

Action Research through Lesson Study for the Reconstruction of Teachers' Practical Knowledge. A Review of Research at Málaga University (Spain)

Soto Gómez, Encarnación*; Serván Núñez, María José; Peña Trapero, Noemí and Pérez Gómez, Ángel Ignacio

Department of Didactics and School Organisation. Málaga University. School of Education Sciences. Avenida Louis Pasteur, s/n. Campus Teatinos. 29071 Málaga.

Authors' details:

***Soto Gómez, Encarnación.** (corresponding author) Telephone: 0034 952132624. Email: esoto@uma.es. ORCID ID: <https://orcid.org/0000-0001-5758-1684>

Lecture University Professor. Department of Didactics and School Organisation. Málaga University. Málaga University. School of Education Sciences. Avenida Louis Pasteur, s/n. Campus Teatinos. 29071 Málaga.

Serván Núñez, María José. Telephone: 0034 952132570. Email: servan@uma.es. ORCID ID: <https://orcid.org/0000-0001-7962-3873>

Lecture University Professor. Department of Didactics and School Organisation. Málaga University. Málaga University. School of Education Sciences. Avenida Louis Pasteur, s/n. Campus Teatinos. 29071 Málaga.

Noemí Peña Trapero Telephone: 0034 952132547. Email: noemiptr@uma.es. ORCID ID: <https://orcid.org/0000-0003-4721-1975>

Temporary Replacement Teacher. Department of Didactics and School Organisation. Málaga University. Málaga University. School of Education Sciences. Avenida Louis Pasteur, s/n. Campus Teatinos. 29071 Málaga.

Pérez Gómez, Ángel Ignacio. Telephone: 0034 952131069. Email: apgomez@uma.es. ORCID ID: <https://orcid.org/0000-0001-8291-0849>

University Professor. Department of Didactics and School Organisation. Málaga University. Málaga University. School of Education Sciences. Avenida Louis Pasteur, s/n. Campus Teatinos. 29071 Málaga.

Funding details:

This research has been made possible thanks to funding provided by the Spanish Ministry of Economy, Industry and Competitiveness in the 2011 round of R&D projects: *The Practical Knowledge of Early Years School Teachers and Its Implications for Pre-service and In-Service Teacher Training: Cooperative Action Research* (EDU2011-29732-c02-02) and 2017 with the project: *Lesson Study, School and University: Researching the Reconstruction of Practical Knowledge in Pre-service Teacher Training* (EDU2017-86082-P), part of the National Programme for the Promotion of Scientific and Technical Research of Excellence, a state sub-programme aimed at generating knowledge. From here we would like to express our most sincere thanks to both the aforementioned institutions and Málaga University for making this research possible, as well as the teachers and students who have been involved in the different processes arising from it.

Action Research through Lesson Study for the Reconstruction of Teachers' Practical Knowledge. A Review of Research at Málaga University (Spain)

ABSTRACT

This article aims to set out our discussions, reflections and research at Málaga University (Spain) in relation to Lesson Study (LS), as a cooperative action research process. The paper aims to summarise the main findings of ten years of research, addressing the concepts and dilemmas found both in forming teachers' practical thinking and in the complex processes of reconstruction through LS. The results of our research provide evidence that it is a useful way to deal with the reconstruction of teachers' practical knowledge in teacher training. Teachers' practical knowledge should be more broadly seen as an active combination of theoretical knowledge, procedural knowledge and skills, attitudes, emotions, beliefs, and values: i.e. teachers' practical thinking. Most of these personal and professional resources are unconscious, or rather sub-conscious. Changes in teachers' practical thinking require more practical experience and reflexion: a dialectical process based around two key components: theorisation of practice and experimentation of reconstructed theory. The results of our research show that these dialectical process could be developed with LS as a particular way of developing AR, adding a complex, systematic, flexible and cooperative way of dealing with specific and contextual curricular innovation projects. We therefore conclude that LS could be a very useful path to follow in reconstructing teachers' practical thinking from within, strengthening the professional teaching community.

Keywords: Lesson study; practical knowledge; tacit knowledge; pre-service teacher training; in-service teacher training.

1. Introduction

Classrooms, as defined by Jackson (1991), are complex places as they support a diversity of simultaneous processes and events. In this context, teachers face a high degree of ambiguity, uncertainty and complexity when developing processes, implementing strategies and taking decisions, all under the added pressure of meeting institutional and social demands.

These practical problems bring a series of dilemmas for which there are often no clear solutions. Generally, the first thing teachers do when faced with an emerging reality is to assess it emotionally and cognitively through the prism of their personal beliefs. These automatic processes that appear spontaneously throughout the school day are affected by a repertoire of knowledge, skills, attitudes, values and emotions –both conscious and unconscious– that form part of practical knowledge (Pérez Gómez 2012; Soto et al. 2015) or *knowledge-in-action* (Schön 1998).

Our research group has been concerned with teachers' professional since it was first set up in 1983, focusing specifically on analysing the evolution of practical knowledge and how it is key to improving and transforming education. Fundamentally, we are interested in knowing which processes activate, mobilise and facilitate the change from practical knowledge to practical thinking, both in pre-service and in-service training, through processes of Action Research (hereinafter AR) moreover, for the last ten years we have been interested in how this relates to processes of Cooperative Action Research or Lesson Study (hereinafter LS).

2. Action research via Lesson Study around practical knowledge

The AR experience in Spain has been long but intermittent. Thanks to authors such as Lawrence Stenhouse, John Elliott and Bridget Somekh, at the start of the 1980s such proposals provided a fertile ground for a sterile Spanish educational system that had been bereft of vitality and hope for more 40 years (Pérez Gómez, et al. 2009). These rich theories brought a radical change in the way the teaching profession and educational practice were conceived. AR, as Elliott (2015) suggests, is a research process where values are transformed into specific actions, involving what Aristotle called *phronesis* or practical knowledge. It is a process-based model that allows teachers to create an ethical space for learning in which both creativity and autonomy are respected, and where teachers are responsible for their own learning. AR therefore requires a critical and constructive approach to pedagogical work, as well as a space to enable professional self-determination.

2.1. Teaching identity and practical knowledge

Although AR has been defined in several ways in accordance with the range of aspects considered relevant in different contexts, it nevertheless encompasses a series of common features which distinguish it in this diverse panorama, even though the theoretical meaning and practical implementation of these features are far from unequivocal. This research process (AR) incorporates an internal definition of what it is and what it means to be a teacher, an identity woven from a complex system of tacit and explicit dimensions. This constructive process requires an understanding of the nature of practical knowledge

(knowledge in use), a knowledge formed by a repertoire of images, maps or artefacts laden with information, logical associations and emotional connotations that we use automatically in our day-to-day practice, as opposed to theoretical knowledge (espoused knowledge), which we use to describe and justify our practice (Pérez Gómez 2012). To appreciate the complexity of practical knowledge (Pérez Gómez, Soto and Serván 2010; Soto et al. 2015), we must first understand:

- The convergence and interaction of the conscious and unconscious aspects¹ of the processing of information found in all human experiences, and in particular in teachers' professional practice (Bargh and Ferguson 2000).
- The automatic nature that defines it. Automatic and unconscious responses are activated in the daily exchange, which appear to diverge and even contradict our rational and conscious knowledge (Argyris 1993).
- The importance of intuition and the oft-forgotten emerging meanings (Greeno, Collins and Resnick 1996).
- The relevance of beliefs -organised to a greater or lesser degree in systems that are formed from an early age- that are fundamentally unconscious and linked to emotions and affections, and which aspire to remain despite the weakness of their logical and rational foundations (Pérez Gómez 2017).
- Its holistic nature. Dewey and Jackson insisted on considering the holistic human experience as the coming together of a range of different, and even opposing, aspects, rather than simply the rationalist dimension of human knowledge and behaviour (Decartes' Error).
- The situated character of practical knowledge, which can help us understand the complex process of formation and change. Some representatives of the socio-cultural and situated perspective (Brown, Collins and Duguid 1989; Lave 1988; Rogoff 1990) defend a new form of interactionism that recognises the fundamental unity of the person-context as a basic principle. We could therefore say that practical knowledge, or *knowledge-in-action* (Schön 1988), is the set of **beliefs, skills, values, attitudes and emotions** that operate automatically, implicitly, without the need for consciousness, influencing our perception, interpretation, decision making and action. **Practical thinking**, on the other hand, includes *knowledge-in-action* plus *reflective knowledge-on-action*. In other words, it comprises all resources (conscious and unconscious) that we, as human beings, use when trying to understand, design and intervene in a specific personal or professional life situation.

2.2. Action research and practical knowledge

AR allows teachers to question their professional roles, identities and ways of relating. Developing an AR process should mean embarking on a journey that involves both the

¹ Most researchers in cognitive neuroscience confirm the non-conscious character of at least 90% of the mechanisms activated by humans to perceive, interpret, make decisions and intervene in the complex reality they inhabit, both in personal and in professional and social spheres.

teacher's identity -values, beliefs and emotions (McLaughlin and Ayubayeva 2015)-, and their knowledge, skills and attitudes (Soto et al. 2015). In general terms, AR represents:

- Integrating knowledge and action.
- Questioning of the instrumental vision of practice, and the emphasis on its educational value in term of experience.
- Counting on teachers as researchers in improving their own practice and, in consequence, of implicitly improving their ways of understanding and acting.
- A vision of social change.

After half a century, it can be said that AR has been implemented unevenly and dispersedly in the Spanish education system, meaning the opportunity to create training networks amongst teachers, from the universities to kindergartens or primary schools, has been lost. We need to promote communities of teachers who cooperatively analyse and design proposals that promote learning, thus helping to chip away at the established culture of teacher isolation. In short, it is necessary to convert teachers into researchers on their own practice and producers of contrasted, public knowledge.

As Hawkings (2015) suggests, the weaknesses in AR are related fundamentally to the knowledge produced, i.e. knowledge with little tradition of contrasting results, written primarily by academic facilitators who tend to shut off or restrict interpretation and focus more on the processes and procedures of AR than on pupils' learning (Ado 2013; Arhar et al. 2013, Marton & Runneson, 2015).

2.3. Lesson study, a new opportunity to transform teaching identity and culture

As Rué (2016) states, LS has nevertheless incorporated new nuances, knowledge and criteria that appeal to professionals, encouraging them to share and disseminate their experiences among the community (Suratno 2012, 202).

In 2008 John Elliott, hitherto President of WALs, presented LS to us at our research stay in CARE (UAE). LS could be conceptualised as a specific form of Cooperative Action Research that is specially designed for in-service teacher education. It aims to achieve both action and research. The practitioner reviews and reformulates the questions they are asking, the methods they are using, the plans they are implementing, the consequences on pupils' learning, and the empowerment of teachers' professional knowledge, all of which is achieved thanks to regular, systematic, cooperative, critical study of what they are doing while experimenting with the new curriculum proposal.

For Rué (2016), LS brings meaning and system together and is therefore proposed as a means to improve learning (and, in consequence, teaching) (Dudley 2015), based on group work by teachers around a learning problem related to relevant public knowledge. It includes teachers' narratives and the practical knowledge that comes into play in the exchange of experiences on day-to-day practice as an alternative discourse to the proposals for top-down reform and improvement (Firman 2010). All this represents a complex approach that places the teaching profession within a new perspective away from training that is disconnected from structured practice, which isolates teachers from their community and is of little practical use in their work contexts.

In essence, LS once again leads the change and the production of knowledge for the agents involved, breaking down the classic distance between those who plan and those who apply (deciders and doers). Participation generates commitment when those affected by the decisions feel that they can intervene and be involved in the decision-making process and in developing the activity that affects them.

It is our conviction that one of the most outstanding aspects of LS as AR resides in both collaboration –the balance between research and action, prioritising student learning– and the strengthening of systematic research processes. This thinking, linked to contrasted and shared action, helps bolster LS as AR in order to reconstruct the implicit aspects of practical knowledge and make them visible (as shown by an important volume of studies: Elliott 1993; Cheung and Wong 2014; Dudley 2015; Lewis 2009). LS is understood essentially as a strategy not only to improve practice and bring curricular change, but also a way to strengthen the professional community and make pupils' and teachers' learning visible through cooperative processes (Firman 2010; Hendayana et al. 2007 as quoted in Suratno 2012).

Tomasello et al. (2005) and Rué (2016) believe that developing a shared intention among participants is what truly constitutes cooperation. Sharing thoughts, hopes and actions with others means subjecting one's own criteria to their judgements and evaluations.

Participatory Action Research (PAR), as suggested by Hawkings (2015), proposes mutual collaboration processes to reach intersubjective agreements and share impressions of a particular situation, therefore building the sense of a valid, legitimate joint achievement not only for participants but also for anyone experiencing this situation. LS continues and intensifies this tradition by establishing a systematic framework that is particularly suited to the school context, and specifically to the teaching community when sharing educational practice.

- Our research experience over the last ten years indicates that LS, as we have interpreted it, is a singular, nuanced expression of AR with enhanced value: it favours self-training and the reconstruction of the practical knowledge of participating teachers, fundamentally through two key processes: theorisation of practice and experimentation of theory (Soto et al. 2015). This is the peculiar perspective of LS we have developed in our work. Reflection "*on*" action (Schön, 1998) and *theorisation of practice* (Hagger and Hazel, 2006) seek to provoke and encourage teachers to identify, analyse and reformulate not only the espoused theories that adorn our rhetoric, but also the theories-in-use that govern our practice. However, reflection "*on*" action is not the same as *practical thinking*. In our opinion, the key step that Korthagen, Loughran and Russell (2006) introduce in Schön's thinking (1998) is the relevance given to the complementary process of converting the new reconstructed personal theories into concrete, sustainable, agile modes of interpretation and action, i.e., *experimentation of theory*.
- PAR systematically redesigns and strengthens the cooperative, community-based character of research by placing it within the peer group. There is no isolated individual work option, and groups of 4-6 teachers are set up in order to stimulate emotional bonds and create a climate of trust, thus ensuring all participants feel they

are fully involved in the process (Suratno 2012), while also giving prominence to the role of the methodological consultant.

- PAR proposes that the research should focus on pupils' learning. Reviewing teaching through the eyes of pupils is important as it establishes a perspective that allows us to bring in other voices and ensure the AR processes are relevant (Suratno 2012). The use of tools such as pedagogical documentation in the lesson study helps to focus the teachers' attention on pupils' learning.

3. A review of research findings around LS at Málaga University

Over recent years we have researched these processes in both in-service and pre-service training teachers, with interesting findings in the reconstruction of their practical knowledge. The section below describes the finished and ongoing research projects and analyses some of our findings around the aforementioned core aspects which, in our opinion, serve to bolster LS for Teacher Education.

3. 1. Methodological design

3. 1. 1. Lesson Study around in-service training. Eight case studies

The project we developed in 2011-2014 aimed to analyse the practical knowledge of seven pre-school teachers who took part in an LS process, and study how the LS processes and phases contributed to this reconstruction.

Eight case studies were designed. Seven of them focused on rebuilding the practical knowledge of the seven teachers involved in the Lesson Study (Peña et al. 2015). The aim of the eighth case study was to monitor the Lesson Study process (Soto et al. 2015).

Observation, in-depth interviews and experience sampling were used as data collection strategies (Riediger, 2010).

In the seven teacher case studies, the teachers' classrooms were observed for 5 months, 2-3 days a week, in order to collect evidence on their theories-in-use. Moreover, in-depth interviews and experience sampling were carried out in order to collect data about their *espoused theories*.

Experience sampling refers to the capture of experiences such as events, behaviours, feelings, or thoughts, at or near the time of their occurrence and within the context of the person's day-to-day life. It is used to capture multiple facets of the natural development of the experiences in their contexts, such as the person's thinking or feelings at the time of the action.

With regard to the LS process case study, all the teachers' meetings were observed and filmed (allowing us to produce a visual report of the study), and the documents produced by the teachers during the process were reviewed (meeting minutes, Lesson Project and pedagogical documentation). The researchers kept a shared diary.

All the data collected were analysed in order to understand how the different processes and phases involved in the LS helped reconstruct teachers' knowledge and practical thinking, for which evidence was found in the seven individual case studies.

3.1.2. Lesson Study around pre-service training at Málaga University

We have been implementing LS processes as part of the different subjects that make up the initial training programmes at Malaga University since 2015. Under the guidance of the professional university tutor, the goal has always been to encourage the reconstruction of student teachers' practical knowledge in a complex process of cooperatively designing, developing and studying the lesson in real contexts that link university and school (Pérez Gómez, Soto and Serván 2010; Soto et al. 2016; Peña et al. 2015; Cajkler and Wood 2016). Our current research project focuses on eight case studies based on the reconstruction of practical knowledge through various Lesson Study processes in initial training for infant and primary school teachers and educational instructors. We already have some preliminary results from the initial research carried out as part of the Infant Education Degree (Soto, Serván and Caparrós 2016; Peña, Serván and Soto 2016). These experiences were analysed through observations, interviews and the students' personal and group portfolios, collecting evidence on the reconstruction of their practical thinking before, during and after the Lesson Study process.

The results show that, thanks to gradual shared conceptual clarification, tutoring and guidance by university teachers, along with the LS methodology, in which students alternate between teacher and observer, they were able to visualise and start to transform their personal beliefs, thus showing the potential of this cooperative work.

The section below describes and analyses some of the findings of both lines of research around core aspects that, in our opinion, serve to bolster LS as a teacher training strategy: 1) the processes of theorisation of practice and experimentation of theory within the framework of LS; 2) the cooperative nature of this strategy; and 3) its emphasis on pupils' learning, reinforced by strategies such as pedagogical documentation.

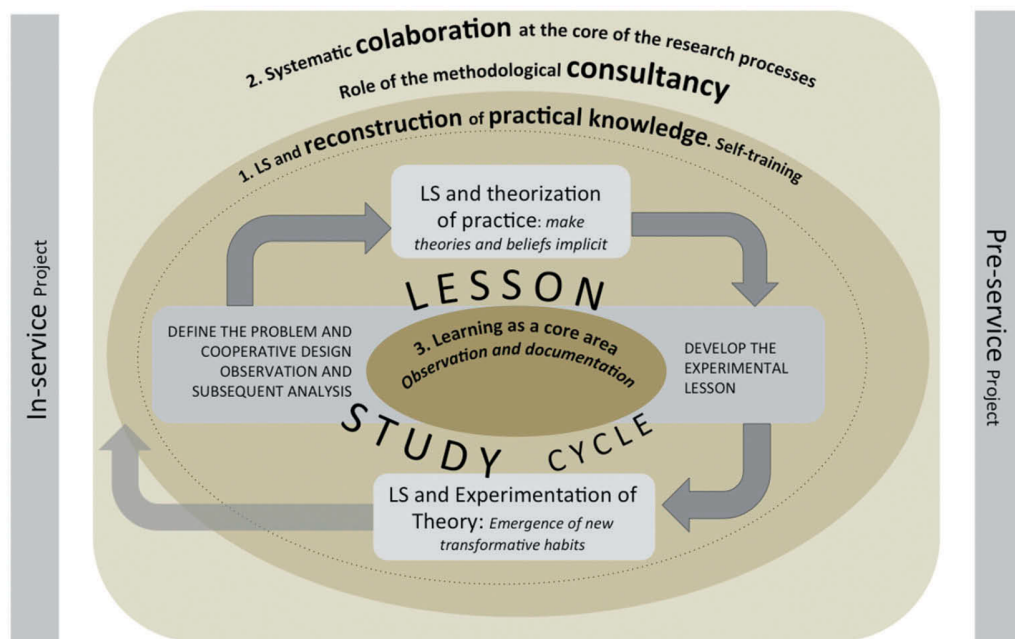


Figure 1. Core aspects that bolster Lesson Study as a teacher training strategy

4. Main findings and discussion

In this section we will try and summarise the main discoveries of this decade of research into LS in Malaga, and, by way of discussion, relate these discoveries with some of the most relevant international contributions in these areas.

4.1. *Theorisation of practice and experimentation of theory as a process of reconstruction of practical knowledge in LS*

The main and singular purpose of the research we have developed is to analyse how LS helps focus on and show the implicit aspects of the principal dimensions of practical thinking (knowledge, skills, attitudes, beliefs and emotions) of the teachers involved, as its potential to help in their reconstruction.

Living and building an educational experience requires an ongoing, cyclical transition from practical knowledge to practical thinking through two key processes: *theorisation of practice* and *experimentation of theory*. Being a teacher requires programmes and strategies that help to create flexible, open, powerful integration between these two structures, where reflection –understood as informed awareness– will be key to ensuring this practical knowledge becomes practical thinking (Soto et al. 2015; Pérez Gómez, Soto and Serván 2010, Pérez Gómez 2017).

The Lesson Studies developed in our research projects have placed special importance on the systematisation of the action research process as defined in its seven stages. The complete LS cycle always includes two developments of the proposal, the initial proposal and the improved one in another classroom by another teacher, thus providing an opportunity for contrast, openness and collaboration that ensures the

presence of both theorisation of practice and experimentation of theory as key processes for the reconstruction of practical thinking.

4.1.1. LS and theorisation of practice:

This visualisation of our own implicit theories and beliefs occurs mainly in the early stages of LS, when defining the problem and cooperatively designing the Experimental Lesson. Hence, in the research project carried out on ongoing training, for example, we were able to collect evidence during the design of the experimental lesson on how the teachers became aware of the most fundamental aspects of their practical knowledge:

"Leaving them to do what they want can generate conflict... the children will be disorientated... The teacher must intervene to establish the rules, present the materials... Assembly as a substantial element... It's a long time without sitting down... they will get bored..." (Notation 1. In-service Project: Teacher intervention at the design meeting, 21/4/2014).

It is equally visible in moments of observation and subsequent analysis of the Lesson, where teachers record and contrast evidence of pupils' learning. Becoming observers helped both those who observe the action and those who develop it to reflect on their own practical knowledge.

"I think it is going to be very difficult to rid myself of this unconscious thinking, because for me it continues to be something unconscious... I am going to need external tools to help me out, maybe someone to analyse us, or shared reflection along with colleagues... The fact that it is unconscious means I often don't realise what I'm doing or what I have inside" (Notation 2. In-service Project: General Meeting prior to the start of research, 29/06/2011).

In the case of pre-service training, the fact that the process culminates in the presentation in an extended context such as the final evaluation session with classmates, as well as in the Dissertation, is an example of how, based on this process of theorisation of practice and experimentation of theory, it is possible to construct academic knowledge and become aware of one's own learning throughout the different phases of the LS (Soto, Serván and Caparrós 2016).

"For someone such as I, coming from a traditional school, with its desks, its chairs, its set playtime and its immutable learning process, to being a free school where children are the protagonists of their own learning, where they learn to discover an environment which they can use to develop their abilities at their own rate, LS has meant a change of mentality." (Notation 3. Pre-service Project: Final Meeting, 05 /06/2015).

4.1.2. LS and experimentation of theory:

The LS process allows teachers to experience their new theories, especially in the developmental moments of the initial and improved experimental proposals. However, this experimentation of theory can occur at any point in the process. Our research shows how the cyclical and sustainable conception of the LS process allows teachers to put the new theory into practice by through the activating of new consensual knowledge, attitudes and skills, new habits that transform their previous practical knowledge.

Nati states that it will get easier, until it is fully automated... Anna confirms this (...); Lena recognises that she has often found it difficult to contain herself and not intervene, although now it is easier because this decision to contain herself is the result of consensus (Notation 4. In-service project: Research diary, Proposal analysis stage. 24/4/2013).

“It has been a useful tool for me to, as a future teacher, know that I have to first set a series of clear objectives, all of which must be well-founded, otherwise how could you defend them? With these objectives in mind, you can develop the activity –the learning environments– and then put it into practice with the children; the first one was not what we were expecting, but it was undoubtedly a great experience... These mistakes are what helped us with the second experimental lesson, which we are more than happy about, because it really exceeded our expectations”. (Notation 5. Pre-service Project: Final Meeting, 05 /06/2015).

4.2. Systematic collaboration as a core part of research processes and the role of the methodological consultant

One of the most relevant core aspects that we have found in both research projects is the power of the systematic, organised collaboration processes that underpin LS.

Our group has developed different strategies to encourage these processes for sharing educational practice, especially in the early stages of LS, such as exchanging teaching auto-biographies, or, in the case of in-service training, descriptions of their own practice (Pérez Gómez, Soto and Serván 2010), along with a series of dynamics to ensure the implicit pedagogical principles emerge and are shared in the case of pre-service training (Peña, Serván and Soto 2016).

Introducing both new and experienced teachers to new strategies that go beyond the established professional culture requires facilitation and advisory processes to help them incorporate these new principles (Cajkler and Wood 2016; Soto et al. 2016). For this reason we have, in accordance with Hawkings (2015) given particular relevance to the figure of the methodological advisor or tutor within the LS, with three main tasks:

- Introduce the group in the methodology, ensuring that they can make it their own and assume it as part of their work.
- Ensure the truly cooperative nature of the research.
- Create a climate of mutual respect, warmth and trust in order to allow openness and free expression.

Our research has identified how LS and methodological advice provide an appropriate framework for educational innovation by building a network of relationships that help break out of comfort zones in a sustained manner, based always on evidence of learning. It encourages them to take risks in teaching by demonstrating the strength of working cooperatively in groups of 4 to 6, broadening the contrast process to ensure real improvement and make less use of consolidated practices. In this sense, our findings converge and partially confirm the contributions of Wennergren (2016), who, based on

Vygotsky, emphasizes the need for closer cooperation in order to dare leave the comfort zone of conventional school culture and embark on curricular experimentation,

4.2.1. In-service training

In our research into in-service training, we discovered how the collaborative nature of LS allows the emergence of a climate that stimulates the creation of emotional bonds and trust, making everyone feel that they are participants and protagonists in the process. For example, one of the teachers who took part in the project:

“For me, Lesson Study has been a complete learning process, one which opens up your mind. My involvement in the group has made me more empathetic. I think the atmosphere was comfortable and fluid at the same time. We would interrupt each other a lot... maybe we were hooked. Things would have been different had we not been so enthusiastic” (Notation 6. In-service Project: Teacher Interview, 27/1/2014).

This climate of cooperation and trust is also conducive to building common strengths, questioning shared doubts, and showing fears that emerge from describing and analysing practice (one of the emotions most present in some stages of the process): *“I don't know how to theorise what I do... I do it, but I'm always fearsome... I don't have the security... I think, 'if I were to do it this way'... I get overwhelmed... I know I'm not doing what I said... I still get overwhelmed even after so many years...”* (Notation 7. In-service Project: Teacher's intervention at the design meeting, 17/3/2014).

It should be stated that the cooperative nature of LS has been highly valuable in facilitating reconstruction processes among the participants, indeed even the teachers themselves are aware of the importance of working in groups, of sharing, and of collaborating in teaching practice with other colleagues.

“... It is no longer "my proposal" but our proposal, it is no longer you but us... you are no longer observing me but us...” (Notation 8. In-service Project: Proposal analysis meeting, 10/6/2013).

4.2.2. In Pre-service training

An accompanying structure was designed at Málaga University (Soto, et al. 2016; Peña et al. 2016) to provide timely feedback on the difficulties encountered by students. These difficulties were related fundamentally to the theory-practice relationship. It was critical to ensure that both the design and the decision-making tested their practical knowledge through debate, contrast and reflection (Parks 2009; Ko Po Yuk 2012). Having teachers from the university oversee this experience stimulates reflection and discussion among the group, creates a climate of harmony, and ensures the main focus of the Lesson Study is not lost.

These structures are made up basically of tutorials and seminars, the personalised monitoring of student's learning portfolios, and encouraging mutual learning strategies such as debates and co-tutorials (Lamb 2015).

“Perhaps the most difficult aspect of this Lesson Study methodology is the cooperative work, which, in turn, is also the most enriching part of the whole

process (...). (Notation 9. Pre-service Project: Practicum III portfolio extract, academic year 2015-2016).

"Without the group I don't think I could... Well, I could, but maybe not in a month, it would take a lot longer. It's difficult as I would only have my way of doing things, and I would be overlooking others that are much more important than what I am thinking about" (Notation 10. Pre-service Project: Interview with first-year university student, academic year 2015-2016) (Jiménez and Rivera 2016, 54).

4.3. Pupils' learning as a core area

The LS has developed the key areas necessary to enrich the methodological approach of AR in developing professionalism in teaching (Rué 2016), with the ultimate goal of ensuring optimal development of learning in participants, as is highlighted in Learning Study (Ling and Marton 2012). Far from being a predictable plan, based on a single precise theory, the LS movement has to deal with the complexity, diversity and inherently contradictory issues of learning found in teaching and learning contexts.

Out of respect for this diversity and uniqueness in learners, the voice of pupils is always present throughout the different stages of LS. In our in-service training study, some of the recurring ideas that emerged in the teachers' discussions were related to this area. However, when collecting evidence, the group unanimously stated that they had little experience in observing their pupils.

The systematic collection of evidence, through the observation guides designed and developed by the teachers themselves for the core areas established in the proposal, along with the singular presence of the pedagogical documentation (Reggio Emilia approach) –a key tool when connecting educational theory and practice, however costly for teachers at the outset– should also be noted.

"Vito says that, before carrying out the observation, she was highly confused about what she had to look at and was unsure how to do it, but later on she realised that the observation chart was of great help. Anna stresses that this is one of the new strategies they have learned, one which would have been much more difficult to learn by herself. (Notation 11. In-service Project: Research diary. Initial proposal analysis stage, 9/7/2013).

Our approach in pre-service training is to ensure that the LS processes implemented include the three learning dimensions proposed by Illeris (2007), i.e. reconstructing cognitive, emotional and social processes. Particular importance is given to building a pedagogical learning community in a climate of trust in order to encourage bold designs (relevant pedagogical problems which are outside students' comfort zones), always in permanent dialogue with the educational needs of the pupils the proposals are designed for. The relationship with real practice is key (in both in-service training, where it is evident, and also in pre-service training) to generating the reconstruction of practical knowledge in relation to pupils' learning:

"I've learned to change my view of childhood. I used to only look at what children were not able to do, but now, after observation in the Experimental Lessons, I look

much more at what they are able to do, and thanks to these active methodologies they are much more autonomous." (Notation 12. Pre-service Project: Extract from a student's portfolio, academic year 2015/2016).

The group of teachers in our research initially found it difficult to organise the results of their research process and establish their theoretical foundations. Finally, the productions that were drafted and presented in an extended forum included findings related not only to pupils' learning –where students stressed that LS allowed them to rediscover their own pupils (cognitive empathy)–, but also, fundamentally, to their own learning as teachers.

"We conclude that we care more about the methodological change –the role we want to play– than about learning logical mathematical concepts. Our biggest challenge is this change of mindset. Lesson Study's major contribution has focused basically on this change of teaching role" (...) Here we have been unanimous, we have seen the way forward [...] we comment on the metaphor of the iceberg and how the presence of the educator is based on considerable work involving initial design and practical reflection, and indeed it is what we have experienced in this group work" (Notation 13. In-service Project: Final LS meeting, 14/1/2014).

In-service Project (Notations)	LESSON STUDY CYCLE	Pre-service Project (Notations)
<p>(1) "Leaving them to do what they want can generate conflict... the children will be disorientated... The teacher must intervene to establish the rules, present the materials... Assembly as a substantial element... It's a long time without sitting down... they will get bored..."</p> <p>(2) "I think it is going to be very difficult to rid myself of this unconscious thinking, because for me it continues to be something unconscious (...). The fact that it is unconscious means I often don't realise what I'm doing or what I have inside"</p>	<p>LS and reconstruction of practical knowledge</p> <p>DEFINE THE PROBLEM, OBSERVATION, DOCUMENTATION AND SUBSEQUENT ANALYSIS</p> <p>LS and theorization of practice: <i>make beliefs explicit</i></p>	<p>(3) "For me LS has meant a change of mentality, from understanding school in a traditional, structured and transmissive way to understanding school as a space where the child is the protagonist of his or her own learning, where children learn to learn."</p>
<p>(4) "Nati states that it will get easier, until it is fully automatised... Anna confirms this (...); Lena recognises that she has often found it difficult to contain herself and not intervene, although now it is easier because this decision to contain herself is the result of consensus."</p>	<p>LS and experimentation of theory: <i>new habits</i></p> <p>DESIGN AND DEVELOP THE LESSON</p>	<p>(5) "(...)Following the phases has helped us understand that it is a difficult process, that we do not initially achieve the expected results, although making mistakes has allowed us to develop an experimental lesson which we feel proud of, and which even exceeded our expectations."</p>
<p>(11) "Vito says that, before carrying out the observation, she was highly confused about what she had to look at and was unsure how to do it, but later on she realised that the observation chart was of great help (...)."</p> <p>(13) "We conclude that we care more about the methodological change –the role we want to play– than about learning logical mathematical concepts. Our biggest challenge is this change of mindset. Lesson Study's major contribution has focused basically on this change of teaching role" (...)."</p>	<p>Learning as a core area: <i>Observation and documentation</i></p>	<p>(12) "I've learned to change my view of childhood. I used to only look at what children were not able to do, but now, after observation in the Experimental Lessons, I look much more at what they are able to do, and thanks to these active methodologies they are much more autonomous."</p>
<p>(6) "My involvement in the group has made me more empathetic. I think the atmosphere was comfortable and fluid at the same (...)."</p> <p>(8) "... It is no longer "my proposal" but our proposal, it is no longer you but us... you are no longer observing me but us..."</p> <p>(7) "I don't know how to theorise what I do... I do it, but I'm always fearsome... I don't have the security... I think, 'if I were to do it this way'... I get overwhelmed... I know I'm not doing what I said... I still get overwhelmed even after so many years..."</p>	<p>Systematic collaboration at the core of the research processes</p>	<p>(9) "Perhaps the most difficult aspect of this Lesson Study methodology is the cooperative work, which, in turn, is also the most enriching part of the whole process (...)"</p> <p>(10) "Without the group I don't think I could... Well, I could, but maybe not in a month, it would take a lot longer. It's difficult as I would only have my way of doing things, and I would be overlooking others which are much more important than what I am thinking about"</p>

Table 1. Summary of focal points and evidence from the two projects presented

5. Conclusions and challenges

LS, thanks to its cooperative nature, its focus on pupils' learning, its capacity to build transferable knowledge based on practice and its potential for the reconstruction of practical knowledge, is making encouraging headway in teacher-training in Spain and in allowing pedagogical renewal.

The systematic process of designing and developing a lesson that is focused on learning helps us turn our teaching culture around and see things from the perspective of pupils and our student teachers.

By cooperatively defining the problem, or area for improvement, and designing the experimental lesson, we can analyse the strengths and weaknesses of our day-to-day practice and, above all, discover the dimensions associated with it: knowledge, values, attitudes, skills and emotions. Describing and sharing practice helps build a framework of trust, harmony and empathy that brings us together and, by making fundamental and widely-ignored dimensions such as emotions and beliefs visible, allows us to reconstruct our practical knowledge. Putting ourselves in a position to act rather than just talk brings out implicit aspects and their surrounding emotions and beliefs. The moments of observation and contrast (the Lesson Study) by the teachers and student teachers imply mean looking back over time from another perspective to *rediscover both our childhood and ourselves* in other people's practice.

LS helps us reconnect with each other. Cooperative work in LS provides a base on which to share concerns, disarming fears and uncertainties while embracing new educational actions accompanied by new ways of being, both personally and as a teacher. One of the most relevant findings of our research is the gentle breakaway from the culture of teacher isolation and individual work.

Our current challenges are to continue to identify the potential of each stage of LS in order to promote theorisation of practice and experimentation of theory as core aspects in the reconstructing the essential components of practical knowledge (knowledge, habits, attitudes, emotions and values) both in pre-service and in-service training. The evidence that we have of these processes is still incipient and would need to be extended.

Giving our practice educational meaning requires us to go through a process of reflection: thinking accompanied by and paired with evidence that helps us come out of ourselves and uncover the theories (beliefs) that move us, allowing us to offer the best learning experiences to our children.

Moreover, we need to continue to promote and adjust use of LS in the context of pre-service teacher training and analyse the role of the LS methodological consultant. Developing LS in pre-service training has specific difficulties (Burroughs and Luebeck 2010) that which we must continue to investigate, especially with regards to how university teachers can provide a framework that ensures students do not get disorientated but, at the same time, does stand in the way of autonomous, relevant learning. With regards to training, we are expanding the framework of joint research and contrast in Latin American university contexts, such as at the Ecuador National University of Education, where LS is now included as a core aspect of the Pedagogical Model, and in teaching practice at Normal Veracruzana School (Xalapa, Mexico), where they are developing a

pilot experience in pre-service teacher training, further examining the role of the university tutor by redesigning training contexts.

REFERENCES

- Ado, K. 2013. "Action Research: Professional Development to Help Support and Retain Early Career Teachers." *Educational Action Research* 21(2): 131–146.
- Argyris, C. 1993. *Conocimiento para la acción*. Barcelona: Granica.
- Arhar, J., T. Niesz, J. Brossmann, S. Koebly, K. O'Brien, D. Loe, and F. Black. 2013. "Creating a 'Third Space' in the Context of a University–School Partnership: Supporting Teacher Action Research and the Research Preparation of Doctoral Students." *Educational Action Research* 21(2): 218–236.
- Bargh, J. A., and M. J. Ferguson. 2000. "Beyond Behaviorism: On the Automaticity of Higher Mental Processes." *Psychological Bulletin* 126(6): 925–945.
- Brown, J. S., A. Collins and P. Duguid. 1989. "Situated cognition and the culture of Learning." *Education Researcher* 18(1): 32–42.
- Burroughs, E. A. and Luebeck, J. L. 2010. "Pre-service teachers in mathematics Lesson Study." *The Montana Mathematics Enthusiast* 7(2-3): 391-400.
- Cajkler, W. and P. Wood. 2016. "Mentors and student-teachers "lesson studying" in initial teacher education." *International Journal for Lesson and Learning Studies* 5(2): 84-98.
- Cheung, W.M. and W.Y. Wong. 2014. "Does Lesson Study work?: A systematic review on the effects of Lesson Study and Learning Study on teachers and students." *International Journal for Lesson and Learning Studies* 3(2): 137 – 149.
- Dudley, P. 2015. *Lesson Study: Professional Learning for our time*. London: Routledge.
- Elliot, J. 1993. *Reconstructing Teacher Education: Teacher Development*. London: The Falmer Press.
- Elliott, J. 2012. "Lesson Study in transnational space." *International Journal for Lesson and Learning Studies*, 1(2).
- Elliott, J. 2015. "Educational action research as the quest for virtue in teaching." *Educational Action Research* 23(1): 4-21.
- Firman, H. 2010. "Dampak program kerjasama FPMIPA UPI dan JICA" [The impact of FOMASE IUE and JICA Cooperation Programmes] In *Teori, paradigma, prinsip dan pendekatan pembelajaran MIPA dalam konteks Indonesia* [Theory, Paradigm, Principle and Approach of Mathematics and Science Learning in Indonesian Context], edited by Hidayat, T., I. Kaniawati, I. Suwama, A. Setiabudi and Suhendra. Bandung: FPMIPA UPI.
- Greeno, J.G., A.M. Collins and L.B. Resnick. 1996. *Handbook of Research in Educational Psychology*. New York, NY: Macmillan.
- Hagger, H. and H. Hazel. 2006. *Learning Teaching from Teachers: Realising the Potential of School-Based Teacher Education*. Buckingham, GBR: Open University Press.

- Hawkings, K.A. 2015. "The complexities of participatory action research and the problems of power, identity and influence." *Educational Action Research* 23:4, 464-478.
- Hiebert, J., A. Morris and B. Glass. 2003. "Learning to learn to teach: an 'experiment' model for teaching and teacher preparation in mathematics." *Journal of Mathematics Teacher Education* 6(2): 201-222.
- Illeris, K. 2007. *How We Learn: Learning and Non-Learning in School and Beyond*. London: Sage.
- Jackson, P.W. 1991. *La vida en las aulas*. Madrid: Morata.
- Jiménez, A. and E. Rivera. 2016. *La Lesson Study en la formación inicial del profesorado como escenario de reconstrucción del conocimiento práctico: dos estudios de caso*. Final Master Degree Work presented at University of Malaga, Spain.
- Ko Po Yuk. 2012. "Critical conditions for pre-service teachers' learning through inquiry: The Learning Study approach in Hong Kong." *International Journal for Lesson and Learning Studies* 1(1): 49 – 64.
- Korthagen, F., J. Loughran, and T. Russell. 2006. "Developing fundamental principles for teacher education programs and practices." *Teaching and Teacher Education* 22(8): 1020-1041.
- Lamb, P. 2015. "Peer-learning between pre-service teachers: embracing Lesson Study." *International Journal for Lesson and Learning Studies* 4(4): 343 – 361.
- Lave, J. 1988. *Cognition in Practice: Mind, mathematics, and culture in everyday life*. Cambridge, UK: Cambridge University Press.
- Lewis, C. 2009. "What is the nature of knowledge development in Lesson Study?" *Educational Action Research* 17(1): 95-110.
- Ling, L.M. and F. Marton. 2012. "Toward a science of the art of teaching. Using variation theory as a guiding principle of pedagogical design." *International Journal for Lesson and Learning Studies* 1(1): 7-22.
- Luttenberg, J., P. Meijer and H. Oolbekkink. 2017. "Understanding the complexity of teacher reflection in action research." *Educational Action Research* 25(1): 88-102.
- Marton, F. and Runneson, U. 2015. "The idea and practice of Learning Study". In *Realising learning: Teachers' professional development through lesson study and learning study*, edited by Keith Wood and Saratha Sithamparam, London: Routledge, 103-121.
- McLaughlin, C. and N. Ayubayeva. 2015. "It is the research of self-experience: Feeling the value in action research." *Educational Action Research* 23(1): 51-67.
- Parks, A.N. 2009. "Collaborating about what? An instructor's look at preservice lesson study." *Teacher Education Quarterly* 36(4): 81-97.
- Peña, N., A. Becerra, A., S. García de Paz, J.A. Rodríguez, J. and K. Vásquez. 2015. "Siete itinerarios singulares y convergentes de formación en relación a las Lesson Study. Las dimensiones del conocimiento práctico como ejes de análisis y posibilidades para la transformación de la práctica educativa." *Revista Interuniversitaria de Formación del Profesorado* 84,29(3): 103-118.
- Peña, N., M.J. Serván and E. Soto. 2016. "Creando ambientes de aprendizaje a través de la Lesson Study en la formación inicial de docentes de Infantil." Edited by Herrada,

- R.I., M.T. Cutanda and A. Torres. *Renovación Pedagógica en Educación Superior*. Murcia: Editum, 15-21.
- Pérez Gómez, A. I., E. Soto and M.J. Serván. 2010. "Participatory Action Research and the reconstruction of teachers' practical thinking. Lesson Studies and core reflection. An experience in Spain." *Educational Action Research* 18(1): 73-87.
- Pérez Gómez, A.I. 2012. *Educarse en la era digital*. Madrid: Morata.
- Pérez Gómez, A.I. 2017. *Pedagogías para tiempos de perplejidad*. Rosario: Homo Sapiens.
- Pérez Gómez, A.I., M. Sola, E. Soto and F. Murillo. 2009. "The impact of action research in Spanish schools in the post Franco era." *Handbook of educational Action Research*, 481-494.
- Rogoff, B. 1990. *Apprenticeship in thinking: Cognitive development in social context*. New York: Oxford University Press.
- Rué, J. 2016. "Reflections on the craftsmanship of teaching: Lesson/learning studies as a cooperative means to enhance professionalism." *International Journal for Lesson and Learning Studies* 5(4): 348-361.
- Schön, D. A. 1998. *El profesional reflexivo: cómo piensan los profesionales cuando actúan*. Barcelona: Paidós.
- Soto, E., M.J. Serván, A.I. Pérez Gómez and N. Peña. 2015. "Lesson Study and the development of teacher's competences: From practical knowledge to practical thinking." *International Journal for Lesson and Learning Studies* 4(3): 209-223.
- Soto, E., M.J., Serván and R. Caparrós. 2016. Learning to teach with Lesson Study: The practicum and the degree essay as the scenario for reflective and cooperative creation." *International Journal for Lesson and Learning Studies* 5(2): 116-129.
- Stigler, J. W. and J. Hiebert. 1999. *The teaching gap; Best ideas from the world's teachers for improving education in the classroom*. New York, NY: The Free Press.
- Suratno, T. 2012. "Lesson study in Indonesia: an Indonesia University of Education experience." *International Journal for Lesson and Learning Studies* 1(3): 196-215.
- Timperley, H. 2008. *Teacher Professional Learning and Development*. Brussels: International Academy of Education (IAE).
- Tomasello, M., M. Carpenter, J. Call, T. Behne and H. Moll. 2005. "Understanding and sharing intentions: The origins of cultural cognition." *Behavioral and Brain Sciences* 28(5): 675-691.
- Wennergren, A. C. 2016. "Teachers as learners – with a little help from a critical friend." *Educational Action Research* 24(2): 260-279.