



Using lesson study to support knowledge development in initial teacher education: Insights from early number classrooms



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HIGHLIGHTS

- Lesson Study (LS) supported reflection on teaching and enhanced teacher noticing.
- Improvements in pedagogical content knowledge (PCK) were observed.
- Enhanced knowledge of content and students (KCS) and content and teaching (KCT) are reported.
- Knowledge development occurred simultaneously across both knowledge subdomains.

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Rote counting

Cardinality

Subitising

ABSTRACT

This paper describes Lesson Study research with 25 pre-service primary teachers. We focus on pedagogical content knowledge (PCK) development as participants design, teach and reflect upon early number lessons. Engaging in Lesson Study promoted mathematics PCK development, notably in Knowledge of Content and Students (KCS) and Knowledge of Content and Teaching (KCT) subdomains. Reflecting on classroom teaching facilitated growth across both knowledge subdomains and resulted in highly integrated and robust pedagogical understandings that transferred beyond the study context. This development of early number PCK is outlined and the features of LS that make it effective in initial teacher education identified.

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'In my previous teaching my focus was way too much on coordinating an activity. Before I did lesson study I failed to recognize how prerequisite number concepts were needed to learn a number concept. Now that I understand this, my teaching will change – for example I will revise one-to-one correspondence before getting children to rational count. And I'll ensure they fully understand rational counting before I'd dream of getting

them to make a set of objects! Now when I think of activities I think about what number concept I want to explore and how my activity is achieving this. I think about what questions I'll ask to help children explain their thinking'

Teacher #9, individual reflection

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1. Introduction

The critical role of teacher reflective practice in enhancing the quality of teaching and learning in classrooms is well documented. Teachers who have the opportunity to critically reflect on their practice are more open to new pedagogical practices, are better able to respond to teaching dilemmas and are more willing to take risks (Darling-Hammond & Bransford, 2005; Zeichner & Liston, 2006).

The ability of teachers to engage in genuine reflection has, however, been contested. Reflecting on practice is a complex task requiring observation and reflective skills. Researchers caution against the overly descriptive nature of reflection that may occur and a corresponding lack of critique, analysis and evaluation (Davis, 2006). Building reflective skills can be particularly challenging in the context of pre-service teacher education. The ability of pre-service teachers to engage in systematic analyses of teaching is limited by the preconceptions they bring with them on entry to initial teacher education (Hammerness, Darling-Hammond, & Bransford, 2005). These preconceptions can cloud their judgements and influence how they reason about the effectiveness of their teaching (Star & Strickland, 2008). Thus the experiences provided to pre-service teachers during initial teacher education (ITE) are critical to challenging the assumptions they bring with them on entry to ITE. It is important that ITE provides opportunities to critically reflect on prior experiences while simultaneously providing support and guidance in terms of classroom teaching practices.

A common critique of ITE is that the theories espoused and the content taught is far removed from the daily practices of classroom teachers thus leading to a 'theory to practice gap'. This theory-to-practice divide is a major factor, Tabachnick and Zeichner (1999) contend, contributing to the lack of success of many ITE programmes in influencing teacher learning. This has led to calls to bridge the divide between the content of ITE courses and the realities of classroom teaching (Darling-Hammond, 2000) in addition to a growing awareness of the importance of providing meaningful field experiences.

Given this emphasis on pre-service teachers engaging in critical reflective practice concomitant with the need to forge closer links between university courses and school placement in ITE, we explored how Lesson Study (LS) can act as a vehicle to promote meaningful learning and knowledge development among pre-service teachers. More specifically, we are interested in the types of pedagogical content knowledge (PCK) developed by pre-service teachers as a result of engaging in LS.

2. Theoretical framework

2.1. The importance of 'noticing' and reflection in teaching

With so much happening in the complex environment of classrooms, such as attending to learning and responding to unexpected events as they emerge, monitoring is a critical skill for the classroom teacher. There has been a proliferation in interest over the past decade in 'teacher noticing', with particular attention to how expert teachers monitor a classroom. Teacher noticing is not passive – it is fundamentally active and requires multiple decisions and actions about what to attend to, what to ignore, and requires interpretation of events which in turn inform and influence subsequent responses. van Es and Sherin (2002, p. 573) identify three aspects of noticing:

- (a) identifying what is important or noteworthy about a classroom situation;

- (b) making connections between the specifics of classroom interactions and the broader principles of teaching and learning they represent; and
- (c) using what one knows about the context to reason about classroom events

Erickson (2011) contends that a teachers' prior teaching experiences greatly influences their noticing patterns thus accounting for the differences found in the noticing patterns of novice and experienced teachers. Experienced teachers are able to attend to a broader range of relevant aspects in the classroom, can concomitantly monitor teacher and student actions and the effect of those teacher actions on student understandings. In contrast, novice teachers direct their attention towards more superficial aspects of the classroom environment such as classroom routines, have less systematic scanning patterns of students (Erickson, 2011), are more likely to connect instructional problems to management issues rather than broader instructional decisions (Gonzalez & Carter, 1996) and focus less on individual student learning and the relationship with broader learning goals (Erickson, 2011). Studies have shown that the provision of certain experiences and carefully designed supports, such as the incorporation of video technology (Sherin & Han, 2004; Sherin & van Es, 2005) and activities designed to improve observation skills (Star & Strickland, 2008), can bring about improvements in the ability of pre-service teachers to both 'notice' and reflect critically on salient aspects of the classroom environment. Gains have been made in the ability to articulate clear learning goals (Jansen, Bartell, & Berk, 2009), to attend to features of the classroom environment (Star, Lynch, & Perova, 2011; Star & Strickland, 2008), to use evidence to support claims relating to the effectiveness of teaching practices (Morris, 2006) and to focus on student thinking and learning (Star & Strickland, 2008; van Es & Sherin, 2002).

2.2. Lesson study as a tool to support reflection and noticing in ITE

Lesson study (LS) originated in Japan as an approach to support the continuing professional development of teachers. Interest in LS has grown since its first published description in 1997 (Lewis & Tsuchida, 1998) and the subsequent reference to Lesson Study as a strategy for change and improvement in education in *The Teaching Gap* (Stigler & Hiebert, 1999). Lesson study is a professional development practice in which small groups of teachers collaborate to develop, discuss, teach, and systematically reflect on one lesson. The primary purpose is not the production of an exemplary or model lesson; rather, to provide an avenue and focus for discussion on effective practices that bring about improvements in learning outcomes for students.

Over the past decade there have been an increasing number of international studies of LS in ITE (Murata & Pothen, 2011). A large part of this work is motivated by the belief in the importance of teachers developing an inquiry stance in teaching (Hiebert, Morris, Berke, & Jansen, 2007). LS can be used to support this inquiry stance in ITE by providing pre-service teachers with the skills to learn from teaching by looking at their own teaching (Nemser, 1983; van Es & Sherin, 2002).

As part of their overview of LS in ITE contexts, Cajkler, Wood, Norton, and Pedder (2013) categorize studies as those falling within the traditional lesson study structure of 'plan-teach-observe learning-evaluate' (referred to as 'formal' LS by Myers (2012)) and variants on this traditional structure. The three studies that undertook the formal structure revealed positive outcomes ranging from improvements in participants' mathematical knowledge and pedagogical content knowledge (Leavy, 2010), the development of deeper reflective and critical observation practices (Chassels &

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