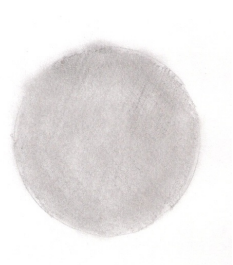
Figure 30: The Moon.

Bearing in mind that we have already studied the Earth in isolation and then the Earth and the Moon, next day we are going to see the Earth in comparison with the rest of heavenly bodies, that is to say, the planets such as Saturn, Mars, etc.

Figure 31: The Solar System.

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