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## The effectiveness and practicability of Lesson Study in the Dutch educational context.

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## WALS 2017 – RUG Symposium

**Strand:** 1. Lesson study in different cultural, subject and learning contexts

### Symposium title

Lesson Study research in North Netherlands:  
its effectiveness and practicability in the Dutch context

Chair: Carien Bakker, Groningen University, the Netherlands  
Discussant: Professor Kiyomi Akita, The University of Tokyo, Japan

### **Paper 1: The effectiveness and practicability of Lesson Study in the Dutch educational context.**

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#### ***abstract***

*This research<sup>1</sup> explored the effectiveness and practicability of LS in the Dutch educational context. Therefore, we built a theoretical model describing (1) factors influencing participation and implementation of LS, (2) participation in the LS process itself, (3) pathways of change and (4) outcomes for teachers and pupils. Our research questions were: which outcomes has participation in LS? which pathways of change lead to these outcomes? which elements in the LS process get the pathways of change going? which factors hinder or stimulate teachers' participation in LS? The research consisted of two parts: a literature review and a case study. For the literature review, we recorded 57 international studies about LS. For the case study, during two years we gathered quantitative and qualitative data from some 30 teachers of Dutch and mathematics from 12 secondary schools in two cross-school PLC's. Results of both the literature review and the case study confirm the theoretical model: the quality of teaching and learning increases via new knowledge and insights, and increased professional community. The four LS features seem to enhance these pathways of change. Important promoting factors are teacher motivation, facilitation, support by the school management and time.*

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## **Introduction**

Lesson Study (LS hereafter in this paper) is a powerful professional development approach for teachers within and outside Japan (e.g. reviews of Xu & Pedder, 2014 and Huang & Shimizu, 2016). LS in the Netherlands is a relatively new approach for teacher learning and is rapidly spreading. However promising a new professional development initiative might be, an empirical base in a new context is required, since the question is always about to what extent it can be replicated elsewhere. The application of LS in the Dutch context is not self-evident, because standard professional development practices in the Netherlands are mostly top-down imposed quick fix and one shot workshops, conferences and seminars, and to a lesser degree teacher directed, practice based collaboration and research (Onderwijscoöperatie, 2016). Besides, student-orientation is no common practice for Dutch teachers (De Vries et al., 2013), and just as in other Western European countries work pressure in schools is high (Inspectie van het Onderwijs, 2016). This brings us to the purpose of this paper where we plan to explore the potential of LS for the Dutch context: what is the effectiveness and practicability of Lesson Study in the Dutch educational context?

## **Theoretical model for teacher learning in Lesson Study**

Lewis et al. (2009) built a theoretical model, based on Desimone (2009), to investigate the mechanisms by which LS can be effectively used for instructional improvement outside of Japan. The model includes four LS features (investigation, planning, research lesson, and reflection), and three pathways through which LS improves instruction: changes in teachers' knowledge and beliefs; changes in professional community; and changes in teaching-learning resources. Firstly, the model posits that LS makes various types of knowledge more visible, thereby enabling teachers to encounter new or different ideas, and to refine their knowledge, according to cognitive learning theories. Secondly, the model posits that LS enables teachers to strengthen professional community, and to build the norms and tools needed for instructional improvement, as situated theories of learning propose (Lewis et al., 2009: 286). Research based on this theoretical model by Lewis et al. (2009) yielded evidence that the LS work affected each of the three pathways, and provided an 'existence proof' of the potential effectiveness of LS in the US context.

However, for successful implementation of professional development activities in teaching practice, all sorts of personal, interpersonal, and conditional factors have to be respected (Kooy & Van Veen, 2012). That is why to this theoretical model we added a conditional part with factors that can foster or hinder the performance of the LS-process. We

based this conditional part of the theoretical model on the Reasoned Action Approach (Fishbein, 2008), combining two empirically tested theories, the theory of Reasoned Action and the theory of Planned Behavior. This theory posits that the only and best predictor that somebody, in our case the teacher, is going to perform a certain behavior, in our case LS, is the teachers' intention to perform this behavior. The teacher's intention is determined by three factors: 1) teacher's positive or negative disposition towards LS; 2) the perceived social pressure to perform or not to perform LS, and 3) teachers' self-efficacy towards performing LS. Besides, the teachers' actual knowledge and skills and the actual conditional factors are conditional to perform LS. The conditional factors can be divided in three categories (Thurlings & Den Brok, 2014):

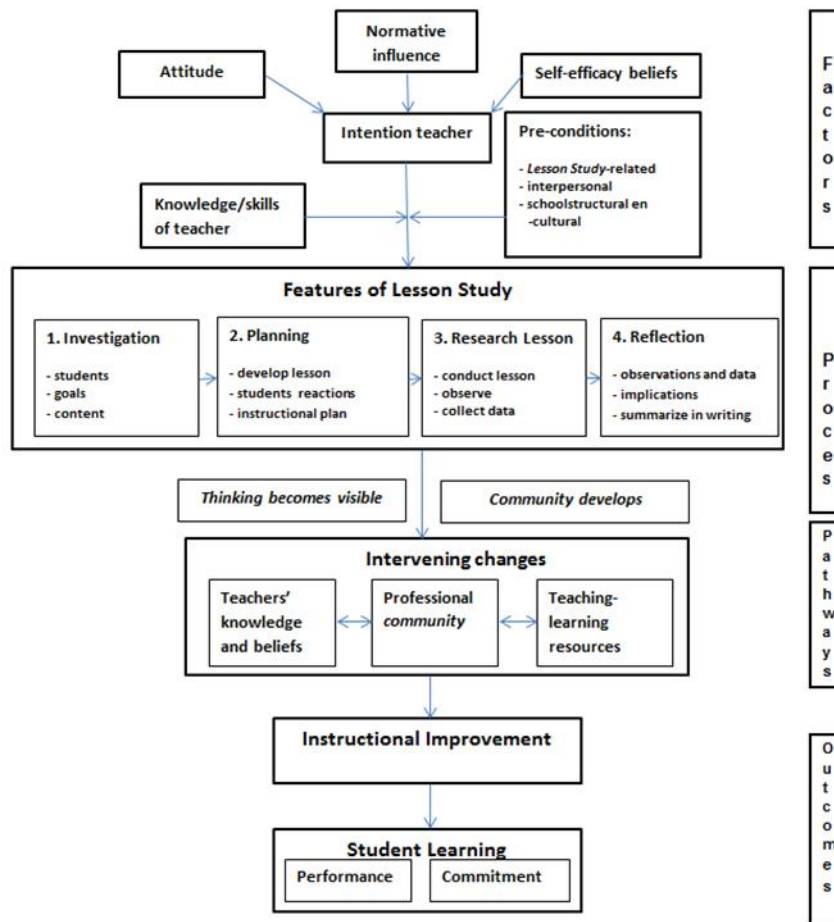
- 1) LS-related factors, including the organization of LS, given guide lines, group size and group composition, and the role of the facilitator;
- 2) interpersonal, collaboration-related factors such as mutual trust and team leadership (Salas et al., 2005);
- 3) school structural and school cultural related factors pertaining to practical support of the school with regard to time and schedule issues, and to social support by the school management.

The model as whole posits that teachers who, - having the right intention, sufficient knowledge and skills and under the right conditions - perform LS, that they improve their teaching via the three pathways of change which eventually will result in improved pupil learning and pupil commitment.

### **Research questions**

The main research question in this study (what is the effectiveness and practicability of Lesson Study in the Dutch educational context?) has been subdivided in the following research questions:

1. Which outcomes has participation in LS?
2. Which pathways of change lead to these outcomes?
3. Which elements in the LS process get the pathways of change going?
4. Which factors hinder or stimulate teachers' participation in LS?



**Figure 1.** Theoretical model (De Vries, Roorda & Van Veen (2017), based on Fishbein (2008) and Lewis, Perry & Hurd (2009)).

## Method

The research consisted of two parts: a literature review and a case study. For the literature review, we built on Xu and Pedder (2014), and recorded 57 international studies about LS between 2013 - 2016. See Table 1 for the characteristics and Appendix 1 for the references of the 57 studies.

**Table 1:** Overview of the characteristics of the 57 international studies 2013-2016.

<b>Geographical spread</b>	North America: 15 (US, Canada) Asia: 14 (Malaysia, Philippines, Hong Kong, Japan, Singapore and China) Europe: 27 (UK, Ireland, Norway, Spain, Netherlands) Africa: 1 Australia: 1
<b>School settings</b>	Initial teacher education: 18 Primary education: 19 Secondary education: 25 Higher education: 1
<b>Subjects</b>	Mathematics: 35 Science: 7 English: 7 Humanities: 5 Languages: 6
<b>Theoretical model</b>	Outcomes: 9 Pathways of change: 37 Process: 25 Factors: 33
<b>Type of research</b>	Type 1: 23 Type 2: 30 Type 3: 4

Notes:

1. The numbers most of the times add up to more than 57, because a study sometimes concerns more countries, school settings, subjects or elements of the theoretical model.
2. The division in types of research relates to Borko (2004):  
type 1: research of one intervention in one setting.  
type 2: research of one intervention in several settings with several facilitators.  
type 3: research of several interventions in several settings with several facilitators.

Compared to the review of Xu and Pedder (2014), recently more studies have been written in the European context, for example at the university of Stavanger (Norway), university of Leicester (UK), university of Exeter (England), and the Dutch university of Twente.

For the case study, during two years we gathered and analyzed quantitative (paper questionnaire after each LS-cycle) and qualitative data (an interview each school year) from 32 teachers of Dutch and mathematics (14 teachers of Dutch (1 male, 13 female) and 18

teachers of mathematics (seven male, eleven female) from 12 secondary schools in two cross-school PLC's and who performed four LS-cycles. The teachers were quite motivated and willing to participate in the PLC's.

## **Results**

Findings are presented according to the above mentioned research questions.

### *Which outcomes has participation in LS?*

In the literature review, we found positive effects on teaching (studies 1, 13, 14, 25, 31, 34, 37), and also on pupils (studies 16 and 22).

Also in the case study teachers reported more often small, but sometimes big changes in their teaching practice.

### *Which pathways of change lead to these outcomes?*

In the literature review, 29 studies reported that teachers developed all sorts of knowledge and insights in the domains of subject matter content, pedagogical content knowledge and pedagogics (in studies 1, 3, 4, 6, 7, 8, 12, 13, 14, 16, 17, 18, 20, 22, 24, 25, 29, 31, 32, 33, 37, 44, 46, 49, 50, 51, 52, 56, 57). Seven studies report explicitly more insight in pupils' learning processes and more focus on pupils' capacities and learning needs (studies 4, 6, 8, 20, 23, 33, 57).

Eight studies report improved collaboration of teachers (1, 3, 5, 6, 8, 38, 42, 43, 52).

In only one study (study 16), the teaching learning resources are mentioned as pathway of change.

Also in the case study, teachers report all sorts of knowledge and insights, an improved understanding of pupils, increased 'professional community', and more insights in teaching learning resources.

### *Which elements in the LS process get the pathways of change going?*

In the literature review, all four LS features (investigation (studies 16 and 17), investigation, planning (studies 5, 6, 12, 23, 24, 25, 35), research lesson (studies 16, 24, 29, 31, 47, 48), and reflection (studies 1, 17, 24, 29, 36, 38) were found to enhance teacher learning. The combination of the four features was also mentioned to enhance teacher learning, as well as the integration of theory and practice (studies 21, 28, 37, 48, 53).

Also in the case study, all four LS features were considered as useful and feasible. However, teachers found investigation and planning difficult.

#### *Which factors hinder or stimulate teachers' participation in LS?*

In the literature review, 33 studies report on stimulating and hindering factors at different levels. At the individual teacher level, teacher motivation and voluntariness are stimulating (studies 11, 30 and 6), and absence of motivation and traditional beliefs about education are hindering (studies 3 and 7, 8, 34).

At the level of the LS-process, facilitation and the presence of an expert or knowledgeable other are helpful (studies 9, 12, 23, 30, 44, 51, 56, 57).

At the interpersonal level, a form of dialogic space enhances teacher learning (study 36).

At the school level, the time factor (3, 8, 23, 25, 30) and support of the school management (studies 22, 25, 39) are stimulating.

In the case study, stimulating factors were teachers' positive attitude as well as the facilitation by the teacher educators, the collaboration in the teams, and the time scheduled on Friday afternoon. Hindering factors for some teachers were the team composition and the lack of support by the school management.

#### **Conclusion and discussion**

The main research question in this study was: what is the effectiveness and practicability of Lesson Study in the Dutch educational context? Both the literature review and the case study reveal that Lesson Study can lead to changed teaching behavior. The pathways of change mentioned in many studies as well as in the case study are knowledge, attitude, views and insights of teachers in the field of subject matter content, pedagogical content knowledge and pedagogics and the thinking and learning of pupils. In addition, participation in Lesson Study appears to promote commitment and solidarity with colleagues. The role of teaching-learning material as a change mechanism appears to be small. All four features, investigation, planning, research lesson, and reflection, appear to encourage the pathways of change among teachers. Promoting factors are motivated teachers, good support in the Lesson Study process, an open discussion climate in the team, and organized time and explicit support from the school leadership.



The theoretical model seems to be confirmed by both the international literature review as the case study in the Dutch context, and provides as such an ‘existence proof’ of the potential effectiveness of LS in the Dutch context. However, little evidence has been found for the role of teaching learning resources as a pathway for teacher change. Although a single study refers to this, it is the question of whether this pathway of change should be explicitly included in the framework.

As stated before, our literature review builds on the review of Xu and Pedder (2014), and confirms the outcomes of LS and its promoting and prohibiting factors. Compared to Xu and Pedder, recently more process studies have been published (7% of the studies in 2014, versus 35% of the studies now). This gives us more insight in the mechanisms of the LS-process (e.g. Warwick et al., 2016). On the other hand, there is still little attention to collaborative aspects in the context of LS. Xu and Pedder found that it was often small-scale, qualitative research based on self-reports. Except for a single study (study 16) this is still the case.

LS has been a successful professionalization approach in Japan for decades. Looking at the research conducted in Western countries, LS also seems to be a promising professionalization approach. However, this has not yet been investigated in a large scale and experimental way with a Borko type 3 research design that explores and compares multiple interventions at multiple schools (Borko, 2004). The question is also whether such a research design is really needed or that we can learn sufficiently in our Dutch context on the basis of a so-called local proof route, learning from what works on the basis of repeated embodiments in various contexts using Borko type 1 and especially type 2 designs: LS performed in multiple locations, supervised by various facilitators.

In addition to the outcomes question, interesting and important themes for future research are in line with the theoretical framework:

Firstly, the motivation of teachers for LS: how are teachers who are moderately or not motivated to learn to move towards constructive participation in LS? Based on self-determination theory (Ryan & Deci, 2000), features of LS are likely to contribute to the motivation of teachers for professional development. What elements are this and how can this be strengthened?

Secondly, the collaboration and facilitation in the context of LS: how can collaborative aspects be influenced to optimize learning? And how can a facilitator contribute to this?

Thirdly, the introduction and sustainable organization and embedding of LS as organizational routine in the school (Feldman & Pentland, 2003; Spillane, Sherer & Parise, 2011): in the Japanese context, LS is a self-evident part of the work of teachers, and it is experienced by teachers as an organizational routine. In many Western schools, collaboration between teachers, how much highly desired, often is not experienced as direct functional for their own teaching. The dominant nature of the organization of schools (teachers are each responsible for their own classes and classes) largely explains that a culture of individualistic functioning is maintained. In this very different context from Japan, it is interesting to investigate how LS, which is experienced by teachers as a meaningful way of working together, can be organized in such a way that it is becoming a more self-evident part of the work of teachers. This requires research on how LS at schools is organized at both meso and micro level and is experienced by teachers as a functional and more obvious part of their work.

Lesson Study seems to have a huge potential to support and stimulate teacher learning processes. However, whether it will be effective in the Dutch context will depend largely on the realization of the promoting factors.

## References

- Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational researcher*, 33(8), 3-15.
- Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational researcher*, 38(3), 181-199.
- De Vries, S., Jansen, E. P., & van de Grift, W. J. (2013). Profiling teachers' continuing professional development and the relation with their beliefs about learning and teaching. *Teaching and Teacher Education*, 33, 78-89.
- De Vries, S., Roorda, G., & Veen, K. van (2017). Lesson Study: Effectief en bruikbaar in het Nederlandse onderwijs? [Lesson Study: effective and practicable in the Dutch context?]. Retrieved October, 26, 2017, from [www.nro.nl/kb/405-15-726](http://www.nro.nl/kb/405-15-726)
- Dutch Schools Inspectorate (2016). *De staat van het Onderwijs* [The state of Education]. *Onderwijsverslag* [Educational report] 2014-2015. Utrecht: Dutch Schools Inspectorate.
- Feldman, M. S., & Pentland, B. T. (2003). Reconceptualizing organizational routines as a source of flexibility and change. *Administrative science quarterly*, 48(1), 94-118.
- Fishbein, M. (2008). A reasoned action approach to health promotion. *Medical Decision Making*, 28(6), 834-844.
- Huang, R., & Shimizu, Y. (2016). Improving teaching, developing teachers and teacher educators, and linking theory and practice through lesson study in mathematics: an international perspective. *ZDM*, 48(4), 393-409.
- Kooy, M., & Van Veen, K. (2012). *Teacher learning that matters. International Perspectives* (pp. 22-43). New York: Routledge
- Lewis, C. C., Perry, R. R., & Hurd, J. (2009). Improving mathematics instruction through lesson study: A theoretical model and North American case. *Journal of Mathematics Teacher Education*, 12(4), 285-304.
- Onderwijscoöperatie (2016). *De staat van de leraar* [The state of the teacher]. Utrecht: Onderwijscoöperatie.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American psychologist*, 55(1), 68.
- Salas, E., Sims, D. E., & Burke, C. S. (2005). Is there a "Big Five" in teamwork?. *Small group research*, 36(5), 555-599.
- Spillane, J. P., Parise, L. M., & Sherer, J. Z. (2011). Organizational routines as coupling mechanisms: Policy, school administration, and the technical core. *American Educational Research Journal*, 48(3), 586-619.
- Thurlings, M., & den Brok, P. (2014). *Leraren leren als gelijken: wat werkt?*. NRO.
- Warwick, P., Vrikki, M., Vermunt, J. D., Mercer, N., & van Halem, N. (2016). Connecting observations of student and teacher learning: an examination of dialogic processes in Lesson Study discussions in mathematics. *ZDM*, 48(4), 555-569.
- Xu, H. & Pedder, D. (2014). Lesson Study: An international review of the research. In P. Dudley (ed.), *Lesson Study, professional learning for our time* (pp. 29 – 58). London/New York: Routledge.

## Appendix 1: References of the 57 studies

1. Baricaua Gutierrez, S. (2016). Building a classroom-based professional learning community through lesson study: insights from elementary school science teachers. *Professional Development in Education*, 42, 801-817.
2. Bocala, C. (2015). From experience to expertise: The development of teachers' learning in lesson study. *Journal of Teacher Education*, 66, 349-362.
3. Brosnan, A. (2014). Introducing lesson study in promoting a new mathematics curriculum in Irish post-primary schools. *International Journal for Lesson and Learning Studies*, 3, 236-251.
4. Bruce, C. D., Flynn, T. C., & Bennett, S. (2016). A focus on exploratory tasks in lesson study: The Canadian 'Math for Young Children' project. *ZDM Mathematics Education*, 48, 541-554.
5. Cajkler, W., Wood, P., Norton, J., & Pedder, D. (2014). Lesson study as a vehicle for collaborative teacher learning in a secondary school. *Professional Development in Education*, 40, 511-529.
6. Cajkler, W., Wood, P., Norton, J., Pedder, D., & Xu, H. (2015). Teacher perspectives about lesson study in secondary school departments: A collaborative vehicle for professional learning and practice development. *Research Papers in Education*, 30, 192-213.
7. Chen, X., & Yang, F. (2013). Chinese teachers' reconstruction of the curriculum reform through lesson study. *International Journal for Lesson and Learning Studies*, 2, 218-236.
8. Chiew, C. M., Mohd, H.D., Lim, C.S. (2016). Implementation of lesson study as an innovative professional development model among Malaysian school teachers. *Malaysian Journal of Learning and Instruction*, 13, 83-111.
9. Chikamori, K., Ono, Y., & Rogan, J. (2013). A lesson study approach to improving a biology lesson. *African Journal of Research in Mathematics, Science and Technology Education*, 17(1-2), 14-25.
10. Ebaegu, M., & Stephens, M. (2014). Cultural challenges in adapting lesson study to a Philippines setting. *Mathematics Teacher Education and Development*, 16(1), 43-64.
11. Gero, G. (2015). The prospects of lesson study in the US: Teacher support and comfort within a district culture of control. *International Journal for Lesson and Learning Studies*, 4, 7-25.
12. Groves, S., Doig, B., Vale, C., & Widjaja, W. (2016). Critical factors in the adaptation and implementation of Japanese Lesson Study in the Australian context. *ZDM Mathematics Education*, 48, 501-512.
13. Huang, R., Su, H., & Xu, S. (2014). Developing teachers' and teaching researchers' professional competence in mathematics through Chinese Lesson Study. *ZDM, Mathematics Education* 46, 239-251.
14. Huang, R., & Han, X. (2015). Developing mathematics teachers' competence through parallel lesson study. *International Journal for Lesson and Learning Studies*, 4, 100-117.
15. Kusanagi, K. N. (2014). The bureaucratising of lesson study: A Javanese case. *Mathematics Teacher Education and Development*, 16(1), 84-103
16. Lewis, C., & Perry, R. (2014). Lesson study with mathematical resources: A sustainable model for locally-led teacher professional learning. *Mathematics Teacher Education and Development*, 16(1), 22 – 42.
17. Moss, J., Hawes, Z., Naqvi, S., & Caswell, B. (2015). Adapting Japanese Lesson Study to enhance the teaching and learning of geometry and spatial reasoning in early years classrooms: A case study. *ZDM Mathematics Education* 47, 377-390.
18. Naresh, N. (2013). Traverses through the landscape of reflective thinking: Teachers' actions in the context of lesson study. *Fields Mathematics Education Journal*, 1(1), 21-42.
19. Nickerson, S.D., Fredenberg, M., & Druken, B.K. (2014). Hybrid lesson study: extending lesson study on-line. *International Journal for Lesson and Learning Studies*, 3, 152-169.
20. Norwich, B., Dudley, P., & Ylonen, A. (2014). Using lesson study to assess pupils' learning difficulties. *International Journal of Lesson and Learning Studies*, 3, 192-207.
21. Norwich, B., Koutsouris, G., Fujita, T., Ralph, T., Adlam, A., & Milton, F. (2016). Exploring knowledge bridging and translation in Lesson Study using an inter-professional team. *International Journal for Lesson & Learning Studies*, 5, 180 – 195.
22. Norwich, B., & Ylonen, A. (2015). Lesson study practices in the development of secondary teaching of students with moderate learning difficulties: A systematic qualitative analysis in relation to context and outcomes. *British Educational Research Journal*, 41, 629-649.
23. Norwich, B. & Ylonen A. (2015). A design-based trial of Lesson Study for assessment purposes: Evaluating a new classroom based dynamic assessment approach. *European Journal of Special Needs Education*, 30, 253-273.
24. Peña Traperó, N. (2013). Lesson study and practical thinking: A case study in Spain. *International Journal for Lesson and Learning Studies*, 2, 115-136.
25. Rahim, S.S.A., Sulaiman, S., & Sulaiman, T. (2015). Teacher professional development through lesson study in secondary schools. *Advanced Science Letters*, 21, 2360-2364.

26. Sarkar Arani, M. R., (2015) Cross cultural analysis of an Iranian mathematics lesson: A new perspective for raising the quality of teaching. *International Journal for Lesson and Learning Studies*, 4, 118-139.
27. Shuilleabhain, A. N. (2016). Developing mathematics teachers' pedagogical content knowledge in lesson study. *International Journal for Lesson and Learning Studies*, 5, 212-226.
28. Soto Gómez, E., Serván Núñez, M. J., & Pérez Gómez, A. I. (2015). Cooperative research. A critical strategy in university teacher training. A case study of Lesson and Learning Studies. *International Journal for Lesson and Learning Studies*, 4, 56-71.
29. Suh, J., & Seshaiyer, P. (2015). Examining teachers' understanding of the mathematical learning progression through vertical articulation during Lesson Study. *Journal of Mathematics Teacher Education*, 18, 207-229.
30. Takahashi, A., Lewis, C., Perry, R. (2013). A US lesson study network to spread teaching through problem solving. *International Journal of Lesson and Learning Studies*, 2, 237-255.
31. Tan-Chia, L., Fang, Y., & Ang, P.C. (2013). Innovating the Singapore English language curriculum through lesson study. *International Journal for Lesson and Learning Studies*, 2, 256-280.
32. Vaughn, M. S., & Zimmerman, S. (2015). An investigation of the facilitator's role in lesson study. *The International Journal of Pedagogy and Curriculum*, 23(1), 21-29.
33. Verhoef, N. C., Coenders, F., Pieters, J. M., van Smaalen, D., & Tall, D. O. (2015). Professional development through lesson study: Teaching the derivative using Geogebra. *Professional Development in Education*, 41(1), 109-126.
34. Verhoef, N., Tall, D., Coenders, F., & Van Smaalen, D. (2014). The complexities of a lesson study in a Dutch situation: mathematics teacher learning. *International journal of science and mathematics education*, 12(4), 859-881.
35. Wake, G., Swan, M., & Foster, C. (2016). Professional learning through the collaborative design of problem-solving lessons. *Journal of Mathematics Teacher Education online publication*, 19, 243-260.
36. Warwick, P., Vrikki, M., Vermunt, J.D., Mercer, N. & Halem, N.van (2016). Connecting observations of student and teacher learning: an examination of dialogic processes in Lesson Study discussions in mathematics. *ZDM Mathematics Education*, 48, 555-569.
37. Widjaja, W., Vale, C., Groves, S., & Doig, B. (2015). Teachers' professional growth through engagement with lesson study. *Journal of Mathematics Teacher Education online publication*. 1-27. doi:10.1007/s10857-015-9341-8
38. Ylonen, A., & Norwich, B.(2013). Professional learning of teachers through a lesson study process in England: Contexts, mechanisms and outcomes. *International Journal for Lesson and Learning Studies*, 2, 137-154.
39. Zhang, Y. (2015). Sustaining lesson study in schools with positive peer leadership: A case studie in Hong Kong. *International Journal for Lesson and Learning Studies*, 4, 140-154.
40. Akerson, V. L., Pongsanon, K., Rogers, M. A. P., Carter, I., & Galindo, E. (2017). Exploring the use of lesson study to develop elementary preservice teachers' pedagogical content knowledge for teaching nature of science. *International Journal of Science and Mathematics Education*, 15, 293-312.
41. Amador, J., & Weiland, I. (2015). What preservice teachers and knowledgeable others professionally notice during lesson study. *The Teacher Educator*, 50, 109-126.
42. Bjuland, R., & Mosvold, R. (2015). Lesson study in teacher education: Learning from a challenging case. *Teaching and Teacher Education*, 52, 83-90.
43. Cajkler, W., & Wood, P. (2016a). Adapting 'lesson study' to investigate classroom pedagogy in initial teacher education: what student-teachers think. *Cambridge Journal of Education*, 46(1), 1-18.
44. Cajkler, W., & Wood, P. (2016b). Mentors and student-teachers "lesson studying" in initial teacher education. *International Journal for Lesson and Learning Studies*, 5, 84-98.
45. Chew, C. M. (2013). Learning to design geometer's sketchpad activities for teaching mathematics through lesson study. *Asia Pacific Journal of Multidisciplinary Research*, 1(1), 62-74.
46. Chew, C.M., & Lim, C.S. (2013) Developing pre-service teachers' technological pedagogical content knowledge for teaching mathematics with the Geometers' Sketchpad through lesson study, *Journal of Education and Learning*, 2(1),1 -8.
47. Helgevold, N., Næsheim-Bjørkvik, G., & Østrem, S. (2015). Key focus areas and use of tools in mentoring conversations during internship in initial teacher education. *Teaching and Teacher Education*, 49, 128-137.
48. Juhler, M. V. (2016). The use of lesson study combined with content representation in the planning of physics lessons during field practice to develop pedagogical content knowledge. *Journal of Science Teacher Education*, 27, 533-553.
49. Lamb, P. (2015). Peer-learning between pre-service teachers: Embracing Lesson Study. *International Journal for Lesson and Learning Studies*, 4, 343-361.

50. Larssen, D., & Drew, I. (2015). The influence of a Lesson Study cycle on a 2nd grade EFL picture book-based teaching practice lesson in Norway. *Nordic Journal of Modern Language Methodology*, 3, 92-105.
51. Leavy, A. M., & Hourigan, M. (2016). Using lesson study to support knowledge development in initial teacher education: Insights from early number classrooms. *Teaching and Teacher Education*, 57, 161-175.
52. Mostofo, J., & Zambo, R. (2015). Improving instruction in the mathematics methods classroom through action research. *Educational Action Research*, 23, 497-513.
53. Munthe, E., Bjuland, R., Helgevold, N. (2016). Lesson study in field practice: A time-lagged experiment in initial teacher education in Norway. *International Journal for Lesson and Learning Studies*, 5, 142-154.
54. Myers, J. (2013). Creating reflective practitioners with preservice lesson study. *International Journal of Pedagogies and Learning*, 8(1), 1-9.
55. Pektas, M. (2014) Effects of lesson study on science teacher candidates' teaching efficacies. *Educational Research and Reviews*, 9, 164-172.
56. Rasmussen, K. (2016). Lesson study in prospective mathematics teacher education: didactic and paradidactic technology in the post-lesson reflection. *Journal of Mathematics Teacher Education*, 19, 301-324.
57. Weiland Carter, I. S., & Amador, J. M. (2015). Lexical and indexical conversational components that mediate professional noticing during lesson study. *Eurasia Journal of Mathematics, Science and Technology Education*, 11, 1339-1361.