An "appreciative inquiry" into primary mathematics teaching in Romania: a baseline report and the use of a "chalk talk" pedagogical practice

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This report details an on-going study into Romanian primary mathematics teaching, conducted in partnership with the British Council. The overall approach is one of "appreciative inquiry", i.e., looking for what is going well, that could be further developed. An online survey was conducted, answered by over 750 primary teachers, which led to follow-up observations with 41 teachers, in 5 different regions. Observations used the "Teaching for Robust Understanding" (TRU) framework. I detail key outcomes, including a practice of children coming to the board to explain their answers. This latter practice (which I label "chalk talk") was apparently so ubiquitous that it remained hidden in most observation reports. Teaching practices around formative assessment and getting students reasoning were relatively little seen. One implication for further work is whether "chalk talk" could be a mechanism to develop teaching practices around assessment and student reasoning.

Keywords: primary mathematics; Romania; teaching; chalk talk

Introduction

The research reported on here was funded by the Romanian-American Foundation (RAF) and conducted as a collaboration between the University of Bristol and the British Council in Romania. The research aims (set out by RAF) were to:

- Provide insight on the needs of teachers and learners of mathematics in primary schools in Romania.
- Assess the current levels, teaching practices and needs of teachers and learners in grades 0 to 4.
- Explore the main areas for development of mathematics teaching.
- Make recommendations to the design of future interventions.

This report will touch briefly on all four aims. Some context is relevant, as to why RAF decided a focus on mathematics was needed. The following comments are derived from past international studies about mathematics education in Romania:

- In mathematics, the scores obtained by Romanian 8th grade students in the TIMSS tests have not changed significantly in the last twenty years.
- Performance distribution remains a major problem for the Romanian educational system. Almost a quarter of students fail to meet the minimum performance benchmarks in mathematics and science.

I was invited to join the project as the academic lead, with the British Council in Romania providing the vital connections to teachers, academics and wider systems.

Methodology

The overall approach was influenced by ideas of appreciative inquiry (Cooperrider & Srivastva, 1987), which is a form of action research where:

> Instead of asking, "Does this theory correspond with the observable facts?" the emphasis for evaluating good theory becomes, "To what extent does this theory present provocative new possibilities for social action, and to what extent does it stimulate normative dialogue about how we can and should organize ourselves?" (Cooperrider & Srivastva, 1987, p.121)

What this meant in practice, was an aim of not attempting to judge or evaluate teaching in Romania against standards derived from other contexts (and ask is the teaching corresponded), but to use theories as prompts for dialogue and reflection. The aim was to arrive at a sense of possibilities for future action, based around what appears to be working well. The two theories which were chosen as starting points were Askew et al.'s (1997) categorisation of teacher orientations and Schoenfeld's (2023) Teaching for Robust Understanding (TRU) framework. The TRU framework was suggested in the document from the RAF, setting out of the aims of the whole project. Askew's categorisation was chosen for its potential to elaborate on anecdotal concerns expressed to me about the kinds of teaching taking place in Romania.

Teacher orientations were classified by Askew et al. (1997) as being: transmission (e.g., belief in the importance of students acquiring a collection of facts and standard methods); discovery (e.g., belief in the importance of students developing numeracy concepts using practical equipment and waiting until students were ready to move onto more formal methods); connectionist (e.g., belief in the importance of discussion of concepts and images as well as the need to intervene to assist students to become more efficient in the use of calculating strategies). What Askew and colleagues found was that connectionist beliefs were held by the most effective teachers of numeracy.

The second theory influencing the study design and report, the TRU framework, has five categories (Schoenfeld, 2023, p.166), which are: The Mathematics (e.g., extent of developing mathematical habits of mind); Cognitive Demand (e.g., levels of productive struggle); Equitable Access to Content (e.g., extent of involvement of all students); Agency, Ownership, and Identity (e.g., extent of student contributions); Formative Assessment (e.g., building on student ideas).

Appreciate inquiry can be separated into five stages: Definition (clarifying); Discovery (appreciating); Dream (envisioning); Design (co-creating); Delivery (innovating). The definitional work was to be done via a questionnaire, the discovery work was to be done through the detail of follow up observations and interviews and we are currently at the dreaming stage, of using the work done to envision possible futures. We (meaning the British Council project leads and myself) had hoped initially to be able to video record lesson observations, however ethical and practical considerations made this impossible, hence there was a decision to base observations on the TRU framework.

Our research questions were organised into three strands: 1. What are primary teachers' orientations towards teaching mathematics? 2. What are teachers' classroom practices, related to teaching for understanding in mathematics (self-reported and observed)? 3. What structures exist to support teachers' on-going professional development? To develop responses to Q1 and Q3, and to find volunteers for observation, we designed a survey questionnaire (based on TIMSS questions). Q2 was answered through classroom observations. The questionnaire was translated into

Romanian and made into an electronic form by the British Council in Romania. The questionnaire link was sent by email to all primary schools in Romania. The initial stage of the research (which I am reporting here) was to create a "baseline" report on primary mathematics teaching in Romania. The hope is to use the report as a prompt to design effective support and in order to track progress in the future. I discuss, below, initial answers to the first two research questions.

Survey findings

We received 775 responses to the survey, approximately 1.6% of the primary teaching population. The median response time was 45 minutes and so it appears that the questions were answered carefully. We initially checked some details to get a sense of how representative our sample was of all teachers. From our survey, 46% of respondents taught in rural schools (54% city or small town schools). The overall national figure is that 47% of schools are rural in Romania – matching our sample very closely. The age and gender of our sample broadly matched national data.

The initial approach taken was an analysis of individual survey answers, supplemented by an exploration of further correlations and connections across columns. One framework which informed choices of design, and analysis, was the distinction between different teacher orientations: transmission, discovery and connectionist (Askew et al., 1997).

We asked teachers how many hours of professional development they have received in the last two years 1. And while it is encouraging 44% of teachers engaged in more that 35 hours, a cumulative figure of 34% of teachers received either none or less than 6 hours of professional development, which is perhaps concerning.

We asked teachers about how often they meet with colleagues to plan and discuss teaching. 28% have meetings twice a year or *less* with other teachers to discuss the curriculum or teaching approaches and 58% meet once a month or less. These findings suggest that in many schools there is not a strong culture of collaboration between teachers.

And yet, the vast majority of teachers say they want more training. Over 90% of teachers said that they wanted training in how to support children's problem-solving skills (91%) and how to address individual needs (93%). Around 75% wanted training in: mathematics-related content; the didactics of mathematics; how to assess mathematical knowledge. There is a disconnect here. Over one third of teachers are barely receiving any professional development and yet over 90% of teachers express a desire for such development opportunities. There appears to be a need to provide high quality opportunities for teachers.

Teachers report spending on average over 2.5 hours a week on reading activities for their professional development (including participation in training), a similar amount of time to that spent on administrative tasks and staff meetings, and also on preparing and grading tests, and also on lesson planning. Such figures might indicate that teachers have capacity to direct their professional development towards a course in mathematics education.

There is a mixed picture in terms of teacher beliefs from our survey, which is perhaps to be expected. Participants were asked to rate as not important, somewhat important and very important, a range of statements about teaching. The view which was considered the least important, overall, by teachers, is that students need to remember formulas and procedures (41% rating this as "very important"). In contrast, 90% of teachers viewed the following as "very important" for students: (1)

understanding concepts, (2) being able to think creatively, (3) understanding how maths is used in the real world, (4) being able to provide reasons to support solutions.

Also, almost all teachers believed multiple representations should be used in teaching mathematics. Such views might be consistent with connectionist beliefs. Remembering formulae is likely to be consistent with transmission beliefs. So, we might guess around 40% of teachers hold fairly strongly transmission beliefs and almost all teachers hold some connectionist beliefs. We tested whether teachers in rural schools, on average, had similar or different beliefs to teachers from other schools and we found strong consistency across all the questions asked.

66% of all teachers agreed, or strongly agreed, that mathematics should be learned as a set of algorithms that cover all possibilities. 86% of teachers believed that, if students are struggling in mathematics, they need more practice by themselves in class. These beliefs are likely to be consistent with practices of direct teaching and a transmission orientation to teaching mathematics. One possible explanation for these results is that many teachers believe that it is through individual practice that students come to understand mathematics (consistent with a transmission orientation).

If we assume that teachers in our survey teach a representative range of students, there is evidence that teachers over-estimate the attainment of their students. Teachers were asked to estimate what proportion of their students were in the top, middle or bottom third of the country, in terms of attainment. When we averaged these scores, teachers believed only 25% of their students were in the bottom third of the country, in terms of attainment. We might take from this that teachers are positive about their students' potential in mathematics.

In terms of professional development, the strong views about the importance of understanding concepts and thinking creatively would suggest these could be powerful ways to frame any training offer. At the same time, if there are strong transmission beliefs amongst a lot of teachers, this needs to be taken into account. In other words, any suggestions around new pedagogical approaches will need to take account of the reality of teachers' classrooms and current practices.

Observation and interview findings

From our survey, we needed to select 40 teachers for follow up observations (41 were observed in the end), which were done by 5 Romanian consultants (i.e., 8 teachers each). We grouped teachers by region and initially selected the regions where over 10 teachers had indicated willingness to take part in a follow-on study. We then matched regions with consultants who would be able to travel there and conduct observations. Finally, we were particularly concerned to ensure that our sample contained a range of schools (urban and rural) and a range of levels of prior attainment on national tests.

We know, from past assessment data in Romania (e.g., PISA 2022), that there is a large educational divide in Romania which correlates with socio-economic status. However, through our methodological approach, we have been able to add substance to the numerical data and provide some further evidence as to what might be going on, for some students, that leads to under-achievement. Our 5 consultants each conducted lesson observations, using the TRU framework for subsequent rating of field notes. They also interviewed the teacher, a group of students, and sometimes the headteacher in each school. A final pair of focus group discussions was held with educational experts in Romania, to present and sense check emerging findings.

Where lessons were rated low (on the TRU Framework), teachers initiated almost all conversations and student responses were short, with teachers giving

evaluative or corrective feedback. Students often worked in silence and the tasks they were given were often simple skill-based exercises, lacking mathematical challenge. In reflecting on lessons, some teachers struggled to look back on key moments. They tended to focus on the presentation aspects of students' work. These teachers also often did not have a lesson or unit plan. In some regions, characteristics such as those above were found particularly in rural areas, for example, one consultant reported:

> In the countryside I witnessed a maths class with a slightly confused teacher, sometimes inattentive to the children's answers, who replaces teaching with video material shown on a small monitor and writes nothing on the blackboard for an hour. Here I also met children without basic knowledge at preparatory class level: for example, a pupil who did not know what a triangle looked like.

By contrast, where lessons were rated highly, teachers offered concentrated and coherent, rich and relevant mathematical content. Teachers had lesson plans, lesson drafts or didactic/unit projects. Teachers controlled mathematical content well, they challenged students with relevant questions that maintained an intellectually stimulating environment. Mathematical language was well used by both teachers and students. The proposed exercises made the transition from simple to complex. The children were challenged to solve the exercises and provide their own explanations, a positive learning environment was created. The children also showed they had gained a lot of mathematical knowledge, they worked with pleasure, they were engaged, active, and gave examples of how to apply mathematics in everyday life.

In some cases, such practices were observed more in urban areas. For example, one consultant noticed:

> In the municipality, I attended a lesson led by a dedicated teacher that I would appreciate: exceptional. In a beautiful classroom, with modern equipment (also thanks to the teacher's effort), the mathematics lesson included various activities, carefully prepared methodically, adapted to the age group. I would also like to note how the teacher treated his students, interacted with them, paid attention to them, valued and built on their ideas. From a mathematical point of view, I would like to remark the references to the number axis, something that does not happen very often in primary education in Romania.

Overall, the consultants analysed lessons in relation to the 5 TRU framework areas and submitted the data from their schools, which was compiled by region. There were two findings, which we state first and then unpack. The first is that "Agency, Authority and Identity" and "Uses of Assessment" stand out as significantly weaker areas of practice compared to the other three aspects. And, the second is that judgments of teaching quality did not correlate with school attainment data.

When we tabulated the consultants' ratings of their lessons, the range of scores indicated there may be some deviation in judgments. The consultants had worked together, online, with me over several sessions in which we worked with the TRU framework and used it to analyse video recordings of actual lessons. The process of evaluating and sharing ratings did result in some convergence of opinion while it being the case that more time was needed to be absolutely confident in equating findings. Nonetheless, across every consultant, "Agency, Authority and Identity" and "Uses of Assessment" were the two lowest score components of the TRU framework (when averaged across their 8 lesson observations).

The non-correlation of teaching quality judgments with school performance is an intriguing finding. It should be noted that we did not have school performance data relating to the year group which was observed. However, our results do point to the possibility that what is causing the big divide in attainment of students in Romania may not be linked to differences in quality of teaching.

There was one pedagogical practice which is so common, that only two of the consultants mentioned it. Here is one exemplification:

> I frequently saw the teacher having one student come and solve an exercise on the blackboard whilst most of the students in the classroom just sat there and waited for the solution to be written … and then copying it to their notebooks.

When discussed with the consultants, all of them agreed that this practice (of students coming to the board) was present in each of their lesson observations. From what I understand, this practice has no name – again, perhaps as a result of it being so common-place. I have labelled this practice "chalk talk". In the spirit of appreciative inquiry, my initial question is whether there is a practice here which could be developed, in a creative manner? From conversations I have had with my colleagues in other countries, it seems similar practices are ubiquitous in Russia, Hungary, Japan, Australia and I am sure more countries. My belief is that it is not commonplace in the UK. In Japan, several students may come to a board simultaneously, in order to illustrate a range of approaches to a task (Baldry et al., 2023). The potential to support student reasoning and discussion is evident. Chalk talk, therefore, has the potential to support those aspects of the TRU framework which appear to need development.

Next steps

This paper summarises a "baseline" report completed for RAF and the British Council. The next steps are that the British Council will prepare a tender document and invite Romanian NGOs to bid to take on implementing the findings of the report (e.g., offering professional development around chalk talk). The idea is to fund work for several years, while evaluating the impact on teaching and student attainment, and comparing findings with the baseline report. I hope to report in future conferences on the on-going impact of the work. There also appears to be interest in finding ways to support greater engagement in CERME from Romanian mathematics educators.

Acknowledgements

Thanks to the employees at the British Council for their skills in organising this research. Thank you to the five consultants who conducted the observations and wrote reports. Thank you to the Romanian-American Foundation for funding the work.

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