Lesson Study in Mathematics: Authentic Assessment of Inquiry Learning

Science and
Mathematics Education
Conference 2014

“Without comparison, there is little understanding. With comparison, all too often, there is but minimal understanding. In education, we compare teachers and lots of other things. The more objective and precise our criteria, the more thoroughly we fail to understand the teachers and those other things. If we really need to understand our teachers, we need to study them at work, in context, solving particular problems. We cannot just ask them. We cannot just rate them. We cannot just measure their competencies. We greatly need anecdotal evidence. We greatly need stories. We greatly need ethnography. Instead we are pressured to identify criteria, to measure and compare”

Prof. Robert E. Stake

What Knowledge Do Teachers Require?

Competence in Mathematics

- To construct rich conceptual understandings of mathematics
- Develop connections between procedures, concepts and representations
- Engage in dialogue and discourse around mathematics.

Teacher Knowledge

Subject-matter knowledge (SMK) (Shulman, 1986)	Pedagogical content knowledge (PCK) (Shulman, 1986)

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Japanese Lesson Study: Background and context

Participants

- Course: Curriculum specialisation in Maths Ed.
- 20 final year pre-service teachers

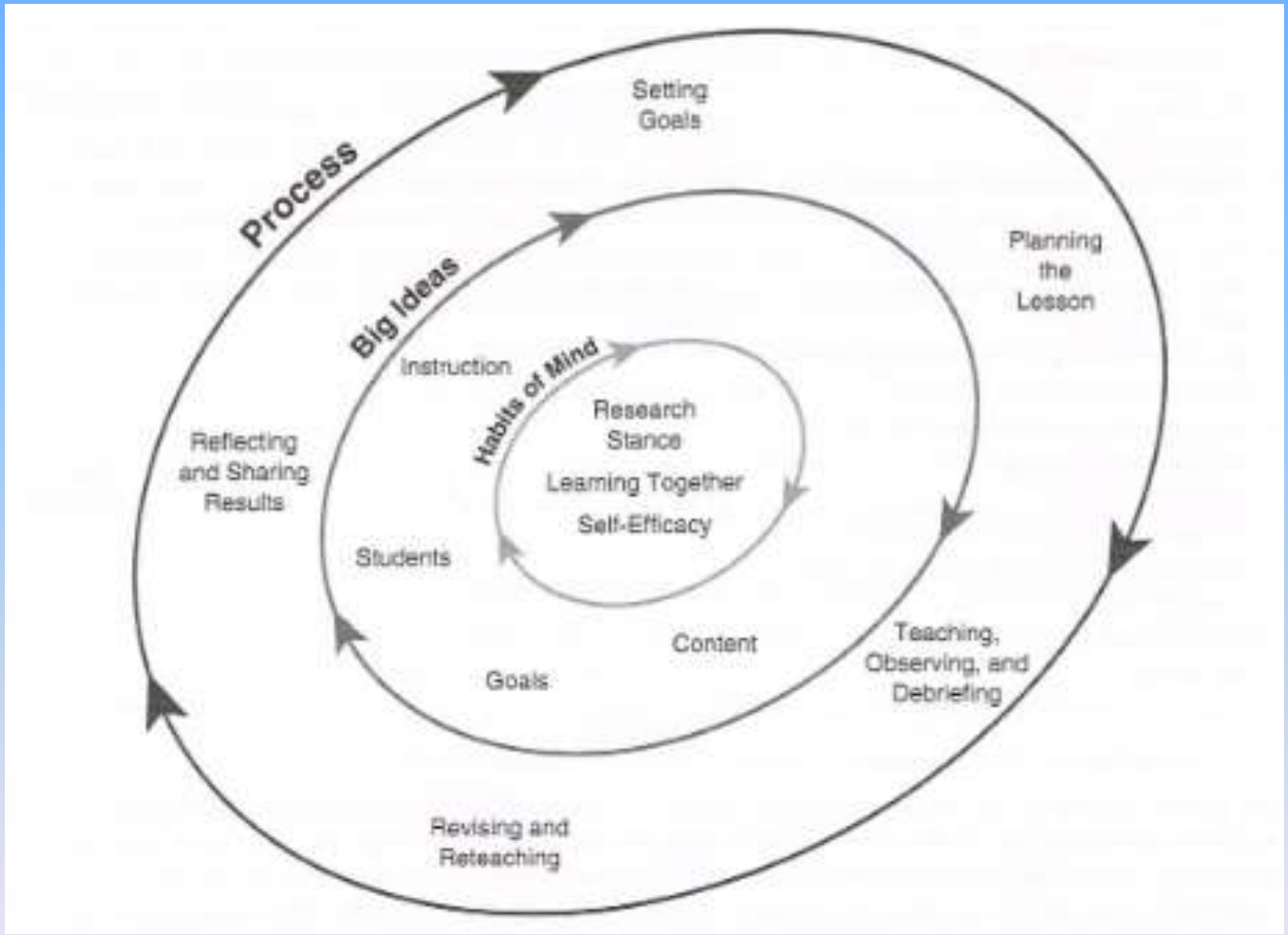
Structure of the study

- Carried out over the 12 week semester
- Working in groups of 5 or 6

Working groups

- Each group designed a lesson to engage primary level children in learning specific mathematics – Data.
- The senior infants group was the unit of analysis for the purpose of this study.

The Core Elements of Lesson Study



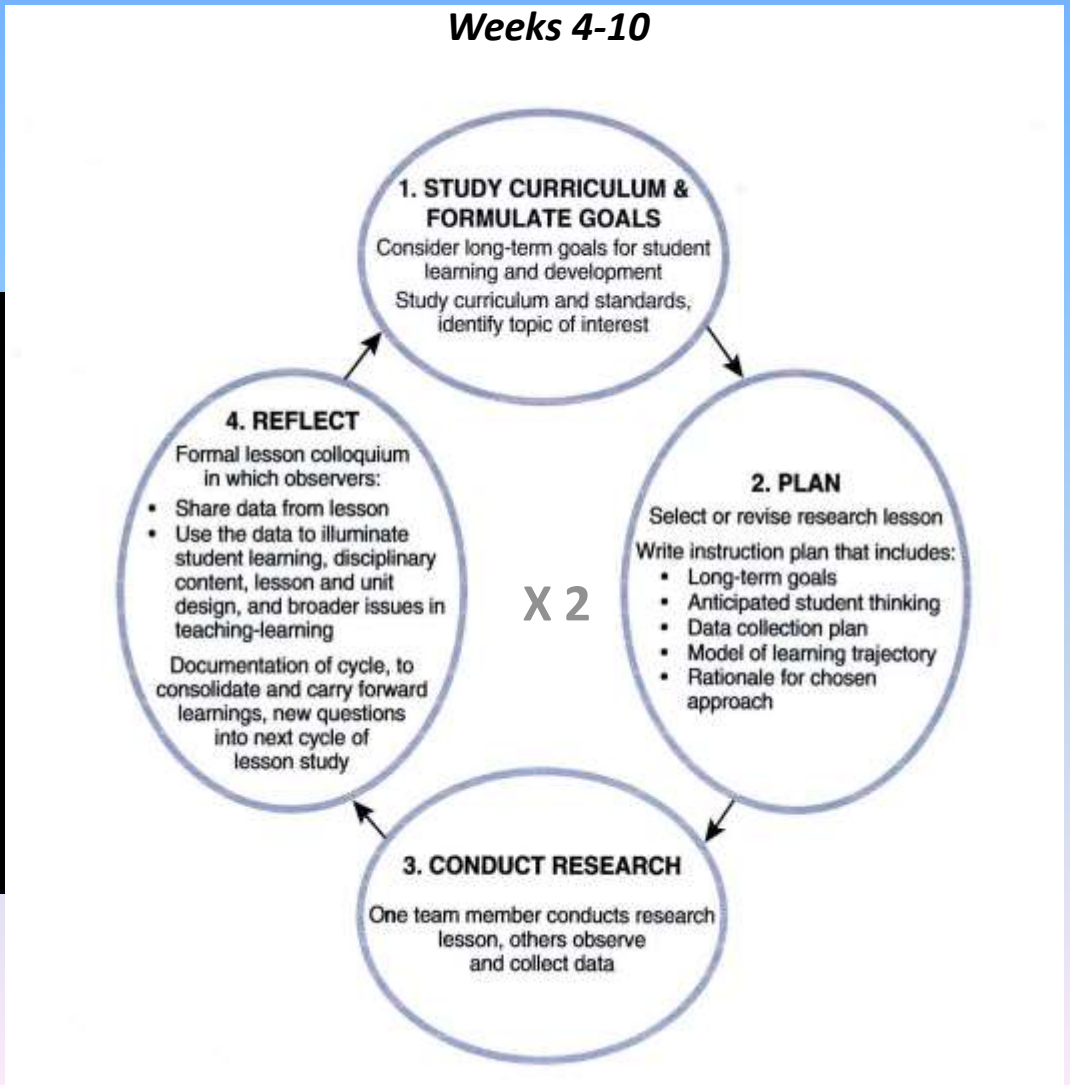
Stages of the study

Stage 2
Lesson Study
Weeks 4-10

Stage 1
Weeks 1-3

Introduction to lesson study

Looking at mathematical concepts



Stage 3
Weeks 11-12

Sharing reflections on teaching mathematics

Class presentations

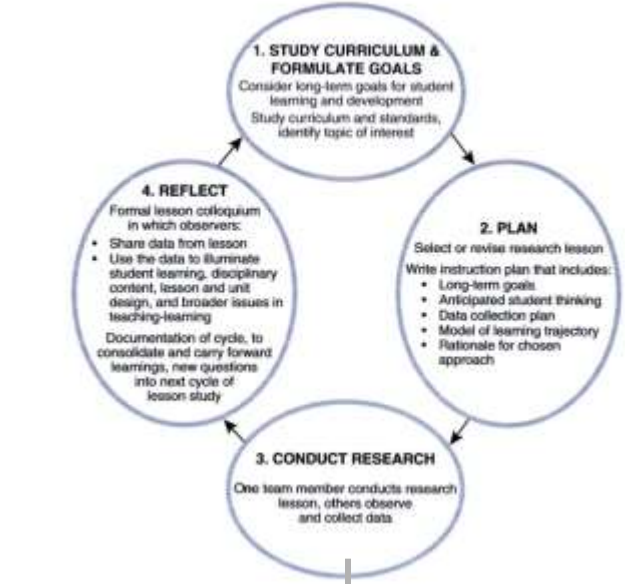
Stage 1

Introduction
to lesson study

Revisiting maths concepts

Copies of lectures
Written group logs

Stage 2
Lesson Study



Audio-taped meetings with group
Digital copy of lesson plan
Observation and video-recording of classroom teaching
Classroom observation notes
Written group logs
Focus group interviews

Stage 3

Sharing reflections on teaching maths

Group presentations

Videotaped presentations
Individual reflective report
Group reflective report

EXAMINING A CASE:
TEACHING DATA IN THE EARLY YEARS


Green Monster
Explores
The Jungle


Green Monster
Explores
The Jungle

Illustration of KCT: Knowledge of Content and Teaching

- “designing the sequencing of the content of instruction”
- “selection of models representations and procedures that support the development of mathematical understandings”

(Ball et al. 2008)

Name: Ronan

12

3

Colin

2

Name: orestis

1234567891011

12

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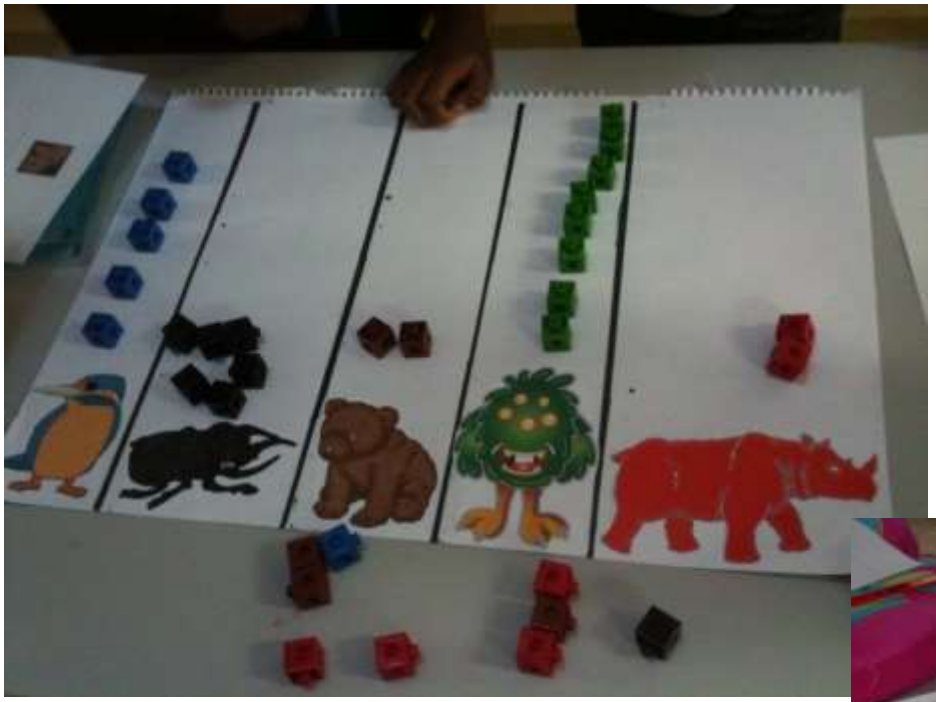

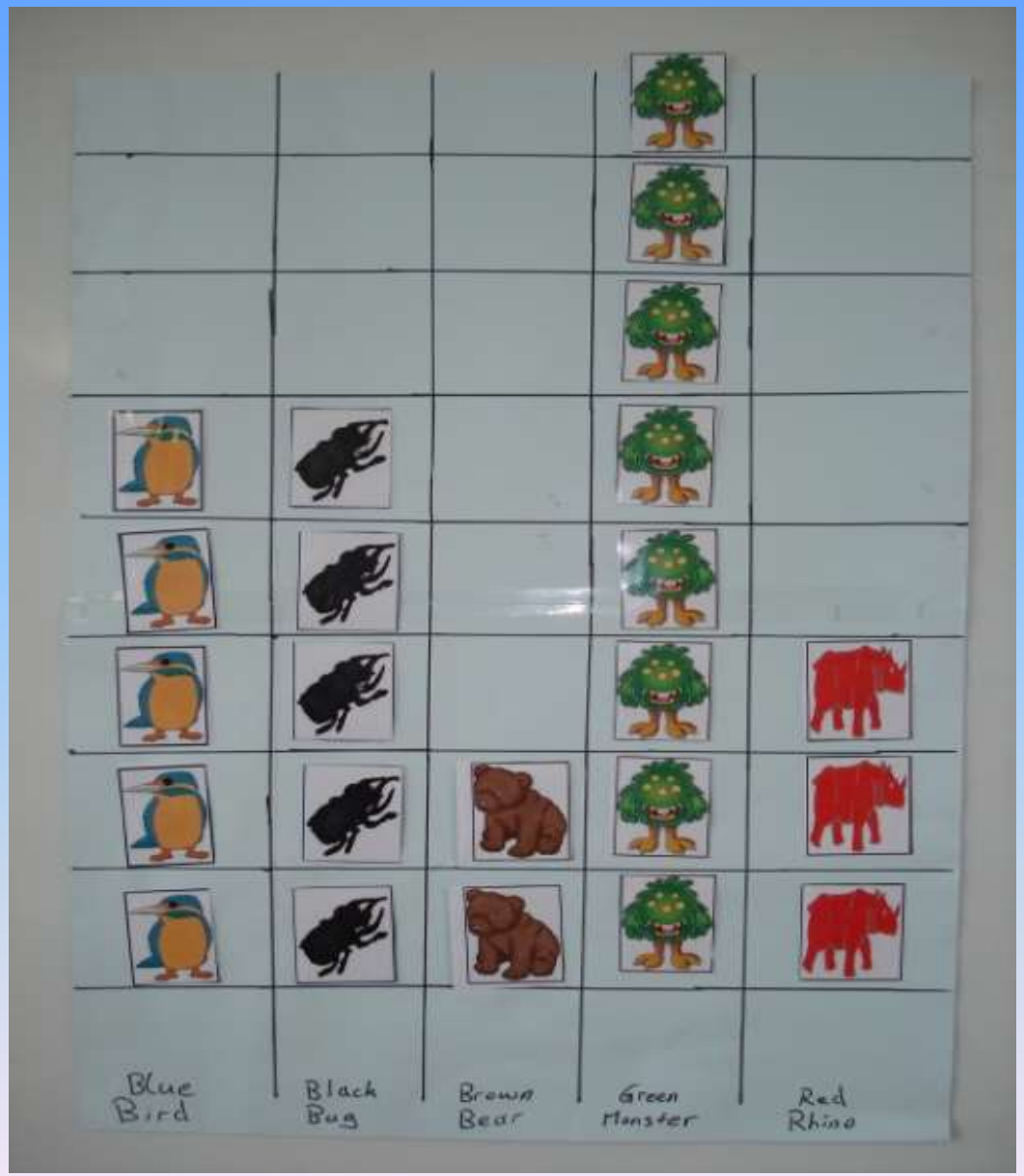
Blue Bird
Black Bug
Brown Bear
Green Monster
Red Rhino

Illustration of KCS: Knowledge of Content and Students

- “the ability to select exemplars that motivate and interest students”
- “their ability to anticipate student misconceptions when presented with a mathematical task”

(Ball et al. 2008)

Video excerpt: Senior Infants Exploring Data

Video Time code 36:41

Deficits in KCS: Knowledge of Content and Students

- “interpret the mathematical meaning associated with student responses”

- “select appropriate mathematical language”

(Ball et al. 2008)

Video excerpt: Lesson study presentations

Video Time code 25:33-28:24

Teachers reflecting on their own knowledge development arising from engaging in Japanese Lesson Study

Conclusion

- Lesson Study allows participants learn from engaging in and observing teaching
- Pre-service teachers' knowledge can be examined and developed concurrently within the context of teaching lessons in 'live' classrooms
- Lesson Study provides both 'assessment of learning' and 'assessment for learning'