Danish University Colleges

Consecutive cycles of “whole class” Lesson Study
A format for development of shared teacher knowledge in preservice teacher education
Rasmussen, Klaus

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Abstract
An analysis of three lesson study cycles of the same research lesson carried out by 16 pre-service lower secondary teachers. The process of lesson planning and revision is displayed and it is shown how the pre-service teachers develop knowledge about critical details of the lesson, its contents and pupils’ learning.

Research Questions
How is knowledge gained from each research lesson and post-lesson reflection incorporated in subsequent re-teaching? What are the benefits and drawbacks of large group sizes in pre-service teacher lesson study?

Context, method and theory
In 2015, a group of 16 students attending a Danish teacher education in which Lesson Study in small groups is common, were asked to plan one research lesson collectively. The development over three cycles of a lesson plan (for a grade 8, 2X45minutes) were subjected to document analyses. The lessons and reflections were observed by the author (note-taking and video recording). All material was indexed using Nvivo10 and subjected to praxeological analysis in the sense of the anthropological theory of the didactic (Chevillard & Senswey, 2014).

Knowledge development

<table>
<thead>
<tr>
<th>Initial task type (T) put to the pupils, anticipated techniques (τ)</th>
<th>After first revision</th>
<th>After second revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1: Who in the class is most likely to be selected to pick up milk.</td>
<td>T1: Investigate who of three pupils are most likely to be the one pick up milk, if they use two coins.</td>
<td>T1: Given one crooked die, who should do the dishes? What rules to make a fair game?</td>
</tr>
<tr>
<td>T2: Make a combinatorial argument to answer T1.</td>
<td>T2: Perform class discussion based on previous experiences.</td>
<td>T2: Perform class discussion based on intuition about how an irregular die will perform.</td>
</tr>
<tr>
<td>T3: Peer/class discussion based on prior experiences</td>
<td>T3: Perform physical simulation, take count.</td>
<td>T3: Perform physical simulation, sample frequency as group probability.</td>
</tr>
<tr>
<td>T5: Perform large number of simulation using padlet (mobile phone)</td>
<td>T5: Draw a schematic of sample space</td>
<td>T5: Perform physical simulation with two dice.</td>
</tr>
<tr>
<td>T6: Draw a schematic of sample space</td>
<td><strong>No new δ</strong></td>
<td>T6: Draw sample space (with unequal probabilities).</td>
</tr>
</tbody>
</table>

Reasons (δ) for tasks and techniques.

δ1: Pupils should become of subjective beliefs about probability
δ2: Pupils become aware of statistic probability
δ3: Pupils aware that statistic probability variation decreases
δ4: Pupils become aware of combinatorial probability.

Associated didactic techniques (φ’)

τ1: Use of familiar context engages the pupils
τ2: Watch video instruction about how to do simulation.
τ3: Make a combinatorial arguments to answer T1
τ4: Peer/class discussion based on previous experiences
τ5: Perform physical simulation, take count.
τ6: Perform large number of simulation using ICT (Excel spreadsheet)
τ7: Draw a schematic of sample space.

Reasons (β) for tasks and techniques.

β1: Students should be able to make subjective inferences about probability on basis of prior experience.
β2: Students realises the value of statistic probability to determine probability
β3: Investigate a more complex situation using statistics
β4: Make a connection to combinatorial probability.

Associated didactic techniques (φ’)

τ1: Use of table to record results of physical simulation
τ2: Step by step video and written instruction about how to do simulation.
τ3: Use of crooked dice to make lesson more oriented towards problem solving.
τ4: Use of crooked dice generates a true need for statistic probability.

Conclusions from post-lesson reflection:
Simulation using padlet difficult, perhaps better on computer. Let pupils work together.
The statistic probability view “looses” to the combinatorial view.

Benefits: Greater sense of unity. Knowledge shared and common to all participants. A greater variety of aspects can be considered in advance. Lower “cost” of educator time.

Drawback: The lesson study were initially undertaken by the whole class, but as schools and executive students were chosen, others lost engagement with the process.

Background
Lesson study is usually done in small teams up to around five teachers. This is reasonable in an in-service perspective, but might be impractical (and costly) in ordinary pre-service education where one teacher educator has to manage 15 students or more. Lesson study collectively performed by larger group sizes is largely unexplored. Another issue is that literature reporting on consecutive re-teaching of a refined lesson plan is scare, although some exist (Robinson & Leikin, 2012). The mechanism for improving instructional performance and teacher knowledge has been suggested to be root in the reflective practice inherent to lesson study (Warwick, Vriek, Vermunt, Mercer, & van Halem, 2016) However, as most studies end with the first reflection session, it is difficult to gauge how the reflections impact on subsequent practice.

Concluding Remarks

- Knowledge that the lesson does not work optimally are first sought remedied with minor didactic changes, before major changes are attempted.
- “Knowledgeable other” is crucial to overcome reluctance to make major changes.
- The semi-autonomous process of lesson study need another scaffolding to engage a whole class and thus produce didactic knowledge common to all pre-service teacher students.

References