Capturing Effective Classroom Practices: An Exploration of the Potential of the TRU Math Framework

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Abstract

This article examines one analytical framework for classroom practice, the TRU Math Scheme, developed in recent years by Schoefeld and colleagues. The scheme is designed to capture mathematical classroom activities in a manner that can inform teachers’ professional development; the purpose of this paper is to explore the framework’s potential to offer meaningful analysis of classroom activity in an English Initial Teacher Education (ITE) context. Student attainment in mathematics retains a high profile in many countries, with benchmarks being provided by international assessments such as PISA (Programme for International Student Assessment). Whilst these comparisons has allowed governments from some lower performing countries to identify practices they want their schools to emulate, research indicates that there is insufficient understanding of classroom interactions for other teachers to replicate practice with the same effect. The authors of the TRU Math argue that their framework has the potential to capture classroom interactions sufficiently to bridge this gap; this more modest research aims to contribute to the testing of the viability of the TRU Math scheme, through consideration of the resultant analysis when the framework is applied to student-teachers’ written commentaries on classroom activities.

First some of the drivers for change in mathematics education are explored, as manifest in governments’ reactions to international comparisons of attainment. This background allows the scheme to be sited as part of the wider US reform agenda and the transition of schools to the
new Common Core State Standards. After which the relationship between the TRU Math scheme and the wider field of cognitive demand is discussed. Questions regarding the sufficiency and the minimum overlap between dimensions in the TRU Math framework are considered. Then, ITE student-teachers’ assignments that discussed mathematics lessons are analysed, using coding derived from the elements of TRU Maths scheme related to cognitive demand. Results indicate that the TRU Math scheme differentiated between student-teachers’ levels of engagement with concepts related to cognitive demand. These results aligned with other known information about the student-teachers’ pedagogical understanding; consequently this work offers some indication that the TRU Math scheme might provide a viable analytical framework for capturing mathematical activity in English classrooms.

**Keywords:** Achievement, Classroom observation, Cognitive demand, Performance tables, Professional development, TRU Math.
Introduction

There is considerable political pressure in the English education system to raise standards. Within this discourse, school success is measured by students’ exam performance as published in performance tables (Jerrim and Choi, 2014; Noyes, 2013), and teacher effectiveness is measured by student progress on standardised assessments (Darling-Hammond et al., 2012; Slater et al., 2012). Embedded within the education policies that drive this performative culture is the assumption that these results, in conjunction with the associated accountability structures, are ‘sufficient to inform and drive changes in the processes that improve students’ learning’ (Hiebert et al., 2005, p. 112). However, research indicates that even though identifying ‘effective’ teachers is possible, there is insufficient understanding of classroom dynamics for this to be replicated by others (Kane et al., 2011; Schoenfeld, 2014). For example, Walkowiak et al. (2014) argued that there was a lack of research that identified skills and practice associated with effective teaching of mathematics. It appears, therefore, that a mechanism for the comprehensive analysis of classroom activities has yet to be developed that has the scope to inform teachers’ professional development.

This paper focuses one particular analytical framework, the TRU Math scheme (Teaching for the Robust Understanding of Mathematics); the aim is to explore this scheme’s potential to capture and analyse data, and to consider whether it is sensitive enough to adequately identify classroom features that may contribute to student learning. In order to provide a context for this discussion, difficulties surrounding the identification of effective approaches for the teaching of mathematics will be addressed first. This will be followed by an outline of the TRU Math scheme, together with how it relates to wider theoretical perspectives about cognitive demand. Then, results from the application of this analytical framework to Initial Teacher Education (ITE) student-teachers’ work will be reported. Finally, the findings are considered from the
perspective of whether the TRU Math scheme has the potential to offer meaningful analysis that could support teachers’ professional development.

The Nature of School Mathematics

Within mathematics education the situation is complicated by the complexities involved in even describing what it means to do mathematics; ‘to attempt a definition—that way madness lies’ (Schoenfeld, 2012, p. 612). Instead, learning goals are often described in terms of developing mathematical reasoning and problems solving skills (Goos et al., 2007; Mason, 2000), though the reader has to anchor these ‘habits of mind’ (Cuoco et al., 1996) within their own understanding of the underlying mathematical concepts. Moreover, school mathematics may be far removed policy makers’ and researchers’ visions of mathematics, as well as from the discipline as it exists in the world outside the classroom (Cuoco et al., 1996; Walkowiak et al., 2014). Di Martino and Zan’s (2010) paper is one of many that has drawn on Skemp’s (1976) seminal work that contrasted instrumental and relational understanding, which led them to question whether all students experienced the same mathematics. Their research indicated that some students develop a view of mathematics as being the accurate recall and use of algorithms, whilst for others it is about understanding the connectedness of mathematics; a difference influenced by whether their teacher focused on product or process in lessons. Teachers’ views about the nature of mathematics also reflected this dichotomy, although espoused beliefs were not always enacted in classrooms (Skemp, 1976; Remillard and Bryans, 2004). Consequently, any mechanism developed to analyse interactions in mathematics classrooms, with the aim to inform teaching, may have the added complication of having to develop a shared understanding of what it means to do mathematics.

The UK government is one of the many that have used international comparisons of student attainment as an indicator of the effectiveness of their education systems (Hiebert et al., 2005;
Jerrim and Choi, 2014). Of particular interest in mathematics education is the consistently high performance of a group of east-Asian jurisdictions in the PISA (Programme for International Student Assessment) and TIMSS (Trends in International Mathematics and Science Study) assessments. The relatively low performance of England has been regularly commented on by government departments and used to justify policy (DfE, 2014). For example, the current Minister for School Reform has introduced a trial of primary textbooks from Shanghai, on the basis that this high performing jurisdiction uses textbooks more frequently in lessons than is seen in English classrooms (Gibb, 2014). However, analysis of the TIMSS video study indicates that highly placed jurisdictions structure their mathematics lessons in different ways, so drawing lessons from their practice is far from straightforward (Boston and Smith, 2009; Hiebert et al., 2005). For example, the use of real-life contexts, and the amount of time devoted to one problem and the amount of procedurally orientated tasks all vary. This lead the authors of the TIMMS video study to conclude that ‘other countries might best be viewed as a source of alternatives to study and consider, not as a source of practices to emulate’ (TIMSS Video Mathematics Research Group, 2003, p774). That said, whilst the classroom features did vary, distinguishing characteristics were found in how tasks were implemented. High achieving jurisdictions ‘were successful in not reducing high-level mathematical tasks into procedural exercises’ (Tekkumru Kisa and Stein, 2015, p106), which was not the case in lower performing countries (Walkowiak et al., 2014; Wilhelm, 2014). The implication for any comprehensive analytical framework is that the maintenance, or otherwise, of cognitive demand as experienced by the students during implementation in the classroom will need to be considered alongside the nature of the task. Moreover, the identification of individual practices in isolation from wider classroom interactions is unlikely to offer insights into how effective classrooms can be developed.
Analytical Frameworks for Conceptualising and Analysing Classroom Mathematics

Over recent years a number of lesson observation schedules have developed to analyse interactions in mathematics classrooms (e.g. Silver et al., 2009; Walkowiak et al., 2014), with one of the more recent being TRU Math (Schoenfeld, 2013). If any of these schemes can capture the complexities of mathematics as it is enacted in a classroom then their use could help bridge the gap between measuring outcomes and developing effective teaching approaches. TRU Math has been developed as part of MAP (Mathematics Assessment Project), a large scale US project with the aim of providing professional development materials for schools implementing the new Common Core State Standards. Whilst this may appear less relevant outside the US, the development and trialling of material was undertaken by an English university, so application to English classrooms should be viable. What may be more problematic is that the research was undertaken in classrooms that took an inquiry approach to ‘contextually rich algebra tasks’ (Schoenfeld, 2013, p608), a style of lesson that is still atypical in England (Watson and Evans, 2012). However, the TRU Math schedule was developed by a large team over a period of three years; as such it represents a classroom analysis tool that is likely to prove more viable than an observation schedule designed by an individual researcher. Moreover, this scheme has been published in a variety of forms, including as a professional development tool where the scheme has been applied to lesson planning and evaluation as well as classroom observation (Baldinger and Louie, 2014). This opens up the possibility of using the TRU Math scheme to analyse a wider variety of data; in this paper ITE students’ assignments that discussed the planning and critical reflections of three lessons will be examined.

TRU Math

The TRU Math scheme consists of general framework of five dimension, which Schoenfeld (2013) argues ‘have the potential to be necessary and sufficient for the analysis of effective classroom instruction’ (p. 618). In addition there is topic-specific component; the published
materials to date relate to algebraic problem solving only, with users expected to write their own rubrics for other topics of interest. A three point scoring rubric is then used to capture the presence of each element in the classroom. In order to be workable in ordinary classrooms, Schoenfeld (2013) comments that any scheme would have to capture and describe what is happening in almost ‘real-time’; the implication being that he believes this can be the case with TRU Maths.

### The Five Dimensions of Mathematically Powerful Classrooms

<table>
<thead>
<tr>
<th>Dimension</th>
<th>The extent to which:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Mathematics</td>
<td>The mathematics discussed is focused and coherent and to which connections between procedures, concepts, and contexts (where appropriate) are addressed and explained.</td>
</tr>
<tr>
<td>Cognitive Demand</td>
<td>Classroom interactions create and maintain an environment of productive intellectual challenge that is conducive to students’ mathematical development.</td>
</tr>
<tr>
<td>Access to Mathematical Content</td>
<td>Classroom activity structures invite and support the active engagement of all of the students in the classroom with the core mathematics being addressed by the class.</td>
</tr>
<tr>
<td>Agency, Authority, and Identity</td>
<td>Students have opportunities to conjecture, explain, make mathematical arguments, and build on one another’s ideas in ways that contribute to their development of agency (the capacity and willingness to engage mathematically) and authority (recognition for being mathematically solid), resulting in positive identities as doers of mathematics.</td>
</tr>
<tr>
<td>Uses of Assessment</td>
<td>The teacher solicits student thinking and subsequent instruction responds to those ideas by building on productive beginnings or</td>
</tr>
</tbody>
</table>
addressing emerging misunderstandings.

**Table 1: TRU Math Dimension adapted from Schoenfeld (2014, p. 608)**

<table>
<thead>
<tr>
<th>Topic-specific Rubric</th>
<th>Students are supported in dealing with complex modelling and applications problems, which typically call for understanding complex problem contexts, identifying relevant variables and the relationships between them, representing those variables and relationships symbolically, operating on the symbols, and interpreting the results.</th>
</tr>
</thead>
</table>

In the published materials, these overarching dimensions are further exemplified, with descriptors for each level of the scoring rubric, and there are additional tailored descriptors for whole class activities, small group work, student presentations and individual work. Documents designed for use in professional development consider each of these dimensions in terms of questions that can be asked during lesson planning and evaluation phases. There appears to be enough information for teachers and researchers to apply the scheme to their context, but as Schoenfeld (2013) himself acknowledges, the viability and value of this analytical framework will only emerge over time and with further research.

The ‘necessary and sufficient’ is a major claim for the potential of this scheme, as this carries the implication that any analysis of classroom activities would fall within this framework. Schoenfeld’s (2013) decision to publish a paper that explains the scheme’s development process does allow the reader make some judgments about his claim that ‘the dimensions are all well-grounded in the literature’ (p. 607), and offers some insight into how different classroom features were distilled into five dimensions. Schoenfeld (2013) also posited that there is limited
overlap between the dimensions; if true this would allow the user to focus on one dimension almost independently from the others as well as allowing interactions between dimensions to be studied. Though a comprehensive comparison of TRU Math with other literature is beyond the scope of this paper, an initial inspection of other theoretical frameworks indicates that they can be categorised within the TRU Math scheme. For example, the Mathematical Task Framework (Stein and Smith, 1998) aligns with TRU Math’s first dimension, ‘The Mathematics’, and the Analysing Teachers Moves coding scheme (Scherrer & Stein, 2013) aligns with the second dimension, ‘Cognitive Demand’. However, even if this alignment extends to other frameworks, the question remains as to whether ‘membership’ of the overarching TRU Math scheme adds anything to the explanatory power of the original frameworks. As a first step in exploring the implied adaptability of TRU Math, the following section discusses how research into cognitive demand in mathematics relates to this scheme.

The Role of Cognitive Demand within Classroom Mathematics and the Relationship with TRU Math

Researchers have been interested in cognitive demand for over 30 years, although more recently there has been a shift of focus from the level of challenge inherent in mathematical tasks to the maintenance of cognitive demand during the lesson (Tekkumru Kisa & Stein, 2015; Wilhelm, 2014). This shift in focus can be traced, at least in part, to the unfavourable position of the US in international comparisons and the subsequent analysis of different lesson characteristics (Hiebert et al., 2005; Wilhelm, 2014). Research indicated that high attaining jurisdictions were far more effective in the maintenance of higher levels of cognitive demand than was typical in US classrooms (Boston and Smith, 2009; Walkowiak et al., 2014). Definitions of levels of cognitive demand do vary, but low level demand is often associated with memorisation and routine procedures, with little connection to the underlying mathematical concepts. On the other hand, higher levels of cognitive demand are associated with non-routine thinking that involves linking
procedures to concepts (Silver et al., 2009; Walkowiak et al., 2014). However, even when criteria for categorising are agreed, determining the cognitive level of tasks is difficult and full consensus is rarely achieved (Boston and Smith, 2009; Stein, 2000). The situation becomes more complex when trying to determine the cognitive demand as enacted in the classroom, where a common approach is to undertake discourse analysis (e.g. Krussel et al., 2004; Leatham et al., 2015). Boston and Smith (2009) reported that when students’ work and observed lessons were analysed in relation to cognitive demand, results were highly correlated; this could be useful in terms of offering an analytical approach that would be easier for teachers to implement than discourse analysis. However, describing the levels of cognitive demand is only the first step; for teachers who routinely work with low levels of cognitive demand, it is a non-trivial process to develop pedagogical skills that would enable them to create and maintain environments where students engage in high level cognitive processes (Krussel et al., 2004; Tekkumru Kisa & Stein, 2015).

When cognitive demand is considered in two parts, the potential of the task and maintenance in the classroom, then task potential aligns with elements of the first dimension of TRU Math, ‘The Mathematics’. This first dimension includes making connections between procedures, concepts and contexts, which are common themes in descriptions of tasks with high cognitive demand. Here the TRU Math scoring rubric resembles other instruments used to ascertain the cognitive demand of a task (e.g. Stein, 2000), but when applying the rubric the researcher would still have to draw on their own understanding of mathematical concepts. The second dimension of TRU Math, ‘Cognitive Demand’, focuses on the role of interactions to ‘create and maintain an environment of productive intellectual challenge…’ (Shoenfeld, 2014, p. 608); as such, this appears to align with the maintenance element of cognitive demand. An interesting contrast emerges between the simplicity of the three point TRU Math scoring rubric and the more complex frameworks used by other researchers investigating maintenance of cognitive demand during implementation in the classroom (e.g. Boston and Smith, 2009; Leatham et al., 2015).
This raises the question as to whether the TRU Math scheme would be sensitive enough to capture sufficient data to make viable judgments about cognitive demand as enacted in the classroom. Schoenfeld (2013) himself argues that additional rubrics may be needed depending on the focus of the research, but any additions may reverse the posited minimum overlap of the dimensions and hence challenge the integrity of the framework.

The Application of the TRU Math Framework to the Analysis Written Reports on Classroom Activities

This section discusses the use of the TRU Math scheme to analyse work submitted by student-teachers on an ITE secondary mathematics course. The work analysed consists of their master’s level assignments, in which the planning and evaluation of three mathematics lessons was discussed. The primary purpose of this paper is to consider the potential of the TRU Math scheme to analyse classroom features related to student learning, although it is anticipated that insights into student-teachers’ understanding of learning may also result. The fact that topic specific rubrics were not developed is a limitation of this analysis, and the application of TRU Math to written reports does use a context outside the scheme’s primary purpose, that of analysis of classroom observations. However, sections are written for lesson planning and evaluation in the broader TRU Math scheme and other researchers have successfully drawn conclusions from similar reports (Silver et al., 2009); it is hoped, therefore, that if the scheme proves useful in this restricted context then it would be worth pursuing as an analytic tool in wider range of circumstances, including the complex context of classroom observations.

The analysis was conducted using the TRU Math scoring rubric in conjunction with the scheme published for teachers’ professional development (Baldinger and Louie, 2014). Six assignments were chosen in the form of a convenient sample, as this allowed similar lesson topics to be considered; three essays were related to algebra and the remaining three to fractions and
decimals. Due to the importance of developing student-teachers' pedagogical expertise with regard to higher-level thinking the first two TRU Math dimensions were considered in detail, with relevant sections of the assignments being coded by this author as the assignments were read. As the assignments contained literature reviews and reflections for future practice, additional coding scale were added to differentiate between student-teachers' synthesis of literature, their reported activities and their reflections for future practice; the same three point scale was used. During the coding process Silver et al. (2009) was drawn on to support the distinction between dimensions; the first, ‘The Mathematics’, being related to the demand of the task and the second, ‘Cognitive Demand’, with maintenance during the lesson. Finally, the coded sections across all six assignments were reviewed.

<table>
<thead>
<tr>
<th>The Mathematics</th>
<th>Cognitive Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive demand of the task(s)</td>
<td>Maintenance of cognitive demand</td>
</tr>
<tr>
<td><strong>How accurate, coherent, and well justified is the mathematical content?</strong></td>
<td><strong>To what extent are students supported in grappling with and making sense of mathematical concepts?</strong></td>
</tr>
<tr>
<td>1 (low) Classroom activities are unfocused or skills-oriented, lacking opportunities for engagement in key practices such as reasoning and problem solving.</td>
<td>Classroom activities are structured so that students mostly apply memorized procedures and/or work routine exercises.</td>
</tr>
<tr>
<td>2 Activities are primarily skills-oriented, with cursory connections between procedures, concepts and contexts (where appropriate) and minimal attention to key practices.</td>
<td>Classroom activities offer possibilities of conceptual richness or problem solving challenge, but teaching interactions tend to &quot;scaffold away&quot; the challenges, removing opportunities for productive struggle.</td>
</tr>
</tbody>
</table>
Classroom activities support meaningful connections between procedures, concepts and contexts (where appropriate) and provide opportunities for engagement in key practices.

The teacher's hints or scaffolds support students in productive struggle in building understandings and engaging in mathematical practices.

Table 2: Extract for TRU Math Scoring Rubric adapted from Schoenfeld et al. (2014b, p. 2)

Results from the TRU Math coding of assignments.

The majority of extracts (72 out of 85) were categorised as being in the first dimension, ‘The Mathematics’, and the analysis did reveal patterns across the six assignments; findings from the first dimension are reported below. The highest and modal coding are reported for each student, along with extracts for each section to exemplify how the coding was undertaken.

<table>
<thead>
<tr>
<th>Student-teacher</th>
<th>Literature Review</th>
<th>Classroom Tasks</th>
<th>Reflections for ‘next time’</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Highest coding</td>
<td>Typical coding</td>
<td>Highest coding</td>
</tr>
<tr>
<td></td>
<td>(mode)</td>
<td>(mode)</td>
<td>(mode)</td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>E</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>F</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 3: Highest and modal coding for student-teacher assignments
Literature Reviews:

All the literature reviews contained discussions of mathematical concepts or misconceptions that were coded at 2 or 3. This often reflected the accuracy and coherence of the mathematical content that the student-teachers had drawn from the literature.

Student-teacher A

Hodgen, Küchemann, Brown and Coe (2010) discuss how pupils often think of fractions in terms of their decimal equivalents … For example, if the pupil is asked to calculate; \( \frac{1}{2} + \frac{1}{8} \) and they do so by converting both fractions to decimals then they may perform the calculation; \( 0.5 + 0.125 = 0.625 \).

[Coded 2 (synthesis of literature): cursory connection between equivalence of fractions and decimals in relation to how pupils attempt to solve addition of fractions.]

Classroom Tasks:

When reports of classroom tasks were analysed 26 out of 30 extracts were coded 1. Three out of six assignments had no sections coded above 1, and the remaining assignments only had one or two sections coded 2, with none coded 3. Though it should be noted that this reflects the descriptions provided in the assignments, which may not be a full reflection of the classroom activity.

Student-teacher B

For example, 0.4 x 0.8. I would multiply 0.4 by 10 to give 4, and multiply 0.8 by 10 to give 8. My calculation would now be 4 x 8, and the class would tell me the answer was 32. I then introduced the fact that I need to reverse the calculations, so I would divide 32 by 10 twice to get the correct answer of 0.32

[Coded 1: skills orientated.]
Reflections for future practice:

Five of the six of the assignments had a third stage to this overall pattern; their reflections for ‘next time’ held higher coding than the reports of classroom tasks, either in terms of highest or modal value.

Student-teacher C

Extract 1 (literature review): Watanabe (2002) identified the use of visual representations as an important way to help students understand fractions but cautioned that representation is complex… beginners can encounter problems if they have to switch between visual representations.

[Coded 3 (synthesis of literature): discussing the role of visual representations in the understanding of fractions.]

Extract 2 (description of task): Students were given questions on equivalent fractions where they had to fill in either the missing numerator or denominator for fractions equivalent to one-half, one-third and one-quarter…

[Coded 1: skills orientated worksheet.]

Extract 3 (evaluation): More… opportunities to develop their own pictorial representations may also have been beneficial… The worksheets used in the lessons discussed in this paper may not have helped students gain an understanding of equivalent fractions… providing them with “ready-made pictures” (Kamii and Clark, 1995, p. 376) will not help them to gain a deep understanding of equivalent fractions.

[Coded 2: issue highlighted but coded 2 rather than 3 as actual task design was not discussed.]
Discussion

The TRU Math rubric seemed to be sensitive enough to highlight differences between student-teachers’ reports of their practice and other more theoretical aspects of their thinking. Considering the point in the course when the assignment was completed this would be anticipated, however, the purpose here is to consider the potential of the TRU Math scheme. From an ITE tutor’s perspective, the analysis might not offer a completely clear window into student-teachers thinking and actions related to cognitive demand, however it did raise some interesting questions. Whilst research indicates that some classrooms do convert procedural tasks into high cognitive demand when enacted in the classroom, this is uncommon (Leatham et al., 2015). So, from a teacher educator standpoint, a successful PGCE course would promote the use of high cognitively demanding tasks and support the development of pedagogical skills necessary to maintain this level of demand during implementation; the analysis indicates that the student-teachers are in different places in their journey towards this goal. For some student-teachers, approaches that could support high cognitive demand did not make the transition from the discussions of literature to considerations for practice. Whist for others, their reflections on practice did involve some elements of cognitive demand, although their theoretical discussions remained ahead of practice. As such, this analysis does have the potential to offer some insight into student-teachers’ understanding of student learning and has the potential to inform the development of the student-teachers’ PGCE courses.

It could be argued that similar results may have been achieved using a different rubric for scoring cognitive demand (e.g. Stein, 2000), however the breadth of the TRU Math scheme did appear to be an advantage when the analysis was undertaken. The student-teachers’ essays were focussed on different aspects of classroom practice, such as assessment for learning, differentiation or low attaining pupils. It was interesting to note that all the different pedagogical foci did fall within
one of the five dimensions of the scheme; a small piece of evidence that does fit with Schoenfeld's (2013) claim of the five dimensions being both necessary and sufficient. However, the claim of the ‘limited overlap of the TRU Math dimension’ (Schoenfeld et al., 2014a, p. 2) was less well supported; there were a number of instances where coding between the first and second dimension seemed problematic, with a score of 1 being a particular issue. The context of this analysis may have been part of the issue, but deciding between ‘classroom activities are … skills orientated’ and ‘classroom activities are structured so that students… work [on] routine exercises’ (Schoenfeld et al., 2014b, p. 2) felt somewhat arbitrary. This difficulty could be attributed to the absence of cognitive demand looking the same in terms of task and implementation. As the problem was not as prevalent in the higher scores this might not be a significant issue if the focus is on identifying features that contribute to students’ learning. It seems therefore, that in this restrictive context no major issues have arisen that would suggest the use of the TRU Math scheme would not provide a viable mechanism for analysing classroom activities. Indeed there are some indications that it could provide a flexible and comprehensive framework for future classroom-based research.

Conclusion

Classrooms are complex environments, where individual features considered in isolation offer little useful information about how to orchestrate effective learning environments. The breadth of the TRU Math scheme does offer the possibility that the different facets of classroom interaction could be captured, although only further use will indicate whether the coherence of the framework will be maintained when additional rubrics are added to accommodate different research foci. The TRU Math scheme’s ultimate goal of improving student learning through the development of teachers’ pedagogical practice would also involve the difficult transition from research to practice. Moreover, developing teachers’ capacity to use the framework as a professional development tool might be undermined in performative cultures if the scoring
rubrics are commandeered as another accountability measure. The range of published materials, designed for both teachers and researchers, does offer the possibility that the framework will be adopted more widely than other analytical frameworks, although time and further research will be needed in order to evaluate its impact on classroom practice.

References


