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Lesson Study… and its effects

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Lesson Study… and its effects

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Abstract

The aim of this contribution is to draw up a theoretical framework to evaluate Lesson Studies (LS) embedded in the schooling context in Lausanne, in the French-speaking part of Switzerland. Firstly, we provide a (re)definition of LSs through a comprehensive literature review. Some reference works like the books of Lewis & Hurd (2011) or Fernandez & Yoshida (2004) enable their readers to build a clear comprehension of what LSs are and how they should be implemented. But the LS practices reported in scientific journals show some variation compared with the theoretical model. To evaluate such a process, we postulate that one has to clearly define what is supposed to be measured and identify its limits. Secondly, we present a synthesis of the different ways to measure the effects of LS as reported in the literature. This second focus leads us to list and discuss the features and components of LS which could (or should) be evaluated and the data to be collected to do so. At the same time, our work highlights some differences between LS practices depending on the variation of several parameters. These two topics lead us to question the effects expected from each feature and component of an LS. Some elements are not on the existing list of essential features of an LS. Others, experimented in groups of teachers, are not even mentioned in the reference literature. Yet they can be keys to breaking a stalemate, to overcoming a barrier or simply helping organise the research of a LS group according to their goals. In March 2017, we submitted this presentation and a database of such keys and their expected results for discussion in the Scientific symposium organised by the Post-graduate Studies Program of the Department of Education Sciences in Early Childhood "Innovative educational approaches in multi-cultural educational environments" (Democritus University of Thrace) and the Municipality of Alexandroupolis (GR). This article reports the main ideas of this presentation.

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Keywords: lesson study; learning study; definition; effects; features

Introduction

When we first came across Lesson Studies (LS) a few years ago, we were seduced by its bottom-up approach to teacher professional development. Every book we read on the subject, each article published, only reinforced our initial impression. Authors systematically presented the positive effects on pupils, teachers, schools and even educational systems. Yet, our enthusiasm, however great it may be, is insufficient to justify proclaiming that this approach is self-evident. As elsewhere, the development of LS necessarily begins with research projects that require time, perseverance and a lot of investment to recognize and improve the quality of LS. To facilitate the up-take of this approach in new areas and contexts, we have launched a research project to test the effectiveness of LS beyond purely theoretical arguments as well as subjective self-assessments.

From this perspective, the current article presents a framework to guide the creation of a tool to measure the effects of LS. First, we will define what Lesson Studies are (and are not). This definition will be based on a review of reference books as well as several dozen articles reporting ways of using

LS, some of which may deviate from the theoretical model. This definition will enable us to discuss the necessary adaptability of a tool to measure the impact of LS in terms of the modalities of its implementation.

What is a Lesson Study?

This first chapter opens with a theoretical definition of LS, synthesizing contributions from reference works on three types: the *Lesson Study*, the *Learning Study* and the *UK Lesson Study*. We will see that, in practice, participants often adapt this process to the specific needs of their different contexts. At the end of this chapter, we will propose a redefinition of LS that may be a contributing factor in the diversity of practices, while imposing a binding framework, to avoid the notion of Lesson Study becoming a catch-all term.

Three Types of LS

The procedure followed by LS is more-or-less clearly defined in several reference works. Why "more-or-less"? Because the conceptual descriptions of LS have diverged to a certain extent, over the last few years. To date, we have identified three variants of the original Japanese *jugyo kenkyuu*. These types of LS are bounded geographically: *Lesson Studies*, from Japan, were exported directly to the USA; *Learning Studies* were the result of an adaptation of *Lesson Studies* between Sweden and Hong Kong; finally, *UK Lesson Studies*, for the moment, are limited to the United Kingdom. This relative diversity can be represented by the following figure:

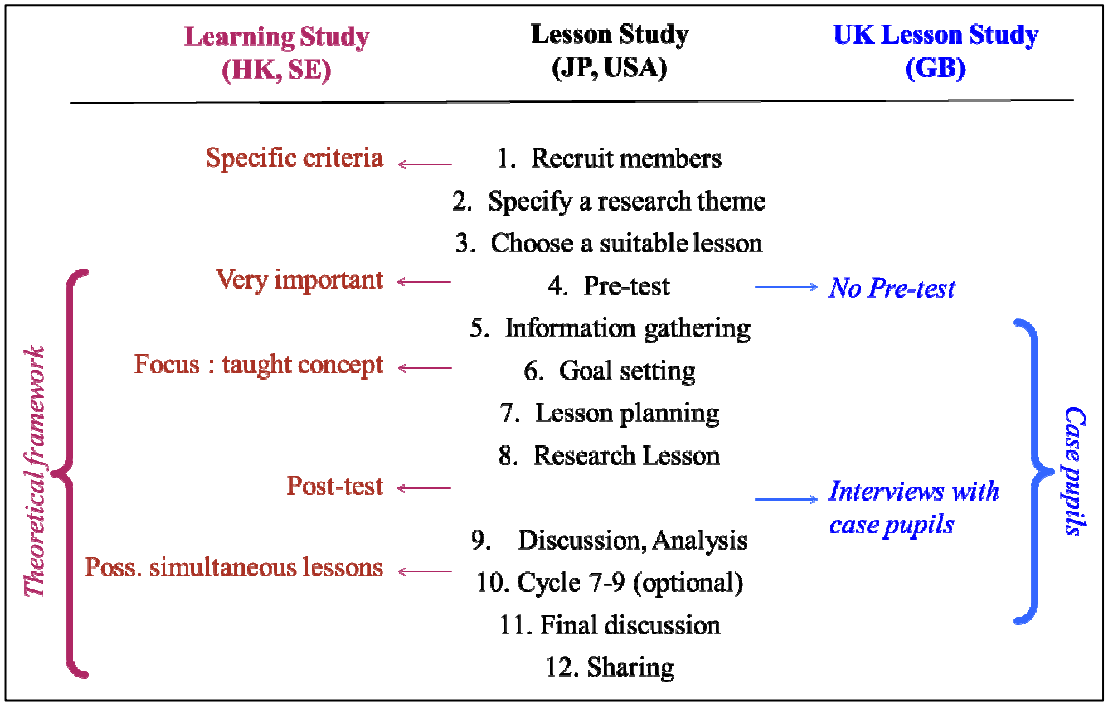

Figure 1 : Three types of LS

Original Lesson Studies

To differentiate this type of LS from the generic term encompassing all three types presented here, we will use the acronym LesS and reserve LS for the generic title encompassing all types. To obtain a synthetic definition of Lesson Studies (the middle column in Figure 1), we have compiled the contributions of eight reference works:

- The books by Stigler & Hiebert (1999) and Fernandez & Yoshida (2004), each of which describes a Jugyo Kenkyuu in detail;
- Stepanek, Appel, Leong, Turner, Mangan & Mitchell (2007), and Lewis & Hurd (2011) synthesizing the usual content of an LS;
- Other works analysing LS from a more global perspective, such as Isoda, Stephens, Ohara & Miyakawa (2007), Burghes & Robinson (2010), Hart, Alston & Murata (2011)), and Inprasitha, Isoda, Wang-Iversen & Yeap (2015).

In these references, LesS are, above all, described as a procedure involving a roughly linear chain of actions:

1) Recruit, form a group, coordinate expectations, set operating standards, schedule meetings.

2) Negotiate, choose a research theme that sets:

    - A long-term goal for pupils that is broad enough to cover all levels and disciplines: "Reducing differences in student achievement"; "Motivating to learn"; "Explore Different Differentiation Strategies"; ... (Lewis & Hurd, 2011, pp. 25, 43).

    - A goal for teachers to answer the following questions: What do we want to learn about our pupils? about the subject? about our teaching? (Lewis & Hurd, 2011, 44).

3) Develop or choose a lesson, within a didactic sequence, conducive to the study of the subject.

4) Create a pre-test and use it to measure pupils' current level and compare it to the expected level according to the learning objectives.

5) Conduct contextual, conceptual and didactic analyses (local curricula specific to other regions or countries, invited experts, research, articles, didactic manuals, teaching recommendations, materials, etc.). Fernandez & Yoshida, 2004, pp. 36-44).

6) Set short-term learning objectives for pupils (e.g. "Use deductive reasoning based on facts to refine choices", Stepanek et al., 2007, 47).

7) Plan the lesson and its insertion in the didactic sequence (the written plan also guides observation, anticipates the strategies of the pupils and the way to observe them, explains, in its introduction, the reasoning that led to the proposed choices, ...).

8) Give / observe the lesson: observing the thought processes of a few selected pupils, in principle chosen for their poor results (Lewis & Hurd, 2011, pp. 20-27), and collect data previously envisaged.

9) Discuss the observed lesson in terms of the strategies identified either immediately or a few days later (Fernandez & Yoshida, 2004: 109).

10) Repeat steps 7 to 9, in another class with another teacher and other pupils (this phase is optional) (Fernandez & Yoshida, 2004, pp. 8, 177, Lewis & Hurd, pp. 3, 29), using the same lesson or a subsequent lesson in the didactic sequence (Lewis & Hurd, 2011: 62).

11) Carry out a final, joint reflection on the process and what each teacher learnt.

12) Share the results of the approach with the other teachers of the school, during a meeting or in a report, an article, etc.

This synthesis emphasises that the schematic representation of the LS as a cycle, which is very widespread, is not really true to the original conception of the approach in which a Lesson Study has a beginning and an end.

Learning Studies

The same is true for the following type of LS since Marton & Tsui (2004) and Lo (2012) have simply adjusted the *Lesson Studies* model to create **Learning Studies (LeaS)**:

- Marton and Tsui (2004) point out, in the first step of the process, that the group brings together teachers of the same discipline, teaching at the same level, with at least two researchers.
- In the fourth stage, Learning Studies emphasize the importance of the pre-test and its analysis in planning.
- Steps 5 through 11 incorporate - and this is the most notable difference - a theoretical framework (phenomenography and the theory of variation) to underpin reflection and observation.
- The learning objectives fixed for pupils are exclusively focused on the subject taught.
- A few days after the research lesson, pupils take a post-test to measure their learning, particularly their progress since the pre-test.
- Finally, in LeaS, unlike LeS, lessons are sometimes given at close intervals (or even simultaneously in different classes), with the same planning and then discussion takes place on all lessons at the same time. (Lo, Marton, Pang, & Pong, 2004, p.201).

These are the differences found in the reference literature between the LeaS and LesS processes. However, we have some reservations about adding the theory of variation as a component to this new version of LS because, as Lo et al. (2004, pp. 192-193) point out, this form of Lesson Study aims at testing the effectiveness of the theory of variation in the teaching-learning relationship. It could therefore be considered that a Lesson Study aiming to test any other theory of learning would benefit from adding the other points presented above.

UK Lesson Studies

The differences observed in the UK Lesson Studies (UKLS) tend to be oriented towards practical considerations. Indeed, Norwich & Jones (2014) and Dudley (2015b) developed what Norwich and Jones called the UK version of Lesson Studies (2014, p.4). In this model, we find that:

- In the fourth stage, the English do not prepare formal pretesting (Dudley, 2015a, pp. 7-8).
- The main difference is that pupils' objectives, planning, observation and discussion (steps 6 to 9) are derived from three *pupil cases*. These three pupils are selected according to the research theme to represent three categories of student (whose results are respectively good, average

and poor) or a single category of pupils (with *Moderate Learning Difficulties*, for example) (Dudley, 2015a, pp. 7-8).

- Teachers also conduct interviews with these pupils after the research lesson, with questions chosen in relation to the overall purpose of the UKLS and / or the subject matter being taught. (Cajkler & Wood, 2015, p.115).

While the primary definition of LesS also specifies that attention should be paid to a few selected pupils (in principle for their poor results, according to Lewis and Hurd, 2011, pp. 20; 27), the English model insists on this point and fixes the number of pupils at 3. Moreover, these pupils are already identified during the preparatory phases to adapt the lesson to their specific needs. The rest of the class is not taken into account.

For Dudley (2014, pp. 28-29), this choice helps focus discussions on pupils' learning and catalyses observation of the lesson. It helps remove the filters through which teachers usually observe pupils, providing a more objective and neutral perspective on their learning and learning strategies, unbiased by preconceived notions. The subsequent interviews make it possible to clarify pupils' thought processes, providing a better understanding of their current position with respect to the learning objective

Varying Practices

Starting from these three models, many LS groups have been formed in several countries, some of which have been reported in scientific journals. Based on these articles, we have been able to deepen our knowledge by comparing practical implementations with theoretical models.

Faced with the diversity of practices, it seems important to design a tool that can be adapted to the concrete situations encountered by LS groups. For this reason, in the current chapter we present a more detailed description of the various possible components of LS that may influence how their impact can be assessed. In fact, the measurement of the effect of a LS will be intimately tied to its organization and the specificities of its implementation, the aim pursued and the focus of the group, which may relate to teaching, learning or the link between the two. It will also be possible to examine the types of objectives pursued to develop each of these three poles. The LS may also be adapted according to the level of education, what is observed in pupils during the research lesson or even the discipline concerned. It is only after these parameters have been analysed that we are able to propose a collection of relevant data to measure the effect of the approach.

Description of our sample

At this stage, it is necessary to specify the criteria used to select the items in our sample. To explore how LS have already been evaluated around the world, we started from the article by Cheung and Yee Wong (2014). They searched four databases (*Springer Link*, *Sage Journals*, *ProQuest*, *JSTOR*) as well as for articles with the keywords '*Lesson Study*' or '*Learning Study*' and '*Outcome*', '*Effect*' or '*Result*' between 2000 and 2010. They then restricted the number of publications to 9 by retaining only those measuring the effects of LS with a control group. We then carried out the same research by adding the keyword '*Impact*' and by moving the publication dates to between 2010 and 2015. Then we added all the articles of the *International Journal for Lesson and Learning Studies* (IJLLS), which brought the number of publications to 349, of which we were able to procure 295. We identified the words '*Lesson Study*' or '*Learning Study*' (by computer-based search) to eliminate articles that did not deal with the topic (often the words '*Learning*' and '*Study*' appeared side by side by chance). The next step consisted of reading the summaries of the remaining articles to identify those measuring the impact of the approach. In this sense, our criteria were more flexible than those of Cheung and Yee Wong by not limiting our sample to experimental or quasi-experimental research. To

the 87 publications remaining after this selection, we added 9 cited by Cheung and Yee Wong (2014), totalling 96 articles, the analysis of which is presented here.

Of course, this method of sampling has several biases. For example, our sample includes only articles written in English. Moreover, only articles dealing with the measurement of the effects of LS were retained. As a result, the LS studied cannot be considered representative of the complete set of LS[1]. However, our analysis raised a few questions, which we detail below and which remain relevant to the definition of LS and the measurement of their potential impact.

The United States has the largest number of items reported, with 25 US LS. Not surprisingly, results reflect the geographic location of the three types of LS presented above, with Sweden, Hong Kong, Brunei and Canada exclusively devoted to *Learning Studies* and the Norwich, Jones and Dudley model exclusively present in the United Kingdom. Only Singapore and the United Kingdom present both LesS and LeaS. It is also interesting to note that only 5 articles refer to the Japanese Jugyo kenkyuu.

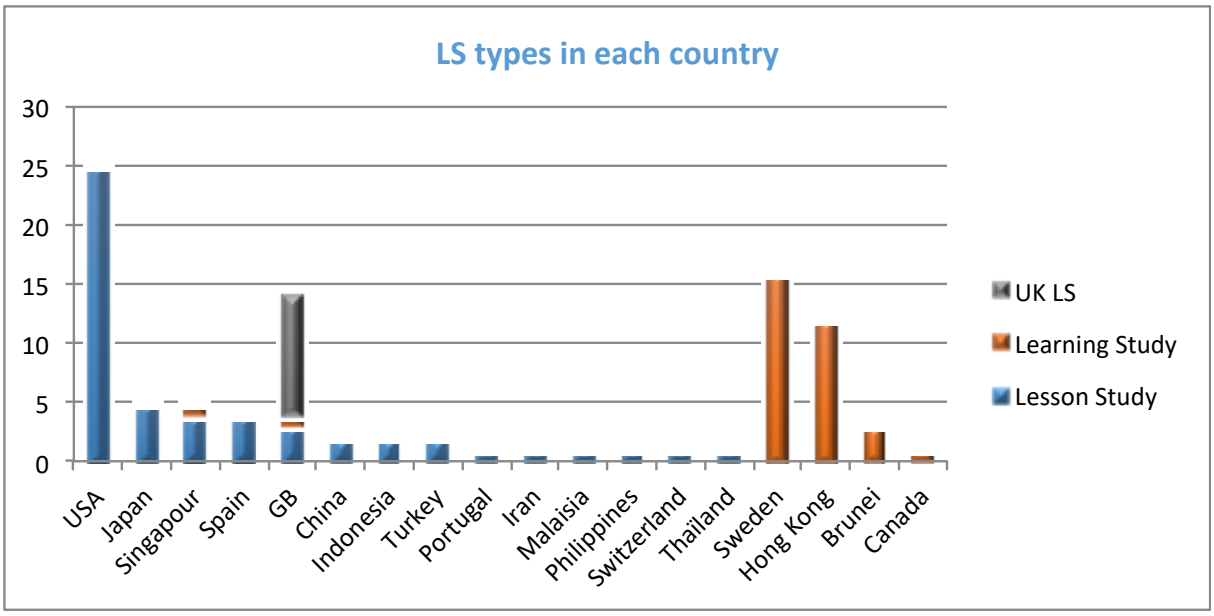

Figure 2 : Distribution of types of LS by country

Differences observed in practices between the three types of LS

All the articles studied present a relatively broad overview of LS practices. For the most part, these approaches are said to be LesS.

[1] Given the limited significance of our statistical analyses in the context of a generic definition of LS, we consider it superfluous to describe our methodology in more detail, in particular the presentation of the 24 variables analysed. We therefore reserve this chapter for an upcoming article, which is currently being written, about the various measures already tested for the effects of LS.

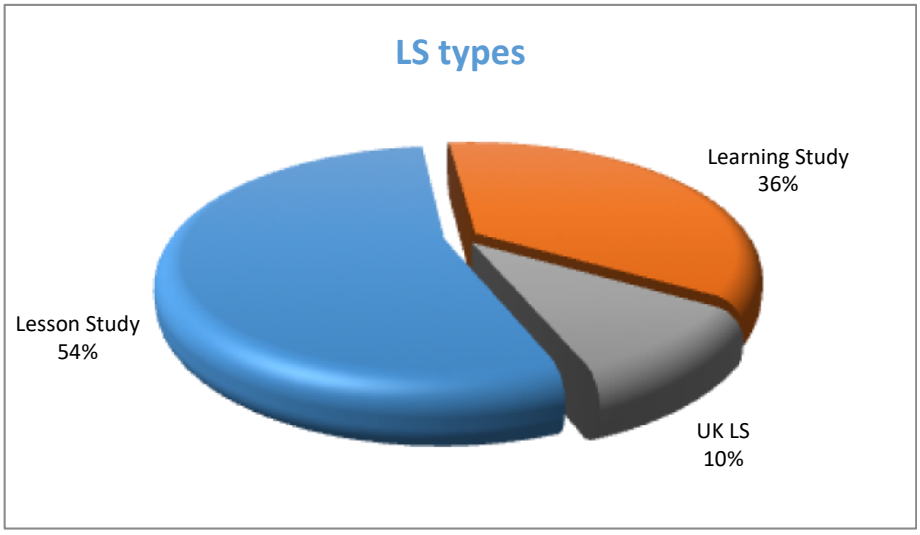

Figure 3 : Types of LS in our sample

The differences between the three types of LS have already been mentioned above. Nevertheless, our readings have shown that it is interesting to ask whether the stated differences are the only ones observed in practice. Indeed, this analysis of the articles highlights other possible variations that are sometimes more fundamental than those assumed by the authors of the reference works for these various approaches.

To begin with, LeaS, like LesS, account for a majority of examples in which the same lesson is repeated, with some changes, in several different classes. The UKLS reported in the articles in our sample are mostly built around a didactic sequence over several successive lessons. These constitute research lessons used to observe case pupils and analyse teaching. As a result, post-lesson discussions serve to plan further teaching in the didactic sequence with the same students. Note that a quarter of the LS involve no iteration while 12 to 14% of the LS carry out only one research lesson, after which the procedure ends.

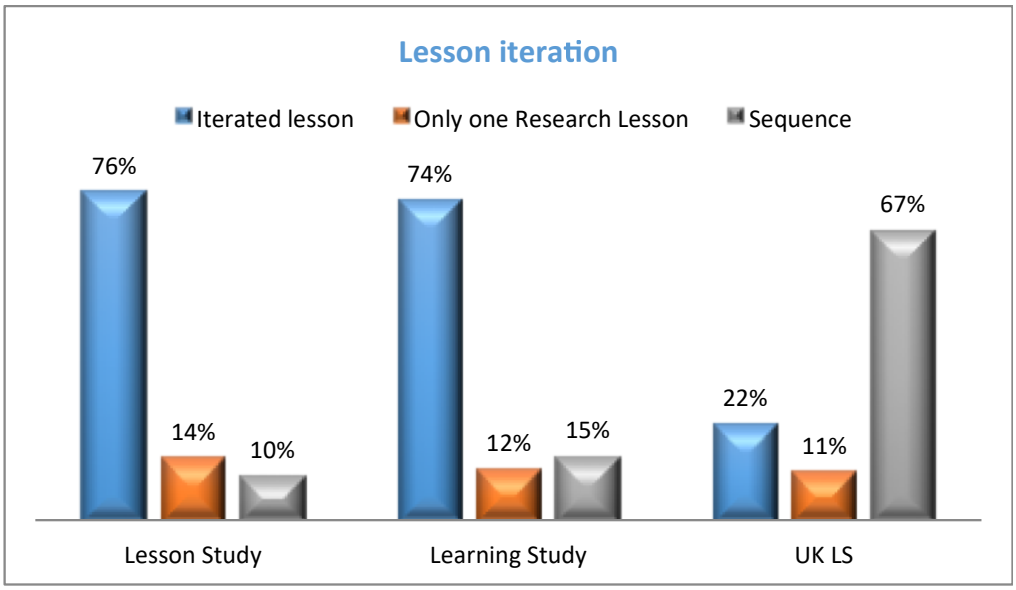

Figure 4 : Iteration of the lesson in each type of LS

Beyond the process, the three types of LS also differ according to the intentions of the groups. LesS focus more on the professional development of teachers, whereas LeaS and the British model place more emphasis on pupils and on the influence of teaching on the puplis' learning:

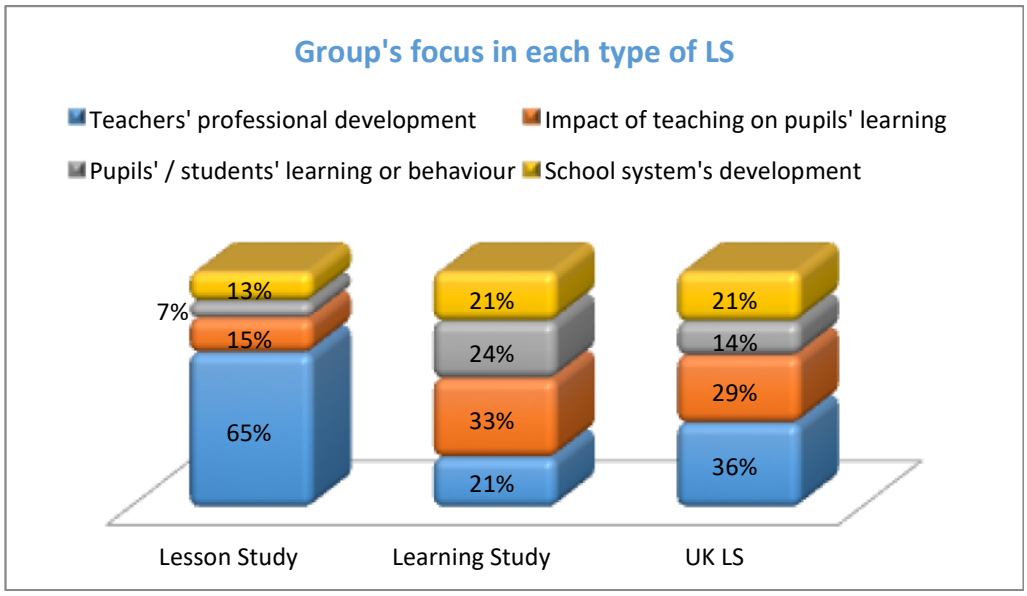

Figure 5 : Focus de la recherche pour chaque type de LS

On examining more closely those LS that focus research on the professional development of teachers, it can be seen that a significant proportion of LesS make no reference of training objectives for teachers (or, at least, these objectives are not mentioned in the articles). When such objectives are explicitly mentioned, they are mainly aimed at general development, measurable in the long-term[2] in LesS and their English variant, whereas the LeaS evaluate short-term objectives related to the object taught during the research lesson.

[2] For example, "improving communication between teachers" (Chichibu & Kihara, 2013, 15), "Changing the theory of dominant learning for more constructivist methods" (Chen & Yang, 2013, p. 219), or "Developing an environment that promotes *active learning*" (Sarkar Arani, 2015, p. 121), etc.

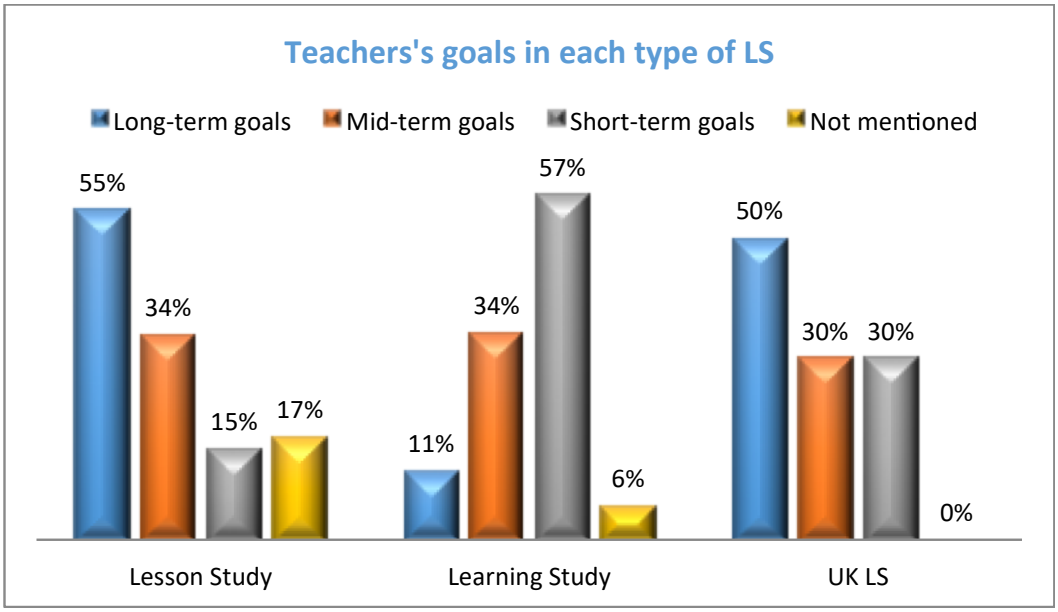

Figure 6 : Objectives of teachers according to the type of LS

These objectives are of some importance to the procedure and can influence several phases of its development. Iin particular, what teachers, researchers and pupils observe, seems to be linked to these goals. LeaS - which most often set short-term goals for teachers - measure the vast majority of competences (seen as the ability to carry out a task) and pupils' knowledge in relation to the object taught whereas LES participants - usually set long-term goals for teachers - are more likely to discern pupils' thought processes.

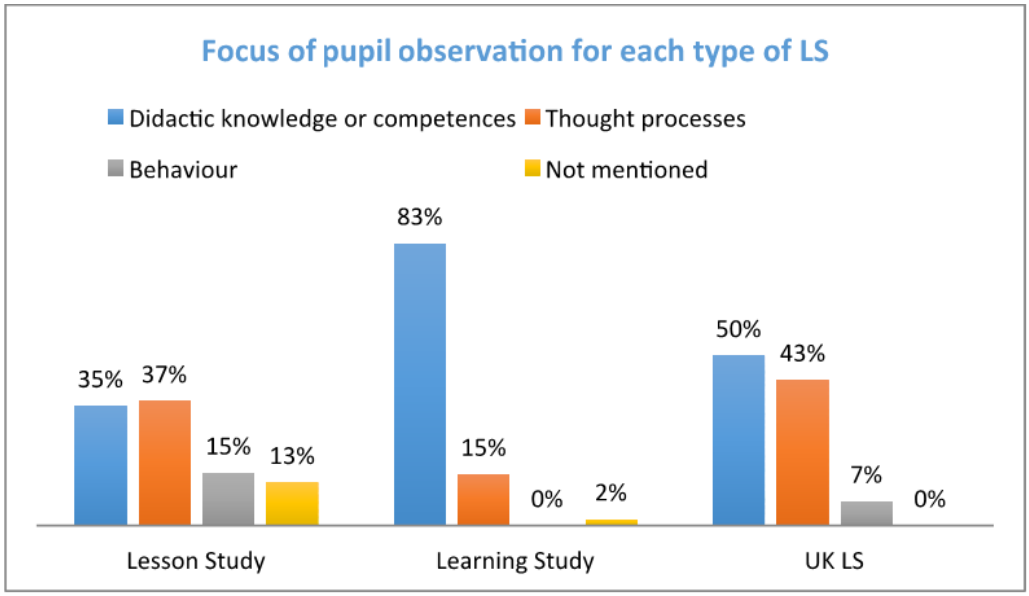

Figure 7 : Observation of pupils according to the type of LS

Other differing parameters of LS in terms of the context

Beyond the variations distinguishing the three families of LS presented above, other LS parameters may vary depending on the context. To produce a tool to measure the effects of LS that can be adapted to all situations, we have identified several characteristics that deserve special attention.

For example, the subject concerned and related didactics can influence how the impact of LS can be measured, especially by pupils. In our sample, all types of LS relate primarily to the teaching of mathematics. This may be due to the fact that the first *jugyo kenkyuu* were set up to study the new syllabus of this subject and that the introduction of this procedure in the USA was very successful after the publication of a book by Stigler and Hiebert (1999), which presented the results of three countries in the *Trends in International Mathematics and Science Study* (TIMSS), with emphasis on research into mathematical didactics.

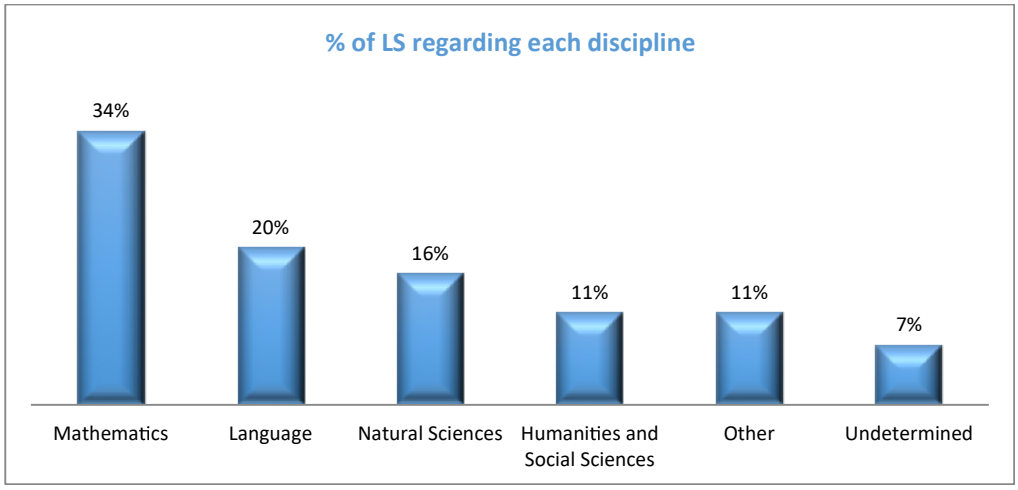

Figure 8 : Percentage of LS by discipline

Another interesting contextual variable: most LS in our sample took place at compulsory school. In Figure 9 we standardized the distinctions. Primary 1 and 2 and lower secondary are distinguished according to the Swiss system depending on pupils' ages. The division between lower and upper secondary corresponds to the end of compulsory schooling.

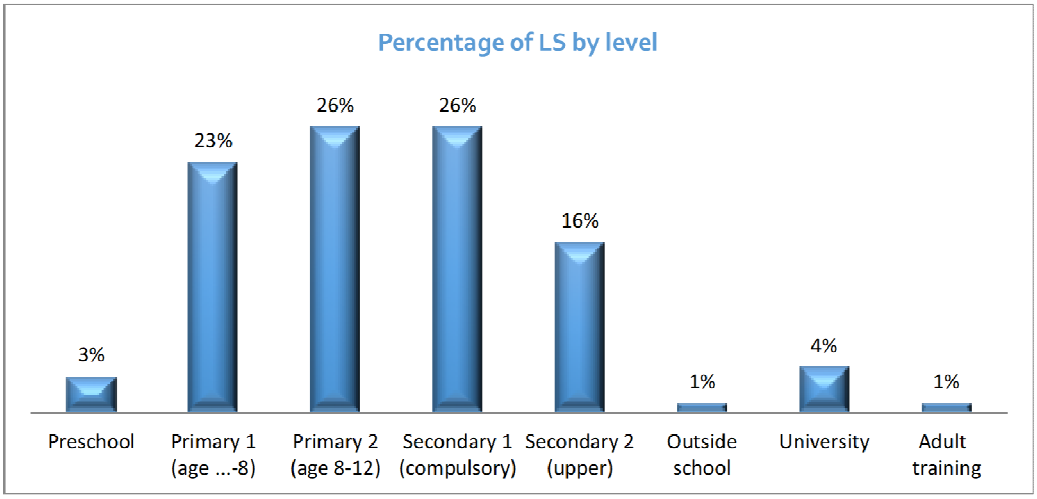

Figure 9 : Percentage of LS according to school levels

But even within compulsory education, changes are apparent when comparing the two primary cycles (pupils of years 4-8 and 8-12). For example, LS groups at the lower level place more emphasis on the relationship between teaching and learning whereas their colleagues from the higher level are more focused on developing teaching.

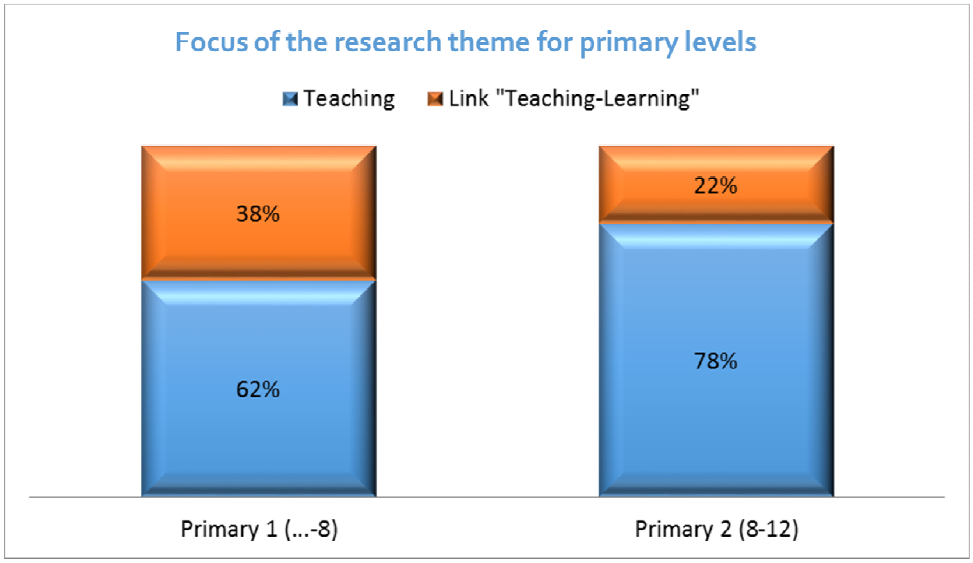

Figure 10 : LS research theme focus according to the primary level it is in

LS groups at the lower level collect information about lesson processes, while second level groups are more inclined to collect data on the preparation and reflection of teachers at their meetings.

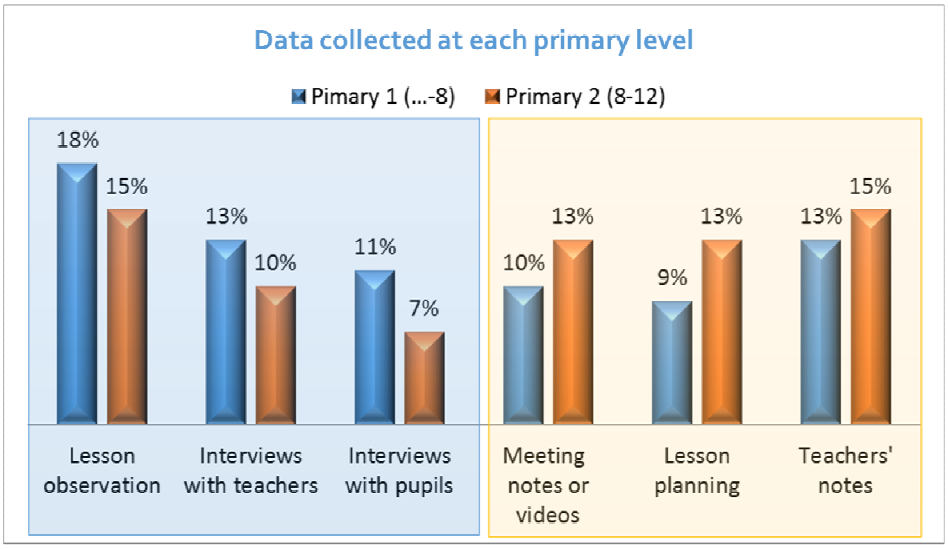

Figure 11 : Data collected according to the primary level

Moreover, when LS group members observe pupils, they focus more on their skills and thinking strategies in the lower level, whereas in the second level, the groups grant more importance to the knowledge of the object taught rather than their competences.

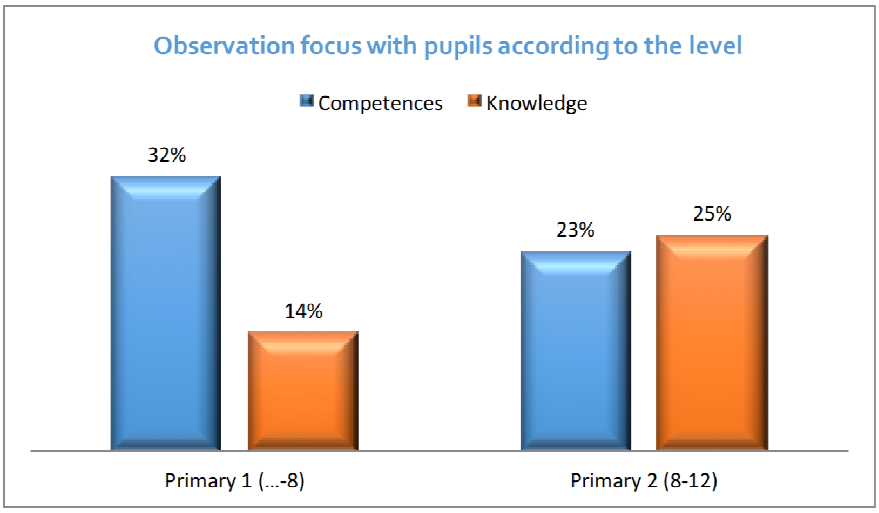

Figure 12 : Observation focus with pupils according to the level

Our Redefinition of LS

Following this review, we are led to speculate around what is and what is not an LS. Indeed, we observed that several stages were not systematically included:

- Pre-test
- Post-test
- Interviews with pupils
- Iteration of the planning-lesson-reflection cycle

In addition, the preoccupations of groups using LS also vary:

- Is the focus on teaching, learning or the link between the two?
- Are there long, medium or short term goals?
- What is observed in pupils: their skills, knowledge or thought processes?

Let's add the contextual variables:

- The subject matter
- The material being taught
- The teaching level

As a result, our schematization of the LS approach could take the following form:

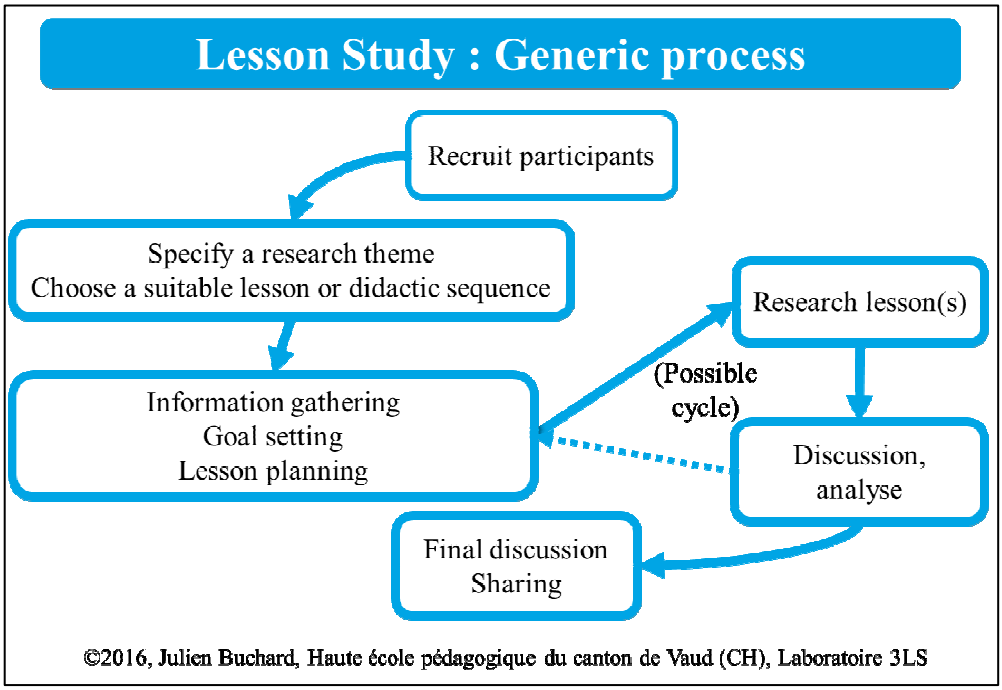

Figure 13 : Generic process of *Lesson Studies*

Starting from these characteristics that we consider essential to an LS, other optional parameters can be listed as levers to adapt the LS to a given context:

- The formation of the group can be carried out under the impetus of teachers or researchers or in various other ways;
- The research theme may be targeted at pupils and / or teachers in the short, medium or long term;
- Research can focus on the subject taught and / or pursue other cross-cutting objectives;
- Information can be structured by a theoretical framework;
- A pre-test can be administered to pupils to foster thought about planning;
- The entire reflective process and observation of the lesson can focus on a few pupils selected according to various criteria;
- Each research lesson can be observed by the participants;
- The planning, implementation and reflection on the research lesson can be repeated.

In any case, it seems appropriate to consider that a *Lesson Study* has a beginning and an end. The process can then be repeated by the same group several times over a period that may stretch to several years, in which other participants are involved or not and their focal points or objectives may or may not be modified, etc. This global multiplication of *Lesson Studies* can then be considered a perpetual cycle (or a spiral movement) such as that reported by the authors who were able to observe and study the *jugyo kenkyuu* system in Japan. The cycle would involve the interlinking of several LS, allowing for a continuous evolution of the education system, the training of teachers and the development of schools.

Observations concerning the impact evaluation of LS

This new modelling and our literature review provide several pointers to guide the design of a tool to measure the impact of LS, one that is adaptable to the concrete situations experienced by the groups. Our research attempts to construct a tool that can take into account the influence of each aspect of an LS on teachers and pupils, and on the evolution of the LS process itself.

To begin with, we need to question the importance of each parameter of the procedure. To what extent can a theoretical framework structuring participants' reflections influence the quality of the LS? What benefits can be derived from the iteration of the research lesson? What does each possible adaptation of the generic process do to contextual variables? etc.

Next, for each LS component, we must ask what effect it has on teachers (their practice, their reflexive practice, their sense of self-efficacy, etc.), pupils (their learning, their thought processes, their motivation, etc.) but also on the process itself (the scope of the project, the previous experience of the participants, the roles played by knowledgeable others, etc.)

Consequently, each component of an LS influencing one of the above elements requires the collection of data to inform the nature and extent of this influence. For example, to measure the effect of LS on teachers, we can collect their lesson plans and the didactic material they have prepared. We can also test their knowledge or analyse the skills demonstrated during various phases of the process. For pupils, knowledge tests can also inform us, as well as provide us with analysis of their behaviour in class or skills developed during the process. Data about the LS process concerns information to be gathered about participants, the analysis of the role played by the different players, the progression of the LS and its contextual variables, and so on. Finally, on a school level, different indicators can be used to measure the impact of LS. These include the evaluation of the climate within the school, the nature and degree of collaboration between teachers, the sense of professional effectiveness of teachers, the results of pupils in regional or national joint tests, etc.

All these questions remain open at present and continue to feed our work as we pursue this research.

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